Administrative Package Cover Page

This file contains the following documents:

1. Summary of application (in plain language)
   - English
   - Alternative Language (Spanish)
2. First Notice (NORI-Notice of Receipt of Application and Intent to Obtain a Permit)
   - English
   - Alternative Language (Spanish)
3. Application materials

Portada de Paquete Administrativo

Este archivo contiene los siguientes documentos:

1. Resumen en lenguaje sencillo (PLS, por sus siglas en inglés) de la actividad propuesta
   - Inglés
   - Idioma alternativo (español)
2. Primer aviso (NORI, el Aviso de Recepción de Solicitud e Intención de Obtener un Permiso)
   - Inglés
   - Idioma alternativo (español)
3. Solicitud original

Section 15. Plain Language Summary (Instructions Page 40)

If you are subject to the alternative language notice requirements in 30 Texas Administrative Code §39.426, **you must provide a translated copy of the completed plain language summary in the appropriate alternative language as part of your application package**. For your convenience, a Spanish template has been provided below.

ENGLISH TEMPLATE FOR TPDES or TLAP NEW/RENEWAL/AMENDMENT APPLICATIONS

DOMESTIC WASTEWATER

The following summary is provided for this pending water quality permit application being reviewed by the Texas Commission on Environmental Quality as required by 30 Texas Administrative Code Chapter 39. The information provided in this summary may change during the technical review of the application and are not federal enforceable representations of the permit application.

The City of Lubbock (CN600130736) operates the Southwest Water Reclamation Plant (RN101609949), which is designed for maximum flexibility of operation. The facilities include a preliminary treatment system, two separate Treatment Trains, interconnected effluent pumping stations, and a solids treatment system. The facility is located at 3603 Guava Avenue, Lubbock, Lubbock County, Texas 79404.

This application is to authorize an increase in the discharge of treated wastewater of Outfall 007 from a volume not to exceed an annual average of 14,500,000 gallons per day to 24,400,000 gallons per day. This amendment includes improving effluent quality by modifying existing treatment units and incorporating biological nutrient removal (BNR).

Discharges from the facility are expected to contain five-day carbonaceous biochemical oxygen demand (CBOD5), total suspended solids (TSS), ammonia nitrogen (NH3-N), and Escherichia coli. Additional potential pollutants are included in the Domestic Technical Report 1.0, Section 7—Pollutant Analysis of Treated Effluent and Domestic Worksheet 4.0 in the permit application package. Domestic wastewater is treated by preliminary treatment, which consists of screening, grit removal, and fine screens. Treatment Train #3 is an activated sludge plant that is proposed to be upgraded to a BNR facility. The treatment units include two primary clarifiers, three activated sludge BNR basins, two secondary clarifiers, five cloth media filter units, and a low-pressure, high-output ultraviolet (UV) disinfection system. The BNR basins consist of pre-anoxic, anaerobic, anoxic, and oxic/ aerobic zones. The effluent from Treatment Train #3 is routed to effluent pump station 2 (EP2). Solids are treated in an anaerobic digester prior to dewatering. Digested sludge is dewatered with centrifuges. The sludge treatment system includes anaerobic digesters, three rotary drum thickeners, and three centrifuges.

PLANTILLA EN ESPAÑOL PARA SOLICITUDES NUEVAS/RENOVACIONES/ENMIENDAS TPDES o TLAP

AGUAS RESIDUALES DOMÉSTICAS

El siguiente resumen se proporciona para esta solicitud de permiso de calidad del agua pendiente que está siendo revisada por la Comisión de Calidad Ambiental de Texas según lo requerido por el Capítulo 39 del Código Administrativo de Texas 30. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no son representaciones federales exigibles de la solicitud de permiso.

La ciudad de Lubbock (CN600130736) opera la Planta de Recuperación de Agua del Sureste (RN101609949), que está diseñada para brindar la máxima flexibilidad de operación. Las instalaciones incluyen un sistema de tratamiento preliminar, dos Trenes de Tratamiento separados, estaciones de bombeo de efluentes interconectadas y un sistema de tratamiento de sólidos. La instalación está ubicada en 3603 Guava Avenue, Lubbock, condado de Lubbock, Texas 79404.

Esta solicitud es para autorizar un aumento en la descarga de aguas residuales tratadas del Emisario 007 de un volumen que no exceda un promedio anual de 14,500,000 galones por día a 24,400,000 galones por día. Esta enmienda incluye mejorar la calidad del efluente modificando las unidades de tratamiento existentes e incorporando la eliminación biológica de nutrientes (BNR).

Se espera que las descargas de la instalación contengan demanda bioquímica de oxígeno carbonoso (CBOD5) de cinco días, sólidos suspendidos totales (SST), nitrógeno amoniacal (NH3-N) y Escherichia coli. Se incluyen contaminantes potenciales adicionales en el Informe Técnico Nacional 1.0, Sección 7—Análisis de Contaminantes del Efluente Tratado y Hoja de Trabajo Doméstico 4.0 en el paquete de solicitud de permiso. Las aguas residuales domésticas se tratan mediante un tratamiento preliminar, que consiste en cribas, desgranadoras y cribas finas. El Tren de Tratamiento #3 es una planta de lodos activados que se propone actualizar a una instalación BNR. Las unidades de tratamiento incluyen dos clarificadores primarios, tres tanques BNR de lodos activados, dos clarificadores secundarios, cinco unidades de filtrado de medios de tela y un sistema de desinfección ultravioleta (UV) de baja presión y alto rendimiento. Las cuencas del BNR constan de zonas preanóxica, anaeróbica, anóxica y óxica/aeróbica. El efluente del Tren de Tratamiento #3 se dirige a la estación de bombeo de efluentes 2 (EP2). Los sólidos se tratan en un digestor anaeróbico antes de la deshidratación. Los lodos digeridos se deshidratan con centrífugas. El sistema de tratamiento de lodos incluye digestores anaeróbicos, tres espesadores de tambor rotatorio y tres centrífugas.

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

NOTICE OF RECEIPT OF APPLICATION AND
INTENT TO OBTAIN WATER QUALITY PERMIT AMENDMENT

PERMIT NO. WQ0010353002

APPLICATION. City of Lubbock, P.O. Box 2000, Lubbock, Texas 79457, has applied to the Texas Commission on Environmental Quality (TCEQ) to amend Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0010353002 (EPA I.D. No. TX0106071) to authorize an increase in the discharge of treated wastewater to a volume not to exceed an annual average flow of 24,400,000 gallons per day via Outfall 007, and to improve the effluent quality by incorporating biological nutrient removal (BNR) into the treatment process. The domestic wastewater treatment facility is located at 3603 East Guava Avenue, Lubbock, in Lubbock County, Texas 79404. The discharge route is from the plant site via outfall 001 to the North Fork Double Mountain Fork Brazos River; thence to the Double Mountain Fork Brazos River, via outfall 007 to the North Fork Double Mountain Fork Brazos River; thence to Buffalo Springs Lake; thence to Lake Ransom Canyon; thence to the North Fork Double Mountain Fork Brazos River; thence to the Double Mountain Fork Brazos River. TCEQ received this application on May 29, 2024. The permit application will be available for viewing and copying at George & Helen Mahon Public Library, Entryway main lobby, 1306 9th Street, Lubbock, in Lubbock County, Texas, and at Wilson City Hall, City Secretary, 1601 10th Street, Wilson, in Wilson County, Texas prior to the date this notice is published in the newspaper. The application, including any updates, and associated notices are available electronically at the following webpage: https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tpdes-applications. This link to an electronic map of the site or facility's general location is provided as a public courtesy and not part of the application or notice. For the exact location, refer to the application. https://gisweb.tceq.texas.gov/LocationMapper/?marker=-101.801111,33.5625&level=18

ALTERNATIVE LANGUAGE NOTICE. Alternative language notice in Spanish is available at https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tpdes-applications. El aviso de idioma alternativo en español está disponible en https://www.tceq.texas.gov/permitting/wastewater/pending-permits/tpdes-applications.

ADDITIONAL NOTICE. TCEQ's Executive Director has determined the application is administratively complete and will conduct a technical review of the application. After technical review of the application is complete, the Executive Director may prepare a draft permit and will issue a preliminary decision on the application. **Notice of the Application and Preliminary Decision will be published and mailed to those who are on the county-wide mailing list and to those who are on the mailing list for this application. That notice will contain the deadline for submitting public comments.**

PUBLIC COMMENT / PUBLIC MEETING. You may submit public comments or request a public meeting on this application. The purpose of a public meeting is to provide the opportunity to submit comments or to ask questions about the application. TCEQ will hold a public meeting if the Executive Director determines that there is a significant degree of public interest in the application or if requested by a local legislator. A public meeting is not a contested case hearing.

OPPORTUNITY FOR A CONTESTED CASE HEARING. After the deadline for submitting public comments, the Executive Director will consider all timely comments and prepare a response to all relevant and material, or significant public comments. **Unless the application is directly referred for a contested case hearing, the response to comments, and the Executive Director's decision on the application, will be mailed to everyone who submitted public comments and to those persons who are on the mailing list for this application. If comments are received, the mailing will also provide instructions for requesting reconsideration of the Executive Director's decision and for requesting a contested case hearing.** A contested case hearing is a legal proceeding similar to a civil trial in state district court.

TO REQUEST A CONTESTED CASE HEARING, YOU MUST INCLUDE THE FOLLOWING ITEMS IN YOUR REQUEST: your name, address, phone number; applicant's name and proposed permit number; the location and distance of your property/activities relative to the proposed facility; a specific description of how you would be adversely affected by the facility in a way not common to the general public; a list of all disputed issues of fact that you submit during the comment period and, the statement "[I/we] request a contested case hearing." If the request for contested case hearing is filed on behalf of a group or association, the request must designate the group's representative for receiving future correspondence; identify by name and physical address an individual member of the group who would be adversely affected by the proposed facility or activity; provide the information discussed above regarding the affected member's location and distance from the facility or activity; explain how and why the member would be affected; and explain how the interests the group seeks to protect are relevant to the group's purpose.

Following the close of all applicable comment and request periods, the Executive Director will forward the application and any requests for reconsideration or for a contested case hearing to the TCEQ Commissioners for their consideration at a scheduled Commission meeting.

The Commission may only grant a request for a contested case hearing on issues the requestor submitted in their timely comments that were not subsequently withdrawn. **If a hearing is granted, the subject of a hearing will be limited to disputed issues of fact or mixed questions of fact and law relating to relevant and material water quality concerns submitted during the comment period.**

MAILING LIST. If you submit public comments, a request for a contested case hearing or a reconsideration of the Executive Director's decision, you will be added to the mailing list for this specific application to receive future public notices mailed by the Office of the Chief Clerk. In addition, you may request to be placed on: (1) the permanent mailing list for a specific applicant name and permit number; and/or (2) the mailing list for a specific county. If you wish to be placed on the permanent and/or the county mailing list, clearly specify which list(s) and send your request to TCEQ Office of the Chief Clerk at the address below.

INFORMATION AVAILABLE ONLINE. For details about the status of the application, visit the Commissioners' Integrated Database at www.tceq.texas.gov/goto/cid. Search the database using the permit number for this application, which is provided at the top of this notice.

AGENCY CONTACTS AND INFORMATION. All public comments and requests must be submitted either electronically at **https://www14.tceq.texas.gov/epic/eComment/**, or in writing to the Texas Commission on Environmental Quality, Office of the Chief Clerk, MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Please be aware that any contact information you provide, including your name, phone number, email address and physical address will become part of the agency's public record. For more information about this permit application or the permitting process, please call the TCEQ Public Education Program, Toll Free, at 1-800-687-4040 or visit their website at www.tceq.texas.gov/goto/pep. Si desea información en Español, puede llamar al 1-800-687-4040.

Further information may also be obtained from City of Lubbock at the address stated above or by calling Mr. Craig Henderson, RS, at 806-775-3223.

Issuance Date: July 12, 2024

Comisión de Calidad Ambiental del Estado de Texas

AVISO DE RECIBO DE LA SOLICITUD Y
EL INTENTO DE OBTENER PERMISO PARA LA CALIDAD DEL AGUA
MODIFICACION

PERMISO NO. WQ0010353002

SOLICITUD. La Ciudad de Lubbock, P.O. Box 2000, Lubbock, Texas 79457, ha solicitado a la Comisión de Calidad Ambiental del Estado de Texas (TCEQ) para modificar el Permiso No. WQ0010353002 (EPA I.D. No. TXTX0106071) del Sistema de Eliminación de Descargas de Contaminantes de Texas (TPDES) para autorizar un aumento en la descarga de aguas residuales tratadas a un volumen que no exceda un flujo promedio anual de 24,400,000 galones por día a través del Emisario 007, y mejorar la calidad del efluente incorporando la remoción biológica de nutrientes (BNR) en el proceso de tratamiento. La planta está ubicada en 3603 East Guava Avenue, Lubbock, en el condado de Lubbock, Texas 79404. La ruta de descarga es desde el sitio de la planta a través del emisario 001 hasta el río North Fork Double Mountain Fork Brazos; de allí al río Double Mountain Fork Brazos; y por el emisario 007 hasta North Fork Double Mountain Fork Brazos River; de allí al lago Buffalo Springs; de allí al cañón del lago Ransom; de allí al río Brazos North Fork Double Mountain Fork; de allí al río Double Mountain Fork Brazos. La TCEQ recibió esta solicitud el 29 de mayo de 2024. La solicitud para el permiso estará disponible para leerla y copiarla en la Biblioteca Pública George & Helen Mahon, vestíbulo principal de entrada, 1306 9th Street, Lubbock, en el condado de Lubbock, Texas, y en el Wilson City Hall, Secretario de la Ciudad, 1601 10th Street, Wilson, en el condado de Wilson, Texas. Este enlace a un mapa electrónico de la ubicación general del sitio o de la instalación es proporcionado como una cortesía y no es parte de la solicitud o del aviso. Para la ubicación exacta, consulte la solicitud.
https://gisweb.tceq.texas.gov/LocationMapper/?marker=-101.801111,33.5625&level=18

AVISO ADICIONAL. El Director Ejecutivo de la TCEQ ha determinado que la solicitud es administrativamente completa y conducirá una revisión técnica de la solicitud. Después de completar la revisión técnica, el Director Ejecutivo puede preparar un borrador del permiso y emitirá una Decisión Preliminar sobre la solicitud. **El aviso de la solicitud y la decisión preliminar serán publicados y enviado a los que están en la lista de correo de las personas a lo largo del condado que desean recibir los avisos y los que están en la lista de correo que desean recibir avisos de esta solicitud. El aviso dará la fecha límite para someter comentarios públicos.**

COMENTARIO PUBLICO / REUNION PUBLICA. Usted puede presentar comentarios públicos o pedir una reunión pública sobre esta solicitud. El propósito de una reunión pública es dar la oportunidad de presentar comentarios o hacer preguntas acerca de la solicitud. La TCEQ realiza una reunión pública si el Director Ejecutivo determina que hay un grado de interés público suficiente en la solicitud o si un legislador local lo pide. Una reunión

pública no es una audiencia administrativa de lo contencioso.

OPORTUNIDAD DE UNA AUDIENCIA ADMINISTRATIVA DE LO CONTENCIOSO. Después del plazo para presentar comentarios públicos, el Director Ejecutivo considerará todos los comentarios apropiados y preparará una respuesta a todo los comentarios públicos esenciales, pertinentes, o significativos. **A menos que la solicitud haya sido referida directamente a una audiencia administrativa de lo contencioso, la respuesta a los comentarios y la decisión del Director Ejecutivo sobre la solicitud serán enviados por correo a todos los que presentaron un comentario público y a las personas que están en la lista para recibir avisos sobre esta solicitud. Si se reciben comentarios, el aviso también proveerá instrucciones para pedir una reconsideración de la decisión del Director Ejecutivo y para pedir una audiencia administrativa de lo contencioso.** Una audiencia administrativa de lo contencioso es un procedimiento legal similar a un procedimiento legal civil en un tribunal de distrito del estado.

PARA SOLICITAR UNA AUDIENCIA DE CASO IMPUGNADO, USTED DEBE INCLUIR EN SU SOLICITUD LOS SIGUIENTES DATOS: su nombre, dirección, y número de teléfono; el nombre del solicitante y número del permiso; la ubicación y distancia de su propiedad/actividad con respecto a la instalación; una descripción específica de la forma cómo usted sería afectado adversamente por el sitio de una manera no común al público en general; una lista de todas las cuestiones de hecho en disputa que usted presente durante el período de comentarios; y la declaración "[Yo/nosotros] solicito/solicitamos una audiencia de caso impugnado". Si presenta la petición para una audiencia de caso impugnado de parte de un grupo o asociación, debe identificar una persona que representa al grupo para recibir correspondencia en el futuro; identificar el nombre y la dirección de un miembro del grupo que sería afectado adversamente por la planta o la actividad propuesta; proveer la información indicada anteriormente con respecto a la ubicación del miembro afectado y su distancia de la planta o actividad propuesta; explicar cómo y porqué el miembro sería afectado; y explicar cómo los intereses que el grupo desea proteger son pertinentes al propósito del grupo.

Después del cierre de todos los períodos de comentarios y de petición que aplican, el Director Ejecutivo enviará la solicitud y cualquier petición para reconsideración o para una audiencia de caso impugnado a los Comisionados de la TCEQ para su consideración durante una reunión programada de la Comisión. La Comisión sólo puede conceder una solicitud de una audiencia de caso impugnado sobre los temas que el solicitante haya presentado en sus comentarios oportunos que no fueron retirados posteriormente. Si se concede una audiencia, el tema de la audiencia estará limitado a cuestiones de hecho en disputa o cuestiones mixtas de hecho y de derecho relacionadas a intereses pertinentes y materiales de calidad del agua que se hayan presentado durante el período de comentarios.

LISTA DE CORREO. Si somete comentarios públicos, un pedido para una audiencia administrativa de lo contencioso o una reconsideración de la decisión del Director Ejecutivo, la Oficina del Secretario Principal enviará por correo los avisos públicos en relación con la solicitud. Ademas, puede pedir que la TCEQ ponga su nombre en una or mas de las listas correos siguientes (1) la lista de correo permanente para recibir los avisos de el solicitante indicado por nombre y número del permiso específico y/o (2) la lista de correo de todas las solicitudes en un condado especifico. Si desea que se agrega su nombre en una de las listas designe cual lista(s) y envia por correo su pedido a la Oficina del Secretario Principal de la

TCEQ.

CONTACTOS E INFORMACIÓN A LA AGENCIA. Todos los comentarios públicos y solicitudes deben ser presentadas electrónicamente vía http://www14.tceq.texas.gov/epic/eComment/ o por escrito dirigidos a la Comisión de Texas de Calidad Ambiental, Oficial de la Secretaría (Office of Chief Clerk), MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Tenga en cuenta que cualquier información personal que usted proporcione, incluyendo su nombre, número de teléfono, dirección de correo electrónico y dirección física pasarán a formar parte del registro público de la Agencia. Para obtener más información acerca de esta solicitud de permiso o el proceso de permisos, llame al programa de educación pública de la TCEQ, gratis, al 1-800-687-4040. Si desea información en Español, puede llamar al 1-800-687-4040.

También se puede obtener información adicional del la Ciudad de Lubbock a la dirección indicada arriba o llamando al Sr. Craig Henderson, R.S. al 806-775-3223.

Fecha de emisión 12 de julio de 2024

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June 18, 2024

Abesha Michael
Water Quality Division (MC-148)
Texas Commission on Environmental Quality
P.O. Box 13087
Austin, TX 78711-3087

Re: Response to TCEQ Notice of Deficiency
Application to Amend Wastewater Permit No. WQ0010353002 (RN101609949)
City of Lubbock (CN600130736)

Dear Ms. Michael:

The City of Lubbock and Freese and Nichols, Inc. (FNI) received a letter from the Texas Commission on Environmental Quality (TCEQ) dated May 31, 2024 that requested a written response to address the deficiencies associated with the application to amend Wastewater Permit No. WQ0010353002. On behalf of the applicant, City of Lubbock, FNI offers the following responses to the TCEQ NOD:

1. ***Section III, item 22 on page 2 of the CDF and Section 9, item B on page 7 of the application: The regulated entity name provided is not consistent with the existing permit. As per section 9 item B of the application and our records the regulated entity name is Southwest water reclamation plant. Please confirm and update page 2 of the CDF.***

    a. A corrected CDF is attached to this correspondence as Attachment A.

2. ***Section 10, item B on page 9 of the application. This item was left blank. However, it is required for major amendment and new applications. Please complete with the discharge route and submit a revised page 9.***
    a. Page 9 of the Administrative Report has been updated in Attachment B.

3. ***Section 14, signature page: Thank you for the submitting the authorized and signed signature page. However, the name is not consistent with page 3, section 3 of the application. Please update section 3 item A page 3 of the application with the elected personnel Mr. W. Jarrett Atkinson, City Manager.***
    a. Page 3 of the Administrative Report has been updated in Attachment C.

4. ***Public Involvement Plan (PIP): Thank you for submitting the PIP form: However, the form is not completed. Please submit a completed PIP form.***
    a. Sections 1 and 2 of the PIP were completed in the application. Sections 3 through 7 are not applicable as not all boxes were checked in Section 2. A copy of the PIP is included in Attachment D.

5. ***Section 1 affected landowners' information 1.1 on page 15 of the application: Thank you for the landowners' map, However, the surrounding owners of the contiguous property owned by the city of Lubbock which is designated by color orange is not identified. Please submit a revised landowners map, cross-referenced mailing list and mailing labels accordingly.***
    a. A revised landowners map, cross-referenced mailing list, and mailing labels are included in Attachment E.

6. ***The following is a portion of the NORI which contains information relevant to your application. Please read it carefully and indicate if it contains any errors or omissions. The complete notice will be sent to you once the application is declared administratively complete.***
    a. Please revise the NORI to state the following:

"The City of Lubbock, P.O. Box 2000, Lubbock, Texas 79457, has applied to the Texas Commission on Environmental Quality (TCEQ) to amend Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0010353002 (EPA I.D. No. TX0106071) to authorize: the discharge of treated wastewater at a volume not to exceed an annual average flow of 9,000,000 gallons per day from Outfall 001; the disposal of treated wastewater at a volume not to exceed an annual average flow of 14,500,000 gallons per day from Outfall 002 via irrigation at the Lubbock Land Application Site (LLAS); the disposal of treated wastewater at a volume not to exceed an annual average flow of 12,000,000 gallons per day from Outfall 003 via at the Hancock Land Application Site (HLAS); the disposal of treated effluent from Outfall 004 at an intermittent and flow variable rate via contract with an outside source to supply industrial reuse water (cooling make-up water) for the Jones Power Plant; from Outfall 005, the disposal of effluent via irrigation by reclaimed water users under the City's 30 Texas Administrative Code (TAC) Chapter 210 authorization; and an increase from Outfall 007, the discharge of treated domestic wastewater at a volume not to exceed an annual average flow of 24,400,000 gallons per day, and to improve effluent quality by incorporating biological nutrient removal (BNR) into the treatment process. The total volume of effluent shall not exceed an annual average flow of 31,500,000 gallons per day which is reported as Outfall 006.

The domestic wastewater treatment facility is located at 3603 East Guava Avenue, Lubbock, in Lubbock County, Texas 79404. The discharge route is from the plant site via Outfall 001 to the North Fork Double Mountain Fork Brazos River; thence to the Double Mountain Fork Brazos River; and via Outfall 007 to North Fork Double Mountain Fork Brazos River; thence to Buffalo Springs Lake; thence to Lake Ransom Canyon; thence to the North Fork Double Mountain Fork Brazos River; thence to the Double Mountain Fork Brazos River. TCEQ received this application on May 29, 2024. The permit application will be available for viewing and copying at George & Helen Mahon Public Library, Entryway main lobby, 1306 9th Street, Lubbock, in Lubbock County, Texas, and at Wilson City Hall, City Secretary, 1601 10th Street, Wilson, in Wilson County, Texas prior to the date this notice is published in the newspaper. This link to an electronic map of the site or facility's general location is provided as a public courtesy and not part of the application or notice. For the exact location, refer to the application.
https://gisweb.tceq.texas.gov/LocationMapper/?marker=-101.801111,33.5625&level=18

Further information may also be obtained from the City of Lubbock ~~and NANANA~~ at the address stated above or by calling Mr. Craig Henderson, RS~~, Wastewater System~~ at 806-775-3223."

7. ***The application indicates that public notices in Spanish are required. After confirming the portion of the NORI above does not contain any errors or omissions, please use the attached template to translate the NORI into Spanish. Only the first and last paragraphs are unique to this application and require translation. Please provide the translated Spanish NORI in a Microsoft Word document.***
    a. The translated Spanish NORI in a Microsoft Word document is included with this correspondence as Attachment F.

In addition, please see the addendum to one technical report attachment, TR-3 Process Flow Diagrams. An updated copy of the application with the revisions has been uploaded to the TCEQ's FTP Server. Please feel free to contact Mr. Craig Henderson, R.S., with the City of Lubbock or me for additional information as necessary.

Sincerely,

Cassandra Villarreal, M.S.
Freese and Nichols, Inc.

cc: Mr. Craig Henderson, R.S., City of Lubbock
File LUB23850

Attachments

Attachment A

Updated Core Data Form

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions on completing this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (*If other is checked please describe in space provided.*)	
☐ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)	
☒ Renewal (*Core Data Form should be submitted with the renewal form*)	☒ Other **Amendment**

2. Customer Reference Number (*if issued*)	Follow this link to search for CN or RN numbers in Central Registry**	**3. Regulated Entity Reference Number** (*if issued*)
CN 600130736		**RN 101609949**

SECTION II: Customer Information

4. General Customer Information	**5. Effective Date for Customer Information Updates** (mm/dd/yyyy)	5/6/2024
☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership ☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)		
The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).		
6. Customer Legal Name (*If an individual, print last name first: eg: Doe, John*)	*If new Customer, enter previous Customer below:*	
City of Lubbock		

7. TX SOS/CPA Filing Number	**8. TX State Tax ID** (11 digits)	**9. Federal Tax ID** (9 digits)	**10. DUNS Number** (*if applicable*)

11. Type of Customer:	☐ Corporation	☐ Individual	Partnership: ☐ General ☐ Limited
Government: ☒ City ☐ County ☐ Federal ☐ Local ☐ State ☐ Other		☐ Sole Proprietorship	☐ Other:

12. Number of Employees	**13. Independently Owned and Operated?**
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☒ 501 and higher	☒ **Yes** ☐ **No**

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*			
☐ Owner	☐ Operator	☒ Owner & Operator	☐ Other:
☐ Occupational Licensee	☐ Responsible Party	☐ VCP/BSA Applicant	

15. Mailing Address:	P.O. Box 2000							
	City	Lubbock	**State**	TX	**ZIP**	79457	**ZIP + 4**	

16. Country Mailing Information (*if outside USA*)	**17. E-Mail Address** (*if applicable*)
	wfranklin@mylubbock.us

18. Telephone Number	**19. Extension or Code**	**20. Fax Number** (*if applicable*)

(806) 775-2343		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected, a new permit application is also required.)*

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☒ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core Data Standards (removal of organizational endings such as Inc, LP, or LLC).

22. Regulated Entity Name *(Enter name of the site where the regulated action is taking place.)*

Southwest Water Reclamation Plant

23. Street Address of the Regulated Entity: ***(No PO Boxes)***	3603 E Guava Avenue							
	City	Lubbock	**State**	TX	**ZIP**	79404	**ZIP + 4**	
24. County	Lubbock							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:	N/A		
26. Nearest City		**State**	**Nearest ZIP Code**
Lubbock		TX	79457

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:	33.561757		**28. Longitude (W) In Decimal:**	-101.8011	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
33	33	42.3252	-101	48	3.96

29. Primary SIC Code (4 digits)	**30. Secondary SIC Code** (4 digits)	**31. Primary NAICS Code** (5 or 6 digits)	**32. Secondary NAICS Code** (5 or 6 digits)
4952		221320	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Wastewater treatment

34. Mailing Address:	**P.O. Box 2000**							
	City	**Lubbock**	**State**	**TX**	**ZIP**	**79547**	**ZIP + 4**	
35. E-Mail Address:	**wfranklin@mylubbock.us**							

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*
(806) 775-2343		**( ) -**

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☒ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
	TXR05CH74			
☐ Voluntary Cleanup	☒ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☒ Other: Pretreatment
	WQ0010353002			TX0106071000

SECTION IV: Preparer Information

40. Name:	Cassandra Villarreal	**41. Title:**	Environmental Scientist

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(817) 735-7294		(817) 735-7492	cassandra.villarreal@freese.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Freese and Nichols, Inc	**Job Title:**	Enviornmental Scientist
Name *(In Print)*:	Cassandra Villarreal	**Phone:**	(817) 735- **7294**
Signature:	CVillarreal	**Date:**	5/6/2024

Attachment B

Administrative Report, Page 9

N/A

B. Are the point(s) of discharge and the discharge route(s) in the existing permit correct?

☒ Yes ☐ No

If **no**, **or a new or amendment permit application**, provide an accurate description of the point of discharge and the discharge route to the nearest classified segment as defined in 30 TAC Chapter 307:

The location on file for Outfall 007 is correct: via Outfall 007 to the North Fork Double Mountain Fork Brazos River, thence to Buffalo Springs Lake, thence to Lake Ransom Canyon, thence to the North Fork Double Mountain Fork Brazos River, thence to the Double Mountain Fork Brazos River, in Segment No. 1241 of the Brazos River Basin. The nearest classified segment is the Double Mountain Fork Brazos River (Segment No. 1241).

City nearest the outfall(s): Lubbock and Wilson

County in which the outfalls(s) is/are located: Lubbock and Lynn

Outfall Latitude: AR-5 Longitude: AR-5

C. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If **yes**, indicate by a check mark if:

☐ Authorization granted ☐ Authorization pending

For **new and amendment** applications, provide copies of letters that show proof of contact and the approval letter upon receipt.

Attachment: N/A

D. For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge.

Lubbock, Crosby, Garza, Kent

Section 11. TLAP Disposal Information (Instructions Page 36)

A. For TLAPs, is the location of the effluent disposal site in the existing permit accurate?

☒ Yes ☐ No

If **no, or a new or amendment permit application**, provide an accurate description of the disposal site location:

N/A

B. City nearest the disposal site: Lubbock

C. County in which the disposal site is located: Lubbock

Attachment C

Administrative Report, Page 3

(Instructions Page 29)

A. The owner of the facility must apply for the permit.

What is the Legal Name of the entity (applicant) applying for this permit?

City of Lubbock

(The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal documents forming the entity.)

If the applicant is currently a customer with the TCEQ, what is the Customer Number (CN)? You may search for your CN on the TCEQ website at http://www15.tceq.texas.gov/crpub/

CN: 600130736

What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

Prefix (Mr., Ms., Miss): Mr.

First and Last Name: W. Jarrett Atkinson

Credential (P.E, P.G., Ph.D., etc.): N/A

Title: City Manager

B. Co-applicant information. Complete this section only if another person or entity is required to apply as a co-permittee.

What is the Legal Name of the co-applicant applying for this permit?

N/A

(The legal name must be spelled exactly as filed with the TX SOS, with the County, or in the legal documents forming the entity.)

If the co-applicant is currently a customer with the TCEQ, what is the Customer Number (CN)? You may search for your CN on the TCEQ website at: http://www15.tceq.texas.gov/crpub/

CN: N/A

What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

Prefix (Mr., Ms., Miss): N/A

First and Last Name: N/A

Credential (P.E, P.G., Ph.D., etc.): N/A

Title: N/A

Provide a brief description of the need for a co-permittee: N/A

C. Core Data Form

Complete the Core Data Form for each customer and include as an attachment. If the customer type selected on the Core Data Form is **Individual**, complete **Attachment 1** of Administrative Report 1.0.

Attachment: AR-2

Attachment D

PIP

Texas Commission on Environmental Quality

Public Involvement Plan Form for Permit and Registration Applications

The Public Involvement Plan is intended to provide applicants and the agency with information about how public outreach will be accomplished for certain types of applications in certain geographical areas of the state. It is intended to apply to new activities; major changes at existing plants, facilities, and processes; and to activities which are likely to have significant interest from the public. This preliminary screening is designed to identify applications that will benefit from an initial assessment of the need for enhanced public outreach.

All applicable sections of this form should be completed and submitted with the permit or registration application. For instructions on how to complete this form, see TCEQ-20960-inst.

Section 1. Preliminary Screening

☐ New Permit or Registration Application

☒ New Activity – modification, registration, amendment, facility, etc. (see instructions)

If neither of the above boxes are checked, completion of the form is not required and does not need to be submitted.

Section 2. Secondary Screening

☒ Requires public notice,

☐ Considered to have significant public interest, **and**

☒ Located within any of the following geographical locations:

- Austin
- Dallas
- Fort Worth
- Houston
- San Antonio
- West Texas
- Texas Panhandle
- Along the Texas/Mexico Border
- Other geographical locations should be decided on a case-by-case basis

If all the above boxes are not checked, a Public Involvement Plan is not necessary. Stop after Section 2 and submit the form.

☒ Public Involvement Plan not applicable to this application. Provide **brief** explanation.

This permit has not had significant public interest in the last permit cycles.

Section 3. Application Information

Type of Application (check all that apply):

Air ☐ Initial ☐ Federal ☐ Amendment ☐ Standard Permit ☐ Title V

Waste ☐ Municipal Solid Waste ☐ Industrial and Hazardous Waste ☐ Scrap Tire
☐ Radioactive Material Licensing ☐ Underground Injection Control

Water Quality

☐ Texas Pollutant Discharge Elimination System (TPDES)

- ☐ Texas Land Application Permit (TLAP)
- ☐ State Only Concentrated Animal Feeding Operation (CAFO)
- ☐ Water Treatment Plant Residuals Disposal Permit

☐ Class B Biosolids Land Application Permit

☐ Domestic Septage Land Application Registration

Water Rights New Permit

☐ New Appropriation of Water

☐ New or existing reservoir

Amendment to an Existing Water Right

☐ Add a New Appropriation of Water

☐ Add a New or Existing Reservoir

☐ Major Amendment that could affect other water rights or the environment

Section 4. Plain Language Summary

Provide a brief description of planned activities.

Section 5. Community and Demographic Information

Community information can be found using EPA's EJ Screen, U.S. Census Bureau information, or generally available demographic tools.

Information gathered in this section can assist with the determination of whether alternative language notice is necessary. Please provide the following information.

(City)

(County)

(Census Tract)

Please indicate which of these three is the level used for gathering the following information.

☐ City ☐ County ☐ Census Tract

(a) Percent of people over 25 years of age who at least graduated from high school

(b) Per capita income for population near the specified location

(c) Percent of minority population and percent of population by race within the specified location

(d) Percent of Linguistically Isolated Households by language within the specified location

(e) Languages commonly spoken in area by percentage

(f) Community and/or Stakeholder Groups

(g) Historic public interest or involvement

Section 6. Planned Public Outreach Activities

(a) Is this application subject to the public participation requirements of Title 30 Texas Administrative Code (30 TAC) Chapter 39?

☐ Yes ☐ No

(b) If yes, do you intend at this time to provide public outreach other than what is required by rule?

☐ Yes ☐ No

If Yes, please describe.

If you answered "yes" that this application is subject to 30 TAC Chapter 39, answering the remaining questions in Section 6 is not required.

(c) Will you provide notice of this application in alternative languages?

☐ Yes ☐ No

Please refer to Section 5. If more than 5% of the population potentially affected by your application is Limited English Proficient, then you are required to provide notice in the alternative language.

If yes, how will you provide notice in alternative languages?

☐ Publish in alternative language newspaper

☐ Posted on Commissioner's Integrated Database Website

☐ Mailed by TCEQ's Office of the Chief Clerk

☐ Other (specify)

(d) Is there an opportunity for some type of public meeting, including after notice?

☐ Yes ☐ No

(e) If a public meeting is held, will a translator be provided if requested?

☐ Yes ☐ No

(f) Hard copies of the application will be available at the following (check all that apply):

☐ TCEQ Regional Office ☐ TCEQ Central Office

☐ Public Place (specify)

Section 7. Voluntary Submittal

For applicants voluntarily providing this Public Involvement Plan, who are not subject to formal public participation requirements.

Will you provide notice of this application, including notice in alternative languages?

☐ Yes ☐ No

What types of notice will be provided?

☐ Publish in alternative language newspaper

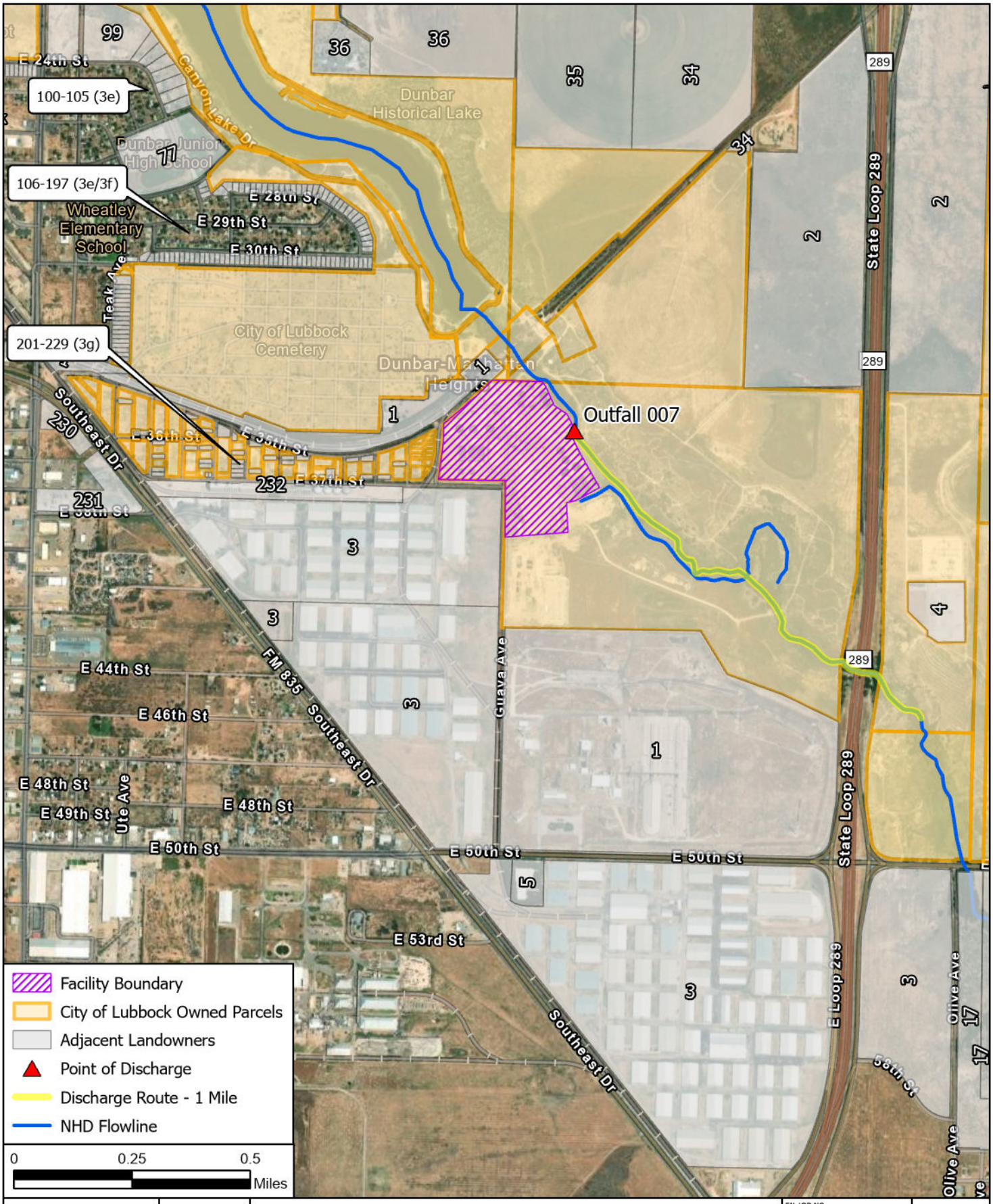
☐ Posted on Commissioner's Integrated Database Website

☐ Mailed by TCEQ's Office of the Chief Clerk

☐ Other (specify)

Attachment E

Revised Landowner Map, Labels, and Cross-Referenced Mailing List



FREESE AND NICHOLS, INC
801 Cherry Street, Suite 2800
Fort Worth, TX 76102
Phone - (817) 735 - 7300

City of Lubbock

TPDES Permit Amendment

Affected Landowner Map

FN JOB NO	LUB23850
FILE NAME	TPDES_Figures.aprx
DATE	6/10/2024
DESIGNED	CLV
DRAFTED	CLV

3a

FIGURE

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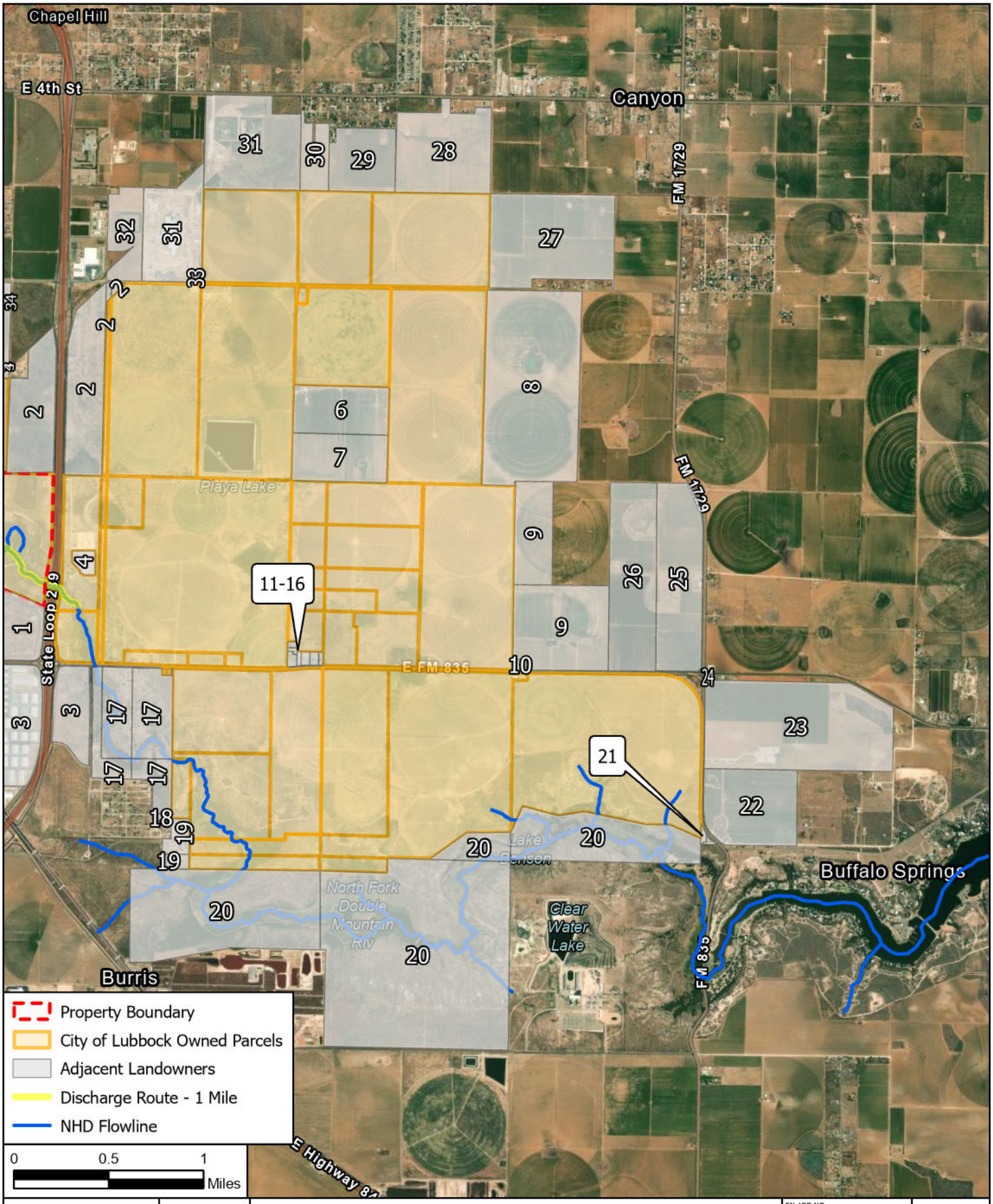

FREESE AND NICHOLS
FREESE AND NICHOLS, INC
801 Cherry Street, Suite 2800
Fort Worth, TX 76102
Phone - (817) 735 - 7300

City of Lubbock

TPDES Permit Amendment

Affected Landowner Map

FN JOB NO	LUB23850
FILE NAME	TPDES_Figures.aprx
DATE	6/7/2024
DESIGNED	CLV
DRAFTED	CLV

3b

FIGURE

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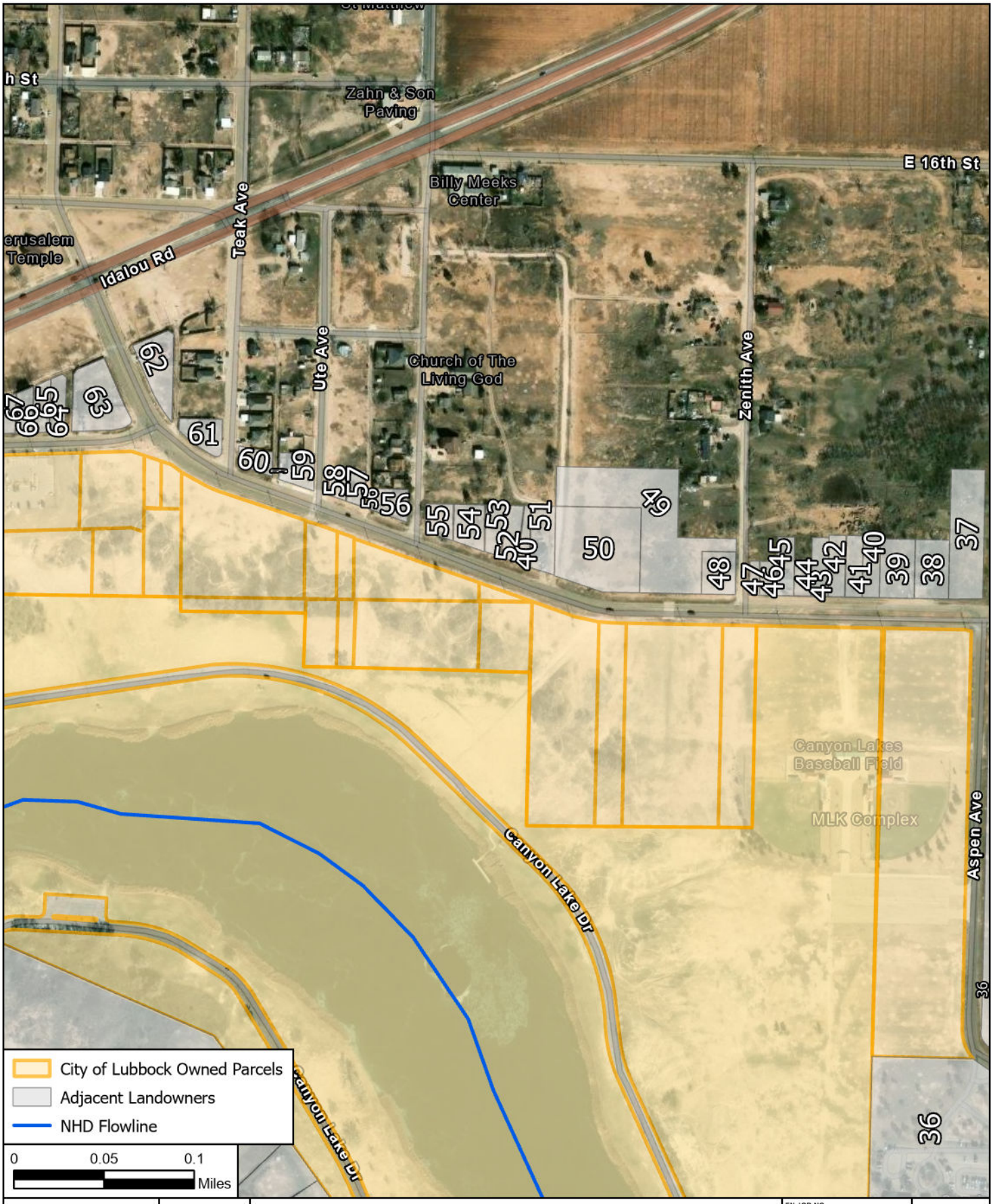

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Phone - (817) 735 - 7300

City of Lubbock

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3c

FIGURE

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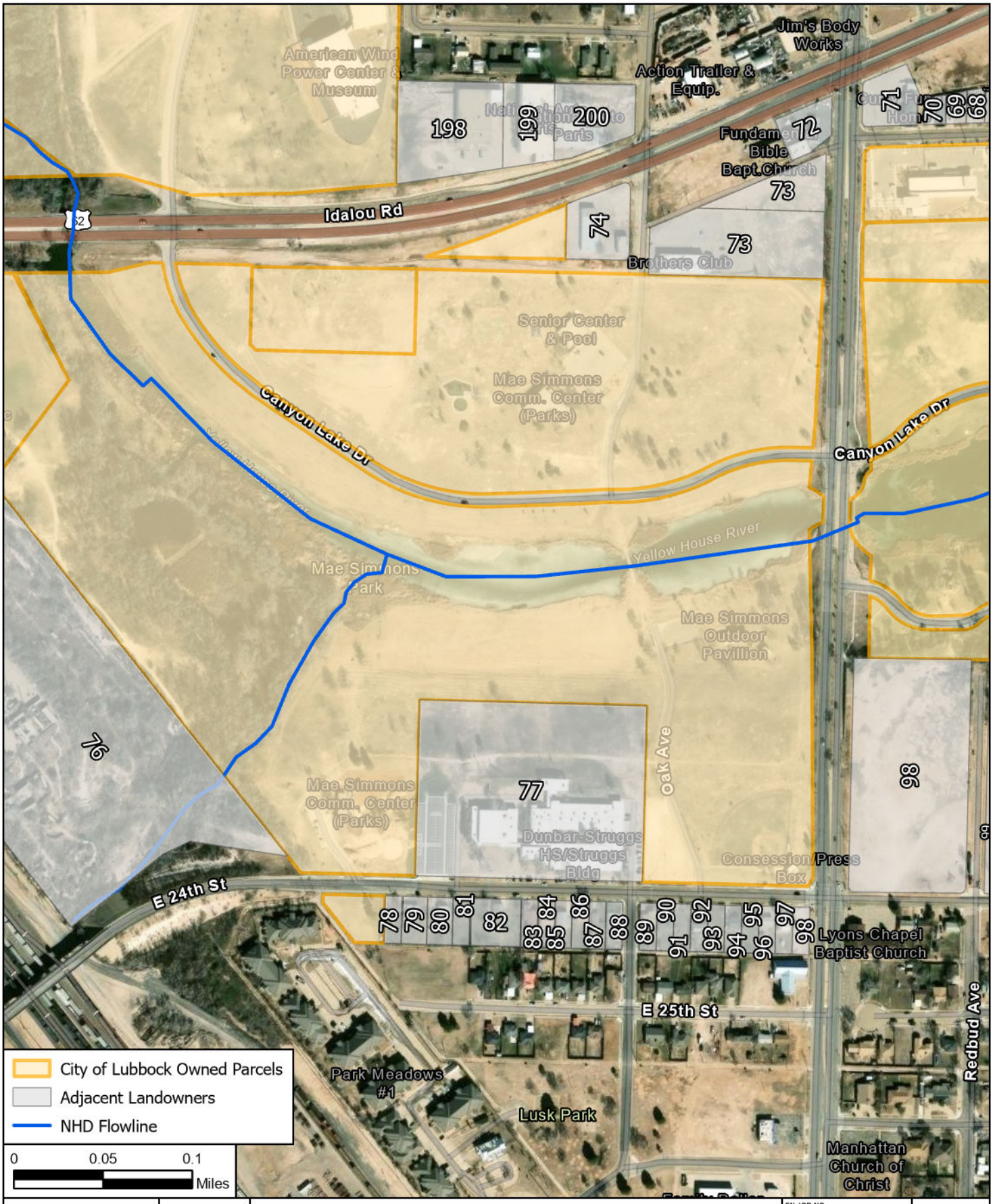

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Phone - (817) 735 - 7300

City of Lubbock

TPDES Permit Amendment

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DATE	6/7/2024
DESIGNED	CLV
DRAFTED	CLV

3d

FIGURE

Path: H:\ENVIRONMENTAL\Working\TPDES_Figures.aprx

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FIGURE

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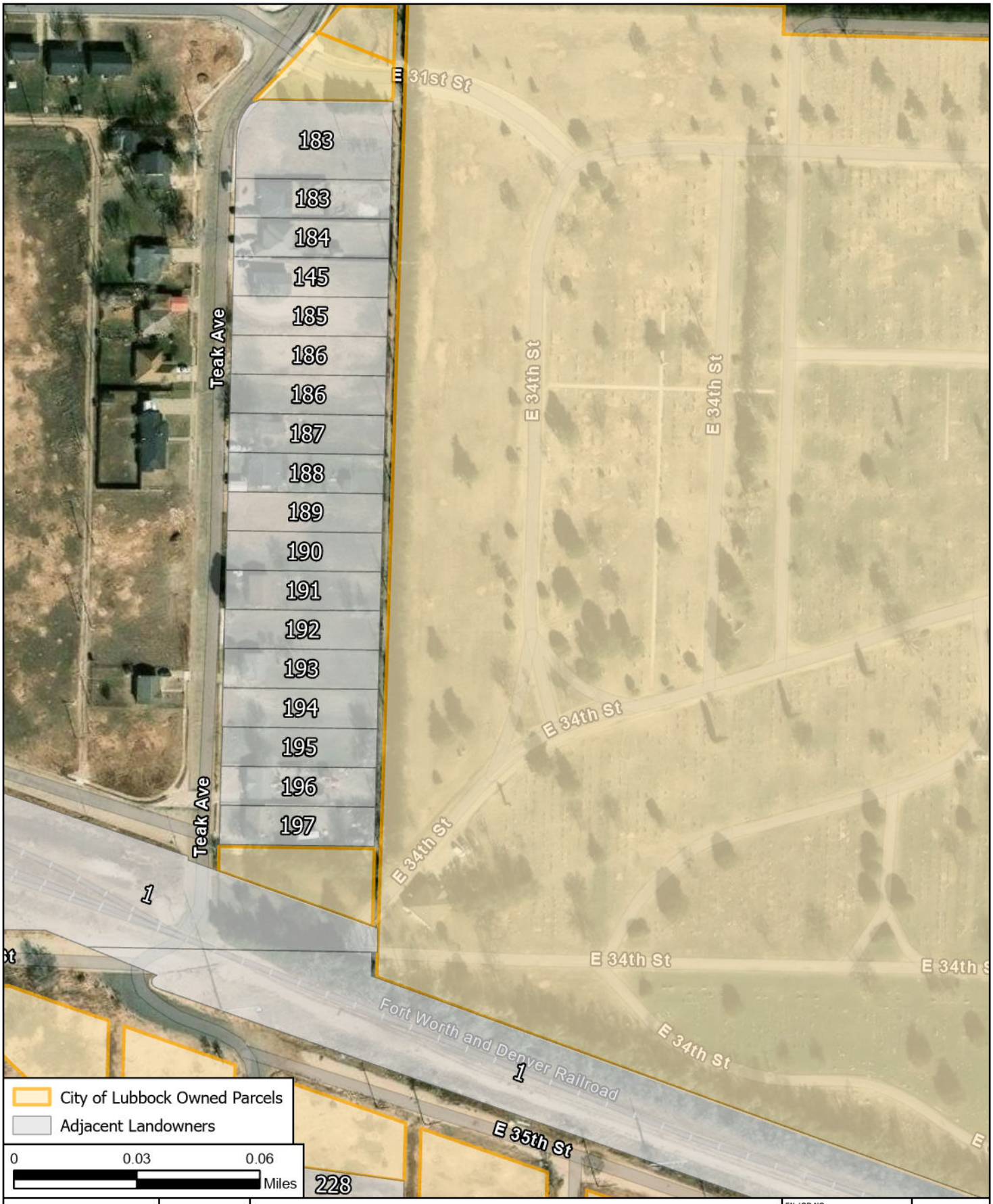

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City of Lubbock

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Affected Landowner Map

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FILE NAME	TPDES_Figures.aprx
DATE	6/7/2024
DESIGNED	CLV
DRAFTED	CLV

3f

FIGURE

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NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

FREESE AND NICHOLS, INC
801 Cherry Street, Suite 2800
Fort Worth, TX 76102
Phone - (817) 735 - 7300

City of Lubbock

TPDES Permit Amendment

Affected Landowner Map

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FILE NAME	TPDES_Figures.aprx
DATE	6/7/2024
DESIGNED	CLV
DRAFTED	CLV

3g

FIGURE

Path: H:\ENVIRONMENTAL\Working\TPDES_Figures.aprx

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

Affected Landowner Map
Cross Referenced List

1
PYCO INDUSTRIES INC
2901 AVE A
LUBBOCK, TX 79404-2231

2
CRBBB PARTNERSHIP LP
5201 19TH ST
LUBBOCK, TX 79407

3
FARMERS CO-OP COMPRESS
PO BOX 2877
LUBBOCK, TX 79408-2877

4
ONCOR ELECTRIC DELIVERY COMPANY LLC
PO BOX 139100
DALLAS, TX 75313-9100

5
PLAINS COTTON COOP ASSOCIATION
PO BOX 2827
LUBBOCK, TX 79408-2827

6
SCHOPPA, RODNEY
2605 CR 2800
LUBBOCK, TX 79403

7
MICKAN RUSSELL
KAY MICKAN SPEER
1405 PONY EXPRESS LANE
COPPERAS COVE, TX 76522

8
GREEN J H TRUSTS
PO BOX 1204
DUNCAN, OK 73534-1204

9
FRITZ, KENNETH
2308 FM 1729
LUBBOCK, TX 79403-7049

10
FRITZ, CAROL A
5815 E FM 835
LUBBOCK, TX 79403-7034

11
TORRES, ALMA
4801 COUNTY ROAD 2800
LUBBOCK, TX 79404

12
BRASHEAR JUSTON THOMAS & DANYELLE MARIE
1909 128TH ST
LUBBOCK, TX 79423-7456

13
KUNKEL CLARK & MARK LEMMONS & CLINT WHITTLE
4905 E FM 835
LUBBOCK, TX 79403

14
ADAMS PROPERTY HOLDINGS LLC
PO BOX 45
IDALOU, TX 79329

15
FITHEN, LESLIE
5437 45TH ST
LUBBOCK, TX 79414

16
TORRES RUDY & ANNETTE
4935 E FM 835
LUBBOCK, TX 79403-9685

17
LUBBOCK RIVERWALK LLC
6301 INDIANA AVE
LUBBOCK, TX 79413

18
MICHAEL ROSS HOLDINGS LLC
6301 INDIANA AVE
LUBBOCK, TX 79413

19
RONNIE ZAHN PAVING INC
6608 MLK BLVD
LUBBOCK, TX 79404

20
ARNETT SAM C III
ABBY F QUINN & WILLIAM A FLYGARE
806 AVE J
LUBBOCK, TX 79401-2717

21 BECK, FRANK W
6406 FM 835
LUBBOCK, TX 79403-7004

22 FOERSTER EARL TRUST & MILTON
GLORIA J KEETON
7412 HURON AVE
LUBBOCK, TX 79424

23 BASF AGRICULTURAL SOLUTIONS SEED US LLC
100 PARK AVE
FLORHAM PARK, NJ 07932

24 JOSEPH ADAM CORPORATION
PO BOX 64791
LUBBOCK, TX 79464-4791

25 GWINN ALY TRUST
JARET W GREASER & BURT C HEINRICH C0-TRS
PO BOX 1378 LUBBOCK, TX 79408

26 PLAYA LAKE FARM & RANCH LP
11107 MIAMI AVE
LUBBOCK, TX 79423

27 MCGEHEE DENNIS H & JULIE
PO BOX 1368
IDALOU, TX 79329

28 FOERSTER, MARC
5907 FM 835
LUBBOCK, TX 79403

29 FALLIN RODNEY & THERESA
5209 E COUNTY ROAD 6610
LUBBOCK, TX 79403

30 NUNEZ ANTONIO & REYNA
6210 E COUNTY ROAD 6450
LUBBOCK, TX 79403

31 LEPRINO FOODS COMPANY
1830 W 38TH AVE
DENVER, CO 80211-2225

32 BASF CORPORATION
100 PARK AVE
FLORHAM PARK, NJ 07932-1089

33 LOS CARNALES MC
4022 WOODROW RD
LUBBOCK, TX 79423

34 ADAMS C POWELL & CAROL
7317 E FM 40 LUBBOCK, TX 79403

35 SIEBER TRUST
PROSPERITY BANK TRUST
1401 AVE Q
LUBBOCK, TX 79401-3819

36 LUBBOCK REGIONAL MHMR DBA
STARCARE SPECIALTY HEALTH SYSTEM
904 AVENUE O
LUBBOCK, TX 79401-3924

37 REYES RAMIRO & DEBRA
15916 N COUNTY ROAD 2500
ABERNATHY, TX 79311-5333

38 CERDA JOSE L
GUADALUPE REYES & ZETA RODRIGUEZ
2902 2ND PL LUBBOCK, TX 79415

39 WALTON BONNIE
TESSIE ESTATE
ADDRESS UNKNOWN

40 RODRIGUEZ ROGER & MARIA ELENA
8710 GOLDEN PT
SAN ANTONIO, TX 78239

41 RODRIGUEZ, MANUEL
13538 BALLAST RD
HOUSTON, TX 77044

42 PITTS, ELAINE
140 CR 3051
DECATUR, TX 76234-4610

43 THOMPSON JAMES E ET AL
2609 E 19TH ST
LUBBOCK, TX 79403-5829

44 GIL, LUIS JESUS
PO BOX 348
SMYER, TX 79367-0348

45 STROUP, MICHAEL ERVIN
2605 E 19TH ST
LUBBOCK, TX 79403-5829

46 PUCKETT, WILEY ESTATE
ADDRESS UNKNOWN

47 ODDIE FREDDRICK II
DARAVION J BONNER JR
904 W LAUREL ST
COMPTON, CA 90220-2907

48 BUTLER, REGINA
4013 47TH ST
LUBBOCK, TX 79413

49 GARCIA ANGEL & EMERY
2506 58TH ST
LUBBOCK, TX 79413-5632

50 CARTER, BRYCE CYRLOYD
4013 47TH ST
LUBBOCK, TX 79413

51 HERRERA, RAMONA (TOD)
2211 E 19TH ST
LUBBOCK, TX 79403

52 RAMIREZ, MARIA LETICIA
5419 48TH ST
LUBBOCK, TX 79414-1523

53 MATA, CHRISTINA V
3702 ENGLEWOOD
LUBBOCK, TX 79407

54 JOINER MELVIN & WELBURN TRAVIS
ADDRESS UNKNOWN

55 3D LAND DEVELOPMENT LLC
2621 21ST ST
LUBBOCK, TX 79410

56 SUBIA MARGARITA ELVIRA & EST OF VIRGINIA R
1720 VANDA AVE
LUBBOCK, TX 79403

57 MARTINEZ LUPE & EST OF VIRIGINIA SUBIA
1720 VANDA AVE
LUBBOCK, TX 79403

58 GUTIERREZ, JOE
JANIE GUTIERREZ
4828 8TH ST LUBBOCK, TX 79416

59 SALAS, AMY
1716 UTE AVE
LUBBOCK, TX 79404

60 MC CULLOUGH, MARY
2205 E 29TH ST
LUBBOCK, TX 79404-2016

61 MCCUTCHEON, VIRGINIA E
1714 TEAK AVE
LUBBOCK, TX 79404

62 CLEAVER, DORIS R
1811 SPRUCE AVE
LUBBOCK, TX 79408-5322

63 CANALES SANTOS JR & REFUGIA M
1721 E 19TH ST
LUBBOCK, TX 79403

64 OCHOA, JOHN
5223 16TH ST
LUBBOCK, TX 79416

65 ALDERETE, SANDY
1105 A MCCLELLAN AVE
MONTEREY, CA 93940

66 GUZMAN, NATALIA M
1715 E 19TH ST
LUBBOCK, TX 79403

67 ACOSTA JORGE & RUTH
2815 O'BANNON
DALLAS, TX 75224

68 RAGSDALE H L ESTATE OF
c/o DOROTHY WILKERSON
2708 TEAK AVENUE LUBBOCK, TX 79404

69 HERNANDEZ, LEE, SR
1709 E 19TH ST
LUBBOCK, TX 79403

70 SANCHEZ, ELSA
1707 E 19TH ST
LUBBOCK, TX 79403-5725

71 CURRY FUNERAL HOME INC
1805 MLK BLVD
LUBBOCK, TX 79403

72 MOUSAVIJAM, MIRASAAD
11212 GENOA AVE
LUBBOCK, TX 79424-3963

73 ROCC SOLID FITNESS LLC
5014 18TH ST
LUBBOCK, TX 79416

74 MANN, VERA LEGALE
2238 LOCUST ST
AMARILLO, TX 79109-1921

75 J & J PARTNERSHIP
8001 QUAKER AVE #STE L
LUBBOCK, TX 79424

76 JAY BIRD INVESTMENTS INC
5025 50th ST #STE A
LUBBOCK, TX 79414

77 LUBBOCK ISD
1628 19TH ST
LUBBOCK, TX 79401-4832

78 FOSTER, RAYMON
3417 40TH ST
LUBBOCK, TX 79413

79 ANZLEY, LAFRANCES RICHARDSON
1827 MANHATTAN DR
LUBBOCK, TX 79404-1317

80 KNIGHTEN, RHONALD
1110 41ST ST #UNIT B
LUBBOCK, TX 79412-2040

81 HOWARD, JOHN HENRY
7307 BRYERS CIR
PLANO, TX 75025-2205

82 ROSS, WENDY TOLSON
8605 NW 74TH TER
KANSAS CITY, MO 64152

83 NIELAND, VICTOR MANUEL
1322 E 24TH ST
LUBBOCK, TX 79404

84 MC KNIGHT, SAMANTHA MASON ESTATE ETAL
1324 E 24TH ST
LUBBOCK, TX 79404

85 THOMAS, MAJORIE
1122 MEADOWLARK LN
DESOTO, TX 75115-8042

86 PHEA DOROTHY B ESTATE OF
3308 S MACGREGOR WAY
HOUSTON, TX 77021

87 MC CORMICK, MAXINE
1330 E 24TH ST
LUBBOCK, TX 79404-1202

88 WALKER BYRON JR & BRIDGETT C
1332 E 24TH ST
LUBBOCK, TX 79404-1202

89
AUGUST & MELESSA HOWARD FAMILY TRUST
HOWARD AUGUST J & MELESSA W TRUSTEES
7307 BRYERS CIRCLE
PLANO, TX 75025

90
CHILDERS, CURTIS W
PO BOX 883
BASTROP, TX 78602-0883

91
DORSEY BETTIE MAE ESTATE OF &
IRION ROSS ET AL
2112 E 29TH ST
LUBBOCK, TX 79404

92
RAY, ROBERT L
JACQUELYN PORCH
1516 E 1ST PL
LUBBOCK, TX 79403

93
BUTLER, JAMES A
TODD SANDERS
2720 E 9TH ST
LUBBOCK, TX 79403

94
MVIII PROPERTIES LLC
605 N WINSTON AVE
LUBBOCK, TX 79416

95
WILLIAMS, REGINALD
1710 E 24TH ST
LUBBOCK, TX 79404

96
MANN-STEWART TIFFANY & TRIELLIS STEWART
2418 E 8TH ST
LUBBOCK, TX 79403

97
ROSSMAN, WOODSON
1518 E 24TH ST
LUBBOCK, TX 79404

98
BAPTIST CHURCH LYONS CHAPEL
1704 E 24TH ST
LUBBOCK, TX 79404-1302

99
LUBBOCK BOYS CLUB INC
WESLEY STRENGTH
3221 59TH ST
LUBBOCK, TX 79413-5515

100
PHEA JOE W JR
1819 E 24TH ST
LUBBOCK, TX 79404-1303

101
FAIR SONYA & DAVID
1821 MANHATTAN DR
LUBBOCK, TX 79404

102
VASQUEZ, ROSABELLE
1823 MANHATTAN DR
LUBBOCK, TX 79404

103
BAPTIST CHURCH GREATER ST LUKE
306 E 26TH ST
LUBBOCK, TX 79404-1606

104
HILL, MARY KATHERINE
2815 BARBEE ST
HOUSTON, TX 77004

105
HILL DAMON H JR
STEPHANIE JO
1831 MANHATTAN DR
LUBBOCK, TX 79404-1317

106
PRIESTLY, WILLIE RUTH
607 MAPLEWOOD CIR
PFLUGERVILLE, TX 78660

107
BEN & JERRYS PROPERTIES LLC
8282 MOBERLY LN
DALLAS, TX 75227

108
THUNDER SUN INC
6303 INDIANA AVE
LUBBOCK, TX 79413

109 JOHNSON, HEENAN
8302 TRENTON AVE
LUBBOCK, TX 79424-4726

110 CAVIEL, BILLIE JEAN
2401 E 28TH ST
LUBBOCK, TX 79404

111 BROWN CHARLES E III & MARCUS D
2403 E 28TH ST
LUBBOCK, TX 79404

112 WILLIAMS, RACHEL
2405 E 28TH ST
LUBBOCK, TX 79404

113 COX, COLTER
3014 125TH ST
LUBBOCK, TX 79423

114 VINCENT, SHAYNE
4707 81ST PL
LUBBOCK, TX 79424

115 WILEY, TINA
2411 E 28TH ST
LUBBOCK, TX 79404

116 JEFFERSON, LILLIAN N (TOD)
5506 76TH ST
LUBBOCK, TX 79424

117 LLANAS JULIO & ROSA
4007 110th ST
LUBBOCK, TX 79423

118 RM INVESTMENT GROUP LLC
10601 CLARENCE DR #STE 250
FRISCO, TX 75033

119 JOHNSON, LASHONDA B
2419 E 28TH ST
LUBBOCK, TX 79404

120 DIXON, BETTY LENNOX
2421 E 28TH ST
LUBBOCK, TX 79404

121 JOHNSON, JANICE
2423 E 28TH ST
LUBBOCK, TX 79404

122 KAVIANI MEHRNOOSH
4210 88TH PL
LUBBOCK, TX 79423-2940

123 KAVIANI MEHRNOOSH
4210 88TH PL
LUBBOCK, TX 79423-2940

124 HODGE, MILTON L
2429 E 28TH ST
LUBBOCK, TX 79404

125 WELLS, CLARENCE
4260 DECATUR DR
WOODBRIDGE, VA 22193-1889

126 BROWN, MARCUS D
2101 SE 36TH AVE
AMARILLO, TX 79118-7744

127 HAWTHRONE, LATORSHA
1705 E 1ST PL
LUBBOCK, TX 79403

128 LEWIS, WILLIAM T
2437 E 28TH ST
LUBBOCK, TX 79404

129 TINGLUND GABRIELA MARIA & LILLIAN
2439 E 28TH ST
LUBBOCK, TX 79404

130 MOORE RAMONA & CHAD
2901 BEECH AVE
LUBBOCK, TX 79404

131 WATLEY, MICHAEL J
2903 BEECH AVE
LUBBOCK, TX 79404

132 SPENCER EDDIE L & DIANA M
2905 BEECH AVE
LUBBOCK, TX 79404

133 ROWE, CONNI C
2907 BEECH AVE
LUBBOCK, TX 79404

134 MOORE, ARWILLA
2628 IVORY AVE
LUBBOCK, TX 79404

135 CARTER CHAPEL C M ECHURCH
PO BOX 413
LUBBOCK, TX 79408-0413

136 ROSS KATHERINE J
KARL JACKSON
2915 BEECH AVE
LUBBOCK, TX 79404

137 VAZQUEZ, ROBERT TALAVERA
2917 BEECH AVE
LUBBOCK, TX 79404

138 ELIZALDE JOSE A R & SILVIA C B MORALES
2919 BEECH AVE
LUBBOCK, TX 79404

139 LUELLEN, RITA K
2921 BEECH AVE
LUBBOCK, TX 79404

140 SIX SHOOTER ENTERPRISES LLC
1821 S MCELROY ST
CRANE, TX 79631

141 ARREOLA MARIBEL G &
ERASMO MARTINEZ BONILLA
5520 E COUNTY ROAD 6540
LUBBOCK, TX 79403

142 WHITFIELD STANLEY & CHARLOTTE
2802 E 30TH ST
LUBBOCK, TX 79404-2046

143 LEE, MATTHEWS
10601 DIXON AVE
LUBBOCK, TX 79423

144 BMC HOLDINGS LLC
5109 82ND ST SUITE 7 #330
LUBBOCK, TX 79424

145 JBRB HOLDINGS LLC
3502 AVENUE N #UNIT A
LUBBOCK, TX 79412

146 GATEWOOD, MICHAEL
3146 BLUESTEM DR
GARLAND, TX 75044-6546

147 STEWART, KENNETH W
1831 KIRKWOOD DR
MACON, GA 31211

148 MONTGOMERY, KATHERINE M EST OF
815 S CENTER ST #UNIT F
GRAND PRAIRIE, TX 75051

149 PAA FLATLAND VENTURES LLC
5007 AVE U
LUBBOCK, TX 79412

150 COLEMAN, JANIE EARL
2436 E 30TH ST
LUBBOCK, TX 79404

151 MANHATTAN HTS CHURCH OF CHR
2434 E 30TH ST
LUBBOCK, TX 79404

152 JOHNSON LUEJENNER & ALIZEAN HUNT
2432 E 30TH ST
LUBBOCK, TX 79404

153 PEPPERS, RAYMOND, JR
2428 E 30TH ST
LUBBOCK, TX 79404-2023

154 ROSS, GLENN
2426 E 30TH ST
LUBBOCK, TX 79404-2023

152 JOHNSON LUEJENNER & ALIZEAN HUNT
2432 E 30TH ST
LUBBOCK, TX 79404

153 PEPPERS, RAYMOND, JR
2428 E 30TH ST
LUBBOCK, TX 79404-2023

154 ROSS, GLENN
2426 E 30TH ST
LUBBOCK, TX 79404-2023

155 GUY, PATRICIA A
2424 E 30TH ST
LUBBOCK, TX 79404

156 HARRIS, BULAH
2422 E 30TH ST
LUBBOCK, TX 79404-2023

157 JACKSON ARLEE ESTATE OF
2420 E 30TH ST
LUBBOCK, TX 79404

158 PENDGRAFT, CLOVIS S
2418 E 30TH ST
LUBBOCK, TX 79404-2023

159 BROOKS, ELNORA JONES
2416 E 30TH ST
LUBBOCK, TX 79404-2023

160 AUSTIN DERRICK D & DARNISE A
2439 E 30TH ST
LUBBOCK, TX 79404-2022

161 BOLDEN ERIE LEE ESTATE & IDA AUSTIN & IRENE BURKS & JOHN L & WAYNE & RICKY & KENNETH BOLDEN
2412 E 30TH ST
LUBBOCK, TX 79404-2023

162 DARTHARD, MINNIE LUE
2410 E 30TH ST
LUBBOCK, TX 79404-2023

163 ORNELAS EDUARDO & MARISOL SALCIDO
2408 E 30TH ST
LUBBOCK, TX 79404

164 STEPTOE, ELIJAH, JR
2406 E 30TH ST
LUBBOCK, TX 79404

165 FLORES MICHELLE LEE & ISRAEL
2404 E 30TH ST
LUBBOCK, TX 79404

166 WILSON, CORI M
2402 E 30TH ST
LUBBOCK, TX 79404-2023

167 SMITH, DORIS HOOD
807 WESTOVER DR
LANCASTER, TX 75134-3732

168 MOUNTS, AARON
4105 84TH ST
LUBBOCK, TX 79423

169 RAGLAND, CAROLYN
2128 E 30TH ST
LUBBOCK, TX 79404-2021

170 BROWN LINDA D ESTATE OF
2126 E 30TH ST
LUBBOCK, TX 79404

171 WILLIAMS SAMMY L & ROSE MARY & JACQULIN
2122 E 30TH ST
LUBBOCK, TX 79404

172 RAGSDALE, CHARLES L
2118 E 30TH ST
LUBBOCK, TX 79404-2021

173 SIPP HOMES LLC
605 CROSBY DR
ALTAMONTE SPRINGS, FL 32714-7217

174 TAYLOR JOHNNIE V ESTATE OF
6704 TULLOCH WAY
AUSTIN, TX 78754-5822

175 BROWN CHALK JOHNSTON LP
PO BOX 550
PLAINVIEW, TX 79073

176 NORRIS, GRENLYN A
2110 E 30TH ST
LUBBOCK, TX 79404

177 COTTON, WILLIE
2106 E 30TH ST
LUBBOCK, TX 79404-2021

178 WARREN ALICE J & MARY MALONE
LYNDA LEON BOOKER
6614 BILLIKIN DR
HOUSTON, TX 77086

179 PROFFER, ANDREW JACOB
2102 E 30TH ST
LUBBOCK, TX 79404

180 ANDERSON, KATHYL R
2914 UTE AVE
LUBBOCK, TX 79404-2038

181 HAMBRICK, BILLY
2913 TEAK AVE
LUBBOCK, TX 79404

182 BELL, MARY EDNA
3125 DIAMOND BLVD 235
SAN ANGELO, TX 76905

183 RADER, DAVID
3109 TEAK AVE
LUBBOCK, TX 79404

184 CARROLL, DESIREE K
1313 49TH ST
LUBBOCK, TX 79412-2331

185 HUDSON CHARLIE F & WILLIE H THOMAS &
RUTH GREEN
2135 W 108TH ST
LOS ANGELES, CA 90047

186 URBAN RENEWAL
COMMUNITY DEV DEPT
PO BOX 2000
LUBBOCK, TX 79457-0001

187 SOUTHWEST PROPERTY DEVELOPMENT AND
CONST LLC
10408 WAVERLY AVE
LUBBOCK, TX 79424-4678

188 QUIGLEY, CORY
2318 BIRCH AVE
LUBBOCK, TX 79404

189 DAVIS SHAFT DESHONE ESTATE OF
c/o YOLANDA WALKER DEPENDENT ADMINR
2806 GREEN OAKS DR
GARLAND, TX 75046

190 NELSON, BOBBIE DAVIS
1713 E AMHERST ST
LUBBOCK, TX 79403-4039

191 WALKER, RUBY
3211 TEAK AVE
LUBBOCK, TX 79404-2035

192 GRIMES W L EST
3213 TEAK AVE
LUBBOCK, TX 79404-2035

193 CYPHERS, EDWIN
3215 TEAK AVE
LUBBOCK, TX 79404-2035

194 COLLINS, MARGARET
1828 E 25TH ST
LUBBOCK, TX 79404

195 GARNER OZE C MS
% PAULA BIBBS-SAMUELS
805 S IVORY ST
SLATON, TX 79364-5740

196 SALDANA, DOLORES
1325 47TH ST
LUBBOCK, TX 79412-2321

197 CONTRERAS, PHILLIP
1929 N TURMERIC
LUBBOCK, TX 79403

198 LUBBOCK HOUSING AUTHORITY
1708 CRICKETS AVE
LUBBOCK, TX 79401-5105

199 TSAI PETER & LI-HUNG C
% UNITED COMMERCE CENTER
1720 E HWY 356
IRVING, TX 75060

200 UNITED COMMERCE CENTERS INC
10679 HARRY HINES BLVD
DALLAS, TX 75220-2611

201 EDWARDS, NETTIE J
3004 80TH ST
LUBBOCK, TX 79423-2021

202 FLETCHER, DORIS LEE VEST
2605 75TH ST
LUBBOCK, TX 79423-2101

203 SNODGRASS MANER CO
PO BOX 579
LUBBOCK, TX 79408-0579

204 HEREFORD, SURLESTER
3102 E AUBURN ST
LUBBOCK, TX 79403-4133

205 FAIR SONYA & DAVID
1821 MANHATTAN DR
LUBBOCK, TX 79404

206 CHANDLER, WILLIE MAE
Attn: CAROLYN L HARPER
4290 CROWN BLVD #APT 44
DENVER, CO 80239-4814

207 PARKS, JAMES
ADDRESS UNKNOWN

208 WILLIAMS, JOSEPH EDDIE
ADDRESS UNKNOWN

209 WASHINGTON, T L EST OF
% LAVERNE BIBBS
2934 E BATES ST
LUBBOCK, TX 79403-4122

210 BUTLER, EARVIN
1510 E 1ST PL
LUBBOCK, TX 79403-3404

211 PRIESTLY, CARLTON
% WILLIE RUTH PRIESTLY
607 MAPLEWOOD CIR
PFLUGERVILLE, TX 78660-2880

212 HAMMONDS, CHARLES WALTER
1046 GREYWOOD DR
VAN ALSTYNE, TX 75495

213 HOWARD, JOHN HENRY
7307 BRYERS CIR
PLANO, TX 75025-2205

214 LEWIS, PATRICK
2611 GLOBE AVE
LUBBOCK, TX 79404-1731

215 BROWN, PEARL
ADDRESS UNKNOWN

216 MT GILEAD BAPTIST CHURCH
2512 FIR AVE
LUBBOCK, TX 79404-1724

217 COLEMAN, TOBY
ADDRESS UNKNOWN

218 BAPTIST CHURCH GREATER ST LUKE
306 E 26TH ST
LUBBOCK, TX 79404-1606

219 ADAMS, SHIRLEY R
4160 189TH PL
COUNTRY CLUB HILLS, IL 60478-5704

220 PARKER, BEULAH ETAL
1306 60TH ST
LUBBOCK, TX 79413-3618

221 WAGGONER, W LEROY
ADDRESS UNKNOWN

222 THOMAS, FRANCIS
ADDRESS UNKNOWN

223 SWENSON, JOHN
ADDRESS UNKNOWN

224 LINK MINISTRIES INC
1414 KENT ST
LUBBOCK, TX 79403-1405

225 COURTNEY DELTON & STELLA R
49 SOUTHBURY RD
CLIFTON PARK, NY 12065

226 ROFE, JAVARA
ADDRESS UNKNOWN

227 CHURCH OF THE LIVING GOD
ADDRESS UNKNOWN

228 BUNTON, MABLE
1711 E 28TH ST
LUBBOCK, TX 79404-2003

229 CHURCH OF GOD IN CHRIST
JAMES JUDIE
2925 E COLGATE ST
LUBBOCK, TX 79403-3605

230 SOLTANI JALAL
10301 NORFOLK AVE
LUBBOCK, TX 79423

231 STALLINGS LARRY C
PO BOX 32190
AMARILLO, TX 79120-2190

232 ATTEBURY GRAIN INC
PO BOX 2707
AMARILLO, TX 79105-2707

PYCO INDUSTRIES INC
2901 AVE A
LUBBOCK, TX 79404-2231

CRBBB PARTNERSHIP LP
5201 19TH ST
LUBBOCK, TX 79407

FARMERS CO-OP COMPRESS
PO BOX 2877
LUBBOCK, TX 79408-2877

ONCOR ELECTRIC DELIVERY
COMPANY LLC
PO BOX 139100
DALLAS, TX 75313-9100

PLAINS COTTON COOP
ASSOCIATION
PO BOX 2827
LUBBOCK, TX 79408-2827

SCHOPPA, RODNEY
2605 CR 2800
LUBBOCK, TX 79403

MICKAN RUSSELL
KAY MICKAN SPEER
1405 PONY EXPRESS LANE
COPPERAS COVE, TX 76522

GREEN J H TRUSTS
PO BOX 1204
DUNCAN, OK 73534-1204

FRITZ, KENNETH
2308 FM 1729
LUBBOCK, TX 79403-7049

FRITZ, CAROL A
5815 E FM 835
LUBBOCK, TX 79403-7034

TORRES, ALMA
4801 COUNTY ROAD 2800
LUBBOCK, TX 79404

BRASHEAR JUSTON THOMAS &
DANYELLE MARIE
1909 128TH ST
LUBBOCK, TX 79423-7456

KUNKEL CLARK & MARK LEMMONS &
CLINT WHITTLE
4905 E FM 835
LUBBOCK, TX 79403

ADAMS PROPERTY HOLDINGS LLC
PO BOX 45
IDALOU, TX 79329

FITHEN, LESLIE
5437 45TH ST
LUBBOCK, TX 79414

TORRES RUDY & ANNETTE
4935 E FM 835
LUBBOCK, TX 79403-9685

LUBBOCK RIVERWALK LLC
6301 INDIANA AVE
LUBBOCK, TX 79413

MICHAEL ROSS HOLDINGS LLC
6301 INDIANA AVE
LUBBOCK, TX 79413

RONNIE ZAHN PAVING INC
6608 MLK BLVD
LUBBOCK, TX 79404

ARNETT SAM C III
ABBY F QUINN & WILLIAM A
FLYGARE 806 AVE J
LUBBOCK, TX 79401-2717

BECK, FRANK W
6406 FM 835
LUBBOCK, TX 79403-7004

FOERSTER EARL TRUST & MILTON
GLORIA J KEETON
7412 HURON AVE LUBBOCK, TX
79424

BASF AGRICULTURAL SOLUTIONS
SEED US LLC
100 PARK AVE FLORHAM PARK, NJ
07932

JOSEPH ADAM CORPORATION
PO BOX 64791
LUBBOCK, TX 79464-4791

GWINN ALY TRUST
JARET W GREASER & BURT C
HEINRICH C0-TRS
PO BOX 1378 LUBBOCK, TX 79408

PLAYA LAKE FARM & RANCH LP
11107 MIAMI AVE
LUBBOCK, TX 79423

MCGEHEE DENNIS H & JULIE
PO BOX 1368
IDALOU, TX 79329

FOERSTER, MARC
5907 FM 835
LUBBOCK, TX 79403

FALLIN RODNEY & THERESA
5209 E COUNTY ROAD 6610
LUBBOCK, TX 79403

NUNEZ ANTONIO & REYNA
6210 E COUNTY ROAD 6450
LUBBOCK, TX 79403

LEPRINO FOODS COMPANY
1830 W 38TH AVE
DENVER, CO 80211-2225

BASF CORPORATION
100 PARK AVE
FLORHAM PARK, NJ 07932-1089

LOS CARNALES MC
4022 WOODROW RD
LUBBOCK, TX 79423

ADAMS C POWELL & CAROL
7317 E FM 40 LUBBOCK, TX 79403

SIEBER TRUST
PROSPERITY BANK TRUST
1401 AVE Q
LUBBOCK, TX 79401-3819

LUBBOCK REGIONAL MHMR DBA
STARCARE SPECIALTY HEALTH
SYSTEM
904 AVENUE O
LUBBOCK, TX 79401-3924

REYES RAMIRO & DEBRA
15916 N COUNTY ROAD 2500
ABERNATHY, TX 79311-5333

CERDA JOSE L
GUADALUPE REYES & ZETA
RODRIGUEZ
2902 2ND PL LUBBOCK, TX 79415

WALTON BONNIE
TESSIE ESTATE
ADDRESS UNKNOWN

RODRIGUEZ ROGER & MARIA ELENA
8710 GOLDEN PT
SAN ANTONIO, TX 78239

RODRIGUEZ, MANUEL
13538 BALLAST RD
HOUSTON, TX 77044

PITTS, ELAINE
140 CR 3051
DECATUR, TX 76234-4610

THOMPSON JAMES E ET AL
2609 E 19TH ST
LUBBOCK, TX 79403-5829

GIL, LUIS JESUS
PO BOX 348
SMYER, TX 79367-0348

STROUP, MICHAEL ERVIN
2605 E 19TH ST
LUBBOCK, TX 79403-5829

PUCKETT, WILEY ESTATE
ADDRESS UNKNOWN

ODDIE FREDDRICK II
DARAVION J BONNER JR
904 W LAUREL ST
COMPTON, CA 90220-2907

BUTLER, REGINA
4013 47TH ST
LUBBOCK, TX 79413

GARCIA ANGEL & EMERY
2506 58TH ST
LUBBOCK, TX 79413-5632

CARTER, BRYCE CYRLOYD
4013 47TH ST
LUBBOCK, TX 79413

HERRERA, RAMONA (TOD)
2211 E 19TH ST
LUBBOCK, TX 79403

RAMIREZ, MARIA LETICIA
5419 48TH ST
LUBBOCK, TX 79414-1523

MATA, CHRISTINA V
3702 ENGLEWOOD
LUBBOCK, TX 79407

JOINER MELVIN & WELBURN TRAVIS
ADDRESS UNKNOWN

3D LAND DEVELOPMENT LLC
2621 21ST ST
LUBBOCK, TX 79410

SUBIA MARGARITA ELVIRA & EST OF
VIRGINIA R
1720 VANDA AVE
LUBBOCK, TX 79403

MARTINEZ LUPE & EST OF VIRIGINIA
SUBIA
1720 VANDA AVE
LUBBOCK, TX 79403

GUTIERREZ, JOE
JANIE GUTIERREZ
4828 8TH ST LUBBOCK, TX 79416

SALAS, AMY
1716 UTE AVE
LUBBOCK, TX 79404

MC CULLOUGH, MARY
2205 E 29TH ST
LUBBOCK, TX 79404-2016

CLEAVER, DORIS R
1811 SPRUCE AVE
LUBBOCK, TX 79408-5322

CANALES SANTOS JR & REFUGIA M
1721 E 19TH ST
LUBBOCK, TX 79403

OCHOA, JOHN
5223 16TH ST
LUBBOCK, TX 79416

ALDERETE, SANDY
1105 A MCCLELLAN AVE
MONTEREY, CA 93940

GUZMAN, NATALIA M
1715 E 19TH ST
LUBBOCK, TX 79403

ACOSTA JORGE & RUTH
2815 O'BANNON
DALLAS, TX 75224

RAGSDALE H L ESTATE OF
c/o DOROTHY WILKERSON
2708 TEAK AVENUE LUBBOCK, TX
79404

HERNANDEZ, LEE, SR
1709 E 19TH ST
LUBBOCK, TX 79403

SANCHEZ, ELSA
1707 E 19TH ST
LUBBOCK, TX 79403-5725

CURRY FUNERAL HOME INC
1805 MLK BLVD
LUBBOCK, TX 79403

MOUSAVIJAM, MIRASAAD
11212 GENOA AVE
LUBBOCK, TX 79424-3963

ROCC SOLID FITNESS LLC
5014 18TH ST
LUBBOCK, TX 79416

MANN, VERA LEGALE
2238 LOCUST ST
AMARILLO, TX 79109-1921

J & J PARTNERSHIP
8001 QUAKER AVE #STE L
LUBBOCK, TX 79424

JAY BIRD INVESTMENTS INC
5025 50th ST #STE A
LUBBOCK, TX 79414

LUBBOCK ISD
1628 19TH ST
LUBBOCK, TX 79401-4832

FOSTER, RAYMON
3417 40TH ST
LUBBOCK, TX 79413

ANZLEY, LAFRANCES RICHARDSON
1827 MANHATTAN DR
LUBBOCK, TX 79404-1317

KNIGHTEN, RHONALD
1110 41ST ST #UNIT B
LUBBOCK, TX 79412-2040

HOWARD, JOHN HENRY
7307 BRYERS CIR
PLANO, TX 75025-2205

ROSS, WENDY TOLSON
8605 NW 74TH TER
KANSAS CITY, MO 64152

NIELAND, VICTOR MANUEL
1322 E 24TH ST
LUBBOCK, TX 79404

MC KNIGHT, SAMANTHA MASON
ESTATE ETAL
1324 E 24TH ST
LUBBOCK, TX 79404

THOMAS, MAJORIE
1122 MEADOWLARK LN
DESOTO, TX 75115-8042

PHEA DOROTHY B ESTATE OF
3308 S MACGREGOR WAY
HOUSTON, TX 77021

MC CORMICK, MAXINE
1330 E 24TH ST
LUBBOCK, TX 79404-1202

WALKER BYRON JR & BRIDGETT C
1332 E 24TH ST
LUBBOCK, TX 79404-1202

AUGUST & MELESSA HOWARD FAMILY
TRUST
HOWARD AUGUST J & MELESSA W
TRUSTEES
7307 BRYERS CIRCLE
PLANO, TX 75025

CHILDERS, CURTIS W
PO BOX 883
BASTROP, TX 78602-0883

DORSEY BETTIE MAE ESTATE OF &
IRION ROSS ET AL
2112 E 29TH ST
LUBBOCK, TX 79404

RAY, ROBERT L
JACQUELYN PORCH
1516 E 1ST PL
LUBBOCK, TX 79403

BUTLER, JAMES A
TODD SANDERS
2720 E 9TH ST
LUBBOCK, TX 79403

MVIII PROPERTIES LLC
605 N WINSTON AVE
LUBBOCK, TX 79416

WILLIAMS, REGINALD
1710 E 24TH ST
LUBBOCK, TX 79404

MANN-STEWART TIFFANY &
TRIELLIS STEWART
2418 E 8TH ST
LUBBOCK, TX 79403

ROSSMAN, WOODSON
1518 E 24TH ST
LUBBOCK, TX 79404

BAPTIST CHURCH LYONS CHAPEL
1704 E 24TH ST
LUBBOCK, TX 79404-1302

LUBBOCK BOYS CLUB INC
WESLEY STRENGTH
3221 59TH ST
LUBBOCK, TX 79413-5515

PHEA JOE W JR
1819 E 24TH ST
LUBBOCK, TX 79404-1303

FAIR SONYA & DAVID
1821 MANHATTAN DR
LUBBOCK, TX 79404

VASQUEZ, ROSABELLE
1823 MANHATTAN DR
LUBBOCK, TX 79404

BAPTIST CHURCH GREATER ST
LUKE
306 E 26TH ST
LUBBOCK, TX 79404-1606

HILL, MARY KATHERINE
2815 BARBEE ST
HOUSTON, TX 77004

HILL DAMON H JR
STEPHANIE JO
1831 MANHATTAN DR
LUBBOCK, TX 79404-1317

PRIESTLY, WILLIE RUTH
607 MAPLEWOOD CIR
PFLUGERVILLE, TX 78660

BEN & JERRYS PROPERTIES LLC
8282 MOBERLY LN
DALLAS, TX 75227

THUNDER SUN INC
6303 INDIANA AVE
LUBBOCK, TX 79413

JOHNSON, HEENAN
8302 TRENTON AVE
LUBBOCK, TX 79424-4726

CAVIEL, BILLIE JEAN
2401 E 28TH ST
LUBBOCK, TX 79404

BROWN CHARLES E III & MARCUS D
2403 E 28TH ST
LUBBOCK, TX 79404

WILLIAMS, RACHEL
2405 E 28TH ST
LUBBOCK, TX 79404

COX, COLTER
3014 125TH ST
LUBBOCK, TX 79423

VINCENT, SHAYNE
4707 81ST PL
LUBBOCK, TX 79424

WILEY, TINA
2411 E 28TH ST
LUBBOCK, TX 79404

JEFFERSON, LILLIAN N (TOD)
5506 76TH ST
LUBBOCK, TX 79424

LLANAS JULIO & ROSA
4007 110th ST
LUBBOCK, TX 79423

RM INVESTMENT GROUP LLC
10601 CLARENCE DR #STE 250
FRISCO, TX 75033

JOHNSON, LASHONDA B
2419 E 28TH ST
LUBBOCK, TX 79404

DIXON, BETTY LENNOX
2421 E 28TH ST
LUBBOCK, TX 79404

JOHNSON, JANICE
2423 E 28TH ST
LUBBOCK, TX 79404

KAVIANI MEHRNOOSH
4210 88TH PL
LUBBOCK, TX 79423-2940

HODGE, MILTON L
2429 E 28TH ST
LUBBOCK, TX 79404

WELLS, CLARENCE
4260 DECATUR DR
WOODBRIDGE, VA 22193-1889

BROWN, MARCUS D
2101 SE 36TH AVE
AMARILLO, TX 79118-7744

HAWTHRONE, LATORSHA
1705 E 1ST PL
LUBBOCK, TX 79403

LEWIS, WILLIAM T
2437 E 28TH ST
LUBBOCK, TX 79404

TINGLUND GABRIELA MARIA & LILLIAN
2439 E 28TH ST
LUBBOCK, TX 79404

MOORE RAMONA & CHAD
2901 BEECH AVE
LUBBOCK, TX 79404

WATLEY, MICHAEL J
2903 BEECH AVE
LUBBOCK, TX 79404

SPENCER EDDIE L & DIANA M
2905 BEECH AVE
LUBBOCK, TX 79404

ROWE, CONNI C
2907 BEECH AVE
LUBBOCK, TX 79404

MOORE, ARWILLA
2628 IVORY AVE
LUBBOCK, TX 79404

CARTER CHAPEL C M E CHURCH
PO BOX 413
LUBBOCK, TX 79408-0413

ROSS KATHERINE J
KARL JACKSON
2915 BEECH AVE
LUBBOCK, TX 79404

VAZQUEZ, ROBERT TALAVERA
2917 BEECH AVE
LUBBOCK, TX 79404

ELIZALDE JOSE A R & SILVIA C B MORALES
2919 BEECH AVE
LUBBOCK, TX 79404

LUELLEN, RITA K
2921 BEECH AVE
LUBBOCK, TX 79404

SIX SHOOTER ENTERPRISES LLC
1821 S MCELROY ST
CRANE, TX 79631

ARREOLA MARIBEL G & ERASMO MARTINEZ BONILLA
5520 E COUNTY ROAD 6540
LUBBOCK, TX 79403

WHITFIELD STANLEY & CHARLOTTE
2802 E 30TH ST
LUBBOCK, TX 79404-2046

LEE, MATTHEWS
10601 DIXON AVE
LUBBOCK, TX 79423

BMC HOLDINGS LLC
5109 82ND ST SUITE 7 #330
LUBBOCK, TX 79424

JBRB HOLDINGS LLC
3502 AVENUE N #UNIT A
LUBBOCK, TX 79412

GATEWOOD, MICHAEL
3146 BLUESTEM DR
GARLAND, TX 75044-6546

STEWART, KENNETH W
1831 KIRKWOOD DR
MACON, GA 31211

MONTGOMERY, KATHERINE M EST OF
815 S CENTER ST #UNIT F
GRAND PRAIRIE, TX 75051

PAA FLATLAND VENTURES LLC
5007 AVE U
LUBBOCK, TX 79412

COLEMAN, JANIE EARL
2436 E 30TH ST
LUBBOCK, TX 79404

MANHATTAN HTS CHURCH OF CHR
2434 E 30TH ST
LUBBOCK, TX 79404

JOHNSON LUEJENNER & ALIZEAN HUNT
2432 E 30TH ST
LUBBOCK, TX 79404

PEPPERS, RAYMOND, JR
2428 E 30TH ST
LUBBOCK, TX 79404-2023

ROSS, GLENN
2426 E 30TH ST
LUBBOCK, TX 79404-2023

GUY, PATRICIA A
2424 E 30TH ST
LUBBOCK, TX 79404

HARRIS, BULAH
2422 E 30TH ST
LUBBOCK, TX 79404-2023

JACKSON ARLEE ESTATE OF
2420 E 30TH ST
LUBBOCK, TX 79404

PENDGRAFT, CLOVIS S
2418 E 30TH ST
LUBBOCK, TX 79404-2023

BROOKS, ELNORA JONES
2416 E 30TH ST
LUBBOCK, TX 79404-2023

AUSTIN DERRICK D & DARNISE A
2439 E 30TH ST
LUBBOCK, TX 79404-2022

BOLDEN ERIE LEE ESTATE & IDA AUSTIN & IRENE BURKS & JOHN L & WAYNE & RICKY & KENNETH BOLDEN
2412 E 30TH ST
LUBBOCK, TX 79404-2023

DARTHARD, MINNIE LUE
2410 E 30TH ST
LUBBOCK, TX 79404-2023

ORNELAS EDUARDO & MARISOL SALCIDO
2408 E 30TH ST
LUBBOCK, TX 79404

STEPTOE, ELIJAH, JR
2406 E 30TH ST
LUBBOCK, TX 79404

FLORES MICHELLE LEE & ISRAEL
2404 E 30TH ST
LUBBOCK, TX 79404

WILSON, CORI M
2402 E 30TH ST
LUBBOCK, TX 79404-2023

SMITH, DORIS HOOD
807 WESTOVER DR
LANCASTER, TX 75134-3732

MOUNTS, AARON
4105 84TH ST
LUBBOCK, TX 79423

RAGLAND, CAROLYN
2128 E 30TH ST
LUBBOCK, TX 79404-2021

BROWN LINDA D ESTATE OF
2126 E 30TH ST
LUBBOCK, TX 79404

WILLIAMS SAMMY L & ROSE MARY & JACQULIN
2122 E 30TH ST
LUBBOCK, TX 79404

RAGSDALE, CHARLES L
2118 E 30TH ST
LUBBOCK, TX 79404-2021

SIPP HOMES LLC
605 CROSBY DR
ALTAMONTE SPRINGS, FL 32714-7217

TAYLOR JOHNNIE V ESTATE OF
6704 TULLOCH WAY
AUSTIN, TX 78754-5822

BROWN CHALK JOHNSTON LP
PO BOX 550
PLAINVIEW, TX 79073

NORRIS, GRENLYN A
2110 E 30TH ST
LUBBOCK, TX 79404

COTTON, WILLIE
2106 E 30TH ST
LUBBOCK, TX 79404-2021

WARREN ALICE J & MARY MALONE LYNDA LEON BOOKER
6614 BILLIKIN DR
HOUSTON, TX 77086

PROFFER, ANDREW JACOB
2102 E 30TH ST
LUBBOCK, TX 79404

ANDERSON, KATHYL R
2914 UTE AVE
LUBBOCK, TX 79404-2038

HAMBRICK, BILLY
2913 TEAK AVE
LUBBOCK, TX 79404

BELL, MARY EDNA
3125 DIAMOND BLVD 235
SAN ANGELO, TX 76905

RADER, DAVID
3109 TEAK AVE
LUBBOCK, TX 79404

CARROLL, DESIREE K
1313 49TH ST
LUBBOCK, TX 79412-2331

HUDSON CHARLIE F & WILLIE H
THOMAS &
RUTH GREEN
2135 W 108TH ST
LOS ANGELES, CA 90047

URBAN RENEWAL
COMMUNITY DEV DEPT
PO BOX 2000
LUBBOCK, TX 79457-0001

SOUTHWEST PROPERTY
DEVELOPMENT AND CONST LLC
10408 WAVERLY AVE
LUBBOCK, TX 79424-4678

QUIGLEY, CORY
2318 BIRCH AVE
LUBBOCK, TX 79404

DAVIS SHAFT DESHONE ESTATE OF
c/o YOLANDA WALKER DEPENDENT
ADMINR
2806 GREEN OAKS DR
GARLAND, TX 75046

NELSON, BOBBIE DAVIS
1713 E AMHERST ST
LUBBOCK, TX 79403-4039

WALKER, RUBY
3211 TEAK AVE
LUBBOCK, TX 79404-2035

GRIMES W L EST
3213 TEAK AVE
LUBBOCK, TX 79404-2035

CYPHERS, EDWIN
3215 TEAK AVE
LUBBOCK, TX 79404-2035

COLLINS, MARGARET
1828 E 25TH ST
LUBBOCK, TX 79404

GARNER OZE C MS
% PAULA BIBBS-SAMUELS
805 S IVORY ST
SLATON, TX 79364-5740

SALDANA, DOLORES
1325 47TH ST
LUBBOCK, TX 79412-2321

CONTRERAS, PHILLIP
1929 N TURMERIC
LUBBOCK, TX 79403

LUBBOCK HOUSING AUTHORITY
1708 CRICKETS AVE
LUBBOCK, TX 79401-5105

TSAI PETER & LI-HUNG C
% UNITED COMMERCE CENTER
1720 E HWY 356
IRVING, TX 75060

UNITED COMMERCE CENTERS INC
10679 HARRY HINES BLVD
DALLAS, TX 75220-2611

EDWARDS, NETTIE J
3004 80TH ST
LUBBOCK, TX 79423-2021

FLETCHER, DORIS LEE VEST
2605 75TH ST
LUBBOCK, TX 79423-2101

SNODGRASS MANER CO
PO BOX 579
LUBBOCK, TX 79408-0579

HEREFORD, SURLESTER
3102 E AUBURN ST
LUBBOCK, TX 79403-4133

FAIR SONYA & DAVID
1821 MANHATTAN DR
LUBBOCK, TX 79404

CHANDLER, WILLIE MAE
Attn: CAROLYN L HARPER
4290 CROWN BLVD #APT 44
DENVER, CO 80239-4814

PARKS, JAMES
ADDRESS UNKNOWN

WILLIAMS, JOSEPH EDDIE
ADDRESS UNKNOWN

WASHINGTON, T L EST OF
% LAVERNE BIBBS
2934 E BATES ST
LUBBOCK, TX 79403-4122

BUTLER, EARVIN
1510 E 1ST PL
LUBBOCK, TX 79403-3404

PRIESTLY, CARLTON
% WILLIE RUTH PRIESTLY
607 MAPLEWOOD CIR
PFLUGERVILLE, TX 78660-2880

HAMMONDS, CHARLES WALTER
1046 GREYWOOD DR
VAN ALSTYNE, TX 75495

HOWARD, JOHN HENRY
7307 BRYERS CIR
PLANO, TX 75025-2205

LEWIS, PATRICK
2611 GLOBE AVE
LUBBOCK, TX 79404-1731

BROWN, PEARL
ADDRESS UNKNOWN

MT GILEAD BAPTIST CHURCH
2512 FIR AVE
LUBBOCK, TX 79404-1724

COLEMAN, TOBY
ADDRESS UNKNOWN

BAPTIST CHURCH GREATER ST LUKE
306 E 26TH ST
LUBBOCK, TX 79404-1606

ADAMS, SHIRLEY R
4160 189TH PL
COUNTRY CLUB HILLS, IL 60478-5704

PARKER, BEULAH ETAL
1306 60TH ST
LUBBOCK, TX 79413-3618

WAGGONER, W LEROY
ADDRESS UNKNOWN

THOMAS, FRANCIS
ADDRESS UNKNOWN

SWENSON, JOHN
ADDRESS UNKNOWN

LINK MINISTRIES INC
1414 KENT ST
LUBBOCK, TX 79403-1405

COURTNEY DELTON & STELLA R
49 SOUTHBURY RD
CLIFTON PARK, NY 12065

ROFE, JAVARA
ADDRESS UNKNOWN

CHURCH OF THE LIVING GOD
ADDRESS UNKNOWN

BUNTON, MABLE
1711 E 28TH ST
LUBBOCK, TX 79404-2003

CHURCH OF GOD IN CHRIST
JAMES JUDIE
2925 E COLGATE ST
LUBBOCK, TX 79403-3605

SOLTANI JALAL
10301 NORFOLK AVE
LUBBOCK, TX 79423

STALLINGS LARRY C
PO BOX 32190
AMARILLO, TX 79120-2190

ATTEBURY GRAIN INC
PO BOX 2707
AMARILLO, TX 79105-2707

Attachment F

Spanish NORI

Comisión de Calidad Ambiental del Estado de Texas

AVISO DE RECIBO DE LA SOLICITUD Y
EL INTENTO DE OBTENER PERMISO PARA LA CALIDAD DEL AGUA
MODIFICACION

PERMISO NO. WQ00_____

SOLICITUD. La Ciudad de Lubbock, P.O. Box 2000, Lubbock, Texas 79457, ha solicitado a la Comisión de Calidad Ambiental del Estado de Texas (TCEQ) para modificar el Permiso No. WQ0010353002 (EPA I.D. No. TXTX0106071) del Sistema de Eliminación de Descargas de Contaminantes de Texas (TPDES) para autorizar: la descarga de aguas residuales tratadas en un volumen que no exceda un flujo promedio anual de 9,000,000 de galones por día del Emisario 001; la eliminación de aguas residuales tratadas en un volumen que no exceda un flujo promedio anual de 14,500,000 galones por día desde el Emisario 002 mediante irrigación en el Sitio de Aplicación Terrestre de Lubbock (LLAS); la eliminación de aguas residuales tratadas en un volumen que no exceda un flujo promedio anual de 12,000,000 de galones por día desde el Emisario 003 a través del Sitio de Aplicación Terrestre de Hancock (HLAS); la eliminación del efluente tratado del Emisario 004 a una tasa intermitente y de flujo variable a través de un contrato con una fuente externa para suministrar agua de reutilización industrial (agua de reposición de refrigeración) para la Planta de Energía Jones; del Emisario 005, la eliminación de efluentes mediante riego por parte de usuarios de agua recuperada según la autorización del Capítulo 210 del Código Administrativo 30 de Texas (TAC) de la Ciudad; y un aumento del Emisario 007, la descarga de aguas residuales domésticas tratadas en un volumen que no exceda un flujo promedio anual de 24,400,000 galones por día, y para mejorar la calidad del efluente mediante la incorporación de la eliminación biológica de nutrientes (BNR) en el proceso de tratamiento. El volumen total de efluente no excederá un caudal promedio anual de 31,500,000 galones por día el cual se reporta como Emisario 006.

La planta está ubicada en 3603 East Guava Avenue, Lubbock, en el condado de Lubbock, Texas 79404. La ruta de descarga es desde el sitio de la planta a través del emisario 001 hasta el río North Fork Double Mountain Fork Brazos; de allí al río Double Mountain Fork Brazos; y por el emisario 007 hasta North Fork Double Mountain Fork Brazos River; de allí al lago Buffalo Springs; de allí al cañón del lago Ransom; de allí al río Brazos North Fork Double Mountain Fork; de allí al río Double Mountain Fork Brazos. La TCEQ recibió esta solicitud el 29 de mayo de 2024. La solicitud para el permiso estará disponible para leerla y copiarla en la Biblioteca Pública George & Helen Mahon, vestíbulo principal de Entryway, 1306 9th Street, Lubbock, en el condado de Lubbock, Texas, y en el Ayuntamiento de Wilson. Secretario de la Ciudad, 1601 10th Street, Wilson, en el condado de Wilson, Texas. Este enlace a un mapa electrónico de la ubicación general del sitio o de la instalación es proporcionado como una cortesía y no es parte de la solicitud o del aviso. Para la ubicación exacta, consulte la solicitud.
https://gisweb.tceq.texas.gov/LocationMapper/?marker=-101.801111,33.5625&level=18

[Include the following non-italicized sentence if the facility is located in the Coastal Management Program boundary and is an application for a major amendment which will increase the pollutant loads to coastal waters or would result in relocation of an outfall to a critical areas, or a renewal with such a major amendment. The Coastal Management Program boundary is the area along the Texas Coast of the Gulf of México as depicted on the map in 31 TAC §503.1 and includes part or all of the following counties: Cameron, Willacy, Kenedy, Kleberg, Nueces, San Patricio, Aransas, Refugio, Calhoun, Victoria, Jackson, Matagorda, Brazoria, Galveston, Harris, Chambers, Jefferson y Orange. If the application is for amendment that does ot meet the above description, do not include the sentence: El Director Ejecutivo de la TCEQ ha revisado esta medida para ver si está de acuerdo con los objetivos y las regulaciones del Programa de Administración Costero de Texas (CMP) de acuerdo con las regulaciones del Consejo Coordinador de la Costa (CCC) y ha determinado que la acción es conforme con las metas y regulaciones pertinentes del CMP.

AVISO ADICIONAL. El Director Ejecutivo de la TCEQ ha determinado que la solicitud es administrativamente completa y conducirá una revisión técnica de la solicitud. Después de completar la revisión técnica, el Director Ejecutivo puede preparar un borrador del permiso y emitirá una Decisión Preliminar sobre la solicitud. **El aviso de la solicitud y la decisión preliminar serán publicados y enviado a los que están en la lista de correo de las personas a lo largo del condado que desean recibir los avisos y los que están en la lista de correo que desean recibir avisos de esta solicitud. El aviso dará la fecha límite para someter comentarios públicos.**

COMENTARIO PUBLICO / REUNION PUBLICA. Usted puede presentar comentarios públicos o pedir una reunión pública sobre esta solicitud. El propósito de una reunión pública es dar la oportunidad de presentar comentarios o hacer preguntas acerca de la solicitud. La TCEQ realiza una reunión pública si el Director Ejecutivo determina que hay un grado de interés público suficiente en la solicitud o si un legislador local lo pide. Una reunión pública no es una audiencia administrativa de lo contencioso.

OPORTUNIDAD DE UNA AUDIENCIA ADMINISTRATIVA DE LO CONTENCIOSO. Después del plazo para presentar comentarios públicos, el Director Ejecutivo considerará todos los comentarios apropiados y preparará una respuesta a todo los comentarios públicos esenciales, pertinentes, o significativos. **A menos que la solicitud haya sido referida directamente a una audiencia administrativa de lo contencioso, la respuesta a los comentarios y la decisión del Director Ejecutivo sobre la solicitud serán enviados por correo a todos los que presentaron un comentario público y a las personas que están en la lista para recibir avisos sobre esta solicitud. Si se reciben comentarios, el aviso también proveerá instrucciones para pedir una reconsideración de la decisión del Director Ejecutivo y para pedir una audiencia administrativa de lo contencioso.** Una audiencia administrativa de lo contencioso es un procedimiento legal similar a un procedimiento legal civil en un tribunal de distrito del estado.

PARA SOLICITAR UNA AUDIENCIA DE CASO IMPUGNADO, USTED DEBE INCLUIR EN SU SOLICITUD LOS SIGUIENTES DATOS: su nombre, dirección, y número de teléfono; el nombre del solicitante y número del permiso; la ubicación y distancia de su propiedad/actividad con respecto a la instalación; una descripción específica de la forma cómo usted sería afectado adversamente por el sitio de una manera no común al público en general; una lista de todas las cuestiones de hecho en disputa que usted presente durante el período de comentarios; y la declaración "[Yo/nosotros] solicito/solicitamos una audiencia de caso impugnado". Si presenta

la petición para una audiencia de caso impugnado de parte de un grupo o asociación, debe identificar una persona que representa al grupo para recibir correspondencia en el futuro; identificar el nombre y la dirección de un miembro del grupo que sería afectado adversamente por la planta o la actividad propuesta; proveer la información indicada anteriormente con respecto a la ubicación del miembro afectado y su distancia de la planta o actividad propuesta; explicar cómo y porqué el miembro sería afectado; y explicar cómo los intereses que el grupo desea proteger son pertinentes al propósito del grupo.

Después del cierre de todos los períodos de comentarios y de petición que aplican, el Director Ejecutivo enviará la solicitud y cualquier petición para reconsideración o para una audiencia de caso impugnado a los Comisionados de la TCEQ para su consideración durante una reunión programada de la Comisión. La Comisión sólo puede conceder una solicitud de una audiencia de caso impugnado sobre los temas que el solicitante haya presentado en sus comentarios oportunos que no fueron retirados posteriormente. Si se concede una audiencia, el tema de la audiencia estará limitado a cuestiones de hecho en disputa o cuestiones mixtas de hecho y de derecho relacionadas a intereses pertinentes y materiales de calidad del agua que se hayan presentado durante el período de comentarios.

LISTA DE CORREO. Si somete comentarios públicos, un pedido para una audiencia administrativa de lo contencioso o una reconsideración de la decisión del Director Ejecutivo, la Oficina del Secretario Principal enviará por correo los avisos públicos en relación con la solicitud. Ademas, puede pedir que la TCEQ ponga su nombre en una or mas de las listas correos siguientes (1) la lista de correo permanente para recibir los avisos de el solicitante indicado por nombre y número del permiso específico y/o (2) la lista de correo de todas las solicitudes en un condado especifico. Si desea que se agrega su nombre en una de las listas designe cual lista(s) y envia por correo su pedido a la Oficina del Secretario Principal de la TCEQ.

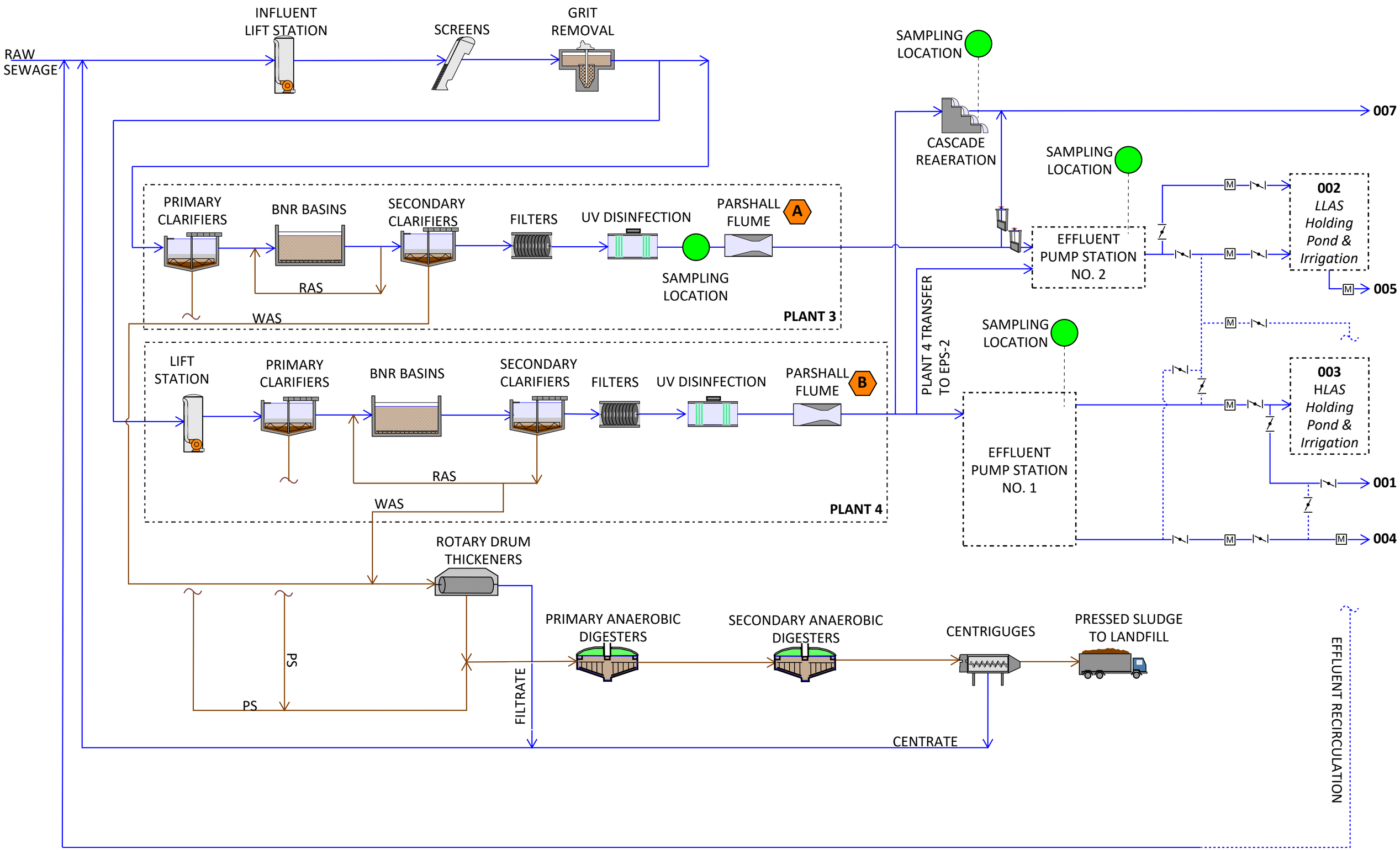
CONTACTOS E INFORMACIÓN A LA AGENCIA. Todos los comentarios públicos y solicitudes deben ser presentadas electrónicamente vía http://www14.tceq.texas.gov/epic/eComment/ o por escrito dirigidos a la Comisión de Texas de Calidad Ambiental, Oficial de la Secretaría (Office of Chief Clerk), MC-105, P.O. Box 13087, Austin, Texas 78711-3087. Tenga en cuenta que cualquier información personal que usted proporcione, incluyendo su nombre, número de teléfono, dirección de correo electrónico y dirección física pasarán a formar parte del registro público de la Agencia. Para obtener más información acerca de esta solicitud de permiso o el proceso de permisos, llame al programa de educación pública de la TCEQ, gratis, al 1-800-687-4040. Si desea información en Español, puede llamar al 1-800-687-4040.

También se puede obtener información adicional del la Ciudad de Lubbock a la dirección indicada arriba o llamando al Sr. Craig Henderson, R.S. al 806-775-3223.

Fecha de emisión _____ *[Date notice issued]*

Attachment TR-3

Process Flow Diagrams


RAW SEWAGE
INFLUENT LIFT STATION
SCREENS
GRIT REMOVAL
SAMPLING LOCATION
CASCADE REAERATION
007
SAMPLING LOCATION
PRIMARY CLARIFIERS
BNR BASINS
SECONDARY CLARIFIERS
FILTERS
UV DISINFECTION
PARSHALL FLUME
A
RAS
WAS
SAMPLING LOCATION
PLANT 3
EFFLUENT PUMP STATION NO. 2
002
LLAS Holding Pond & Irrigation
005
PLANT 4 TRANSFER TO EPS-2
SAMPLING LOCATION
LIFT STATION
PRIMARY CLARIFIERS
BNR BASINS
SECONDARY CLARIFIERS
FILTERS
UV DISINFECTION
PARSHALL FLUME
B
RAS
WAS
PLANT 4
EFFLUENT PUMP STATION NO. 1
003
HLAS Holding Pond & Irrigation
001
004
ROTARY DRUM THICKENERS
PS
PS
FILTRATE
PRIMARY ANAEROBIC DIGESTERS
SECONDARY ANAEROBIC DIGESTERS
CENTRIFUGES
PRESSED SLUDGE TO LANDFILL
CENTRATE
EFFLUENT RECIRCULATION

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

DOMESTIC WASTEWATER PERMIT APPLICATION CHECKLIST

Complete and submit this checklist with the application.

APPLICANT: City of Lubbock

PERMIT NUMBER: WQ0010353002

Indicate if each of the following items is included in your application.

	Y	N
Administrative Report 1.0	☒	☐
Administrative Report 1.1	☒	☐
SPIF	☒	☐
Core Data Form	☒	☐
Public Involvement Plan Form	☒	☐
Technical Report 1.0	☒	☐
Technical Report 1.1	☒	☐
Worksheet 2.0	☒	☐
Worksheet 2.1	☐	☒
Worksheet 3.0	☒	☐
Worksheet 3.1	☒	☐
Worksheet 3.2	☐	☒
Worksheet 3.3	☐	☒
Worksheet 4.0	☒	☐
Worksheet 5.0	☒	☐
Worksheet 6.0	☒	☐
Worksheet 7.0	☐	☒

	Y	N
Original USGS Map	☒	☐
Affected Landowners Map	☒	☐
Landowner Disk or Labels	☒	☐
Buffer Zone Map	☒	☐
Flow Diagram	☒	☐
Site Drawing	☒	☐
Original Photographs	☒	☐
Design Calculations	☒	☐
Solids Management Plan	☒	☐
Water Balance	☒	☐

For TCEQ Use Only

Segment Number _____ County _____
Expiration Date _____ Region _____
Permit Number _____

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

APPLICATION FOR A DOMESTIC WASTEWATER PERMIT ADMINISTRATIVE REPORT 1.0

If you have questions about completing this form please contact the Applications Review and Processing Team at 512-239-4671.

Section 1. Application Fees (Instructions Page 29)

Indicate the amount submitted for the application fee (check only one).

Flow	New/Major Amendment	Renewal
<0.05 MGD	$350.00 ☐	$315.00 ☐
≥0.05 but <0.10 MGD	$550.00 ☐	$515.00 ☐
≥0.10 but <0.25 MGD	$850.00 ☐	$815.00 ☐
≥0.25 but <0.50 MGD	$1,250.00 ☐	$1,215.00 ☐
≥0.50 but <1.0 MGD	$1,650.00 ☐	$1,615.00 ☐
≥1.0 MGD	$2,050.00 ☒	$2,015.00 ☐

Minor Amendment (for any flow) $150.00 ☐

Payment Information:

Mailed Check/Money Order Number: Click here to enter text.

Check/Money Order Amount: Click here to enter text.

Name Printed on Check: Click here to enter text.

EPAY Voucher Number: Click here to enter text.

Copy of Payment Voucher enclosed? Yes ☒ Attachment AR-1

Section 2. Type of Application (Instructions Page 29)

☐ New TPDES ☐ New TLAP

☒ Major Amendment *with* Renewal ☐ Minor Amendment *with* Renewal

☐ Major Amendment *without* Renewal ☐ Minor Amendment *without* Renewal

☐ Renewal without changes ☐ Minor Modification of permit

For amendments or modifications, describe the proposed changes: This amendment is to increase the flow of Outfall 007 from 14.5 MGD to 24.4 MGD and improve effluent quality by incorporating biological nutrient removal (BNR) into the treatment process.

For existing permits:

Permit Number: WQ0010353002

EPA I.D. (TPDES only): TX0106071

Expiration Date: November 27, 2024

Section 3. Facility Owner (Applicant) and Co-Applicant Information

(Instructions Page 29)

A. The owner of the facility must apply for the permit.

What is the Legal Name of the entity (applicant) applying for this permit?

City of Lubbock

(The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal documents forming the entity.)

If the applicant is currently a customer with the TCEQ, what is the Customer Number (CN)? You may search for your CN on the TCEQ website at http://www15.tceq.texas.gov/crpub/

CN: 600130736

What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

Prefix (Mr., Ms., Miss): Mr.

First and Last Name: W. Jarrett Atkinson

Credential (P.E, P.G., Ph.D., etc.): N/A

Title: City Manager

B. Co-applicant information. Complete this section only if another person or entity is required to apply as a co-permittee.

What is the Legal Name of the co-applicant applying for this permit?

N/A

(The legal name must be spelled exactly as filed with the TX SOS, with the County, or in the legal documents forming the entity.)

If the co-applicant is currently a customer with the TCEQ, what is the Customer Number (CN)? You may search for your CN on the TCEQ website at: http://www15.tceq.texas.gov/crpub/

CN: N/A

What is the name and title of the person signing the application? The person must be an executive official meeting signatory requirements in *30 TAC § 305.44*.

Prefix (Mr., Ms., Miss): N/A

First and Last Name: N/A

Credential (P.E, P.G., Ph.D., etc.): N/A

Title: N/A

Provide a brief description of the need for a co-permittee: N/A

C. Core Data Form

Complete the Core Data Form for each customer and include as an attachment. If the customer type selected on the Core Data Form is **Individual**, complete **Attachment 1** of Administrative Report 1.0.

Attachment: AR-2

Section 4. Application Contact Information (Instructions Page 30)

This is the person(s) TCEQ will contact if additional information is needed about this application. Provide a contact for administrative questions and technical questions.

A. Prefix (Mr., Ms., Miss): Mr.

First and Last Name: Craig Henderson

Credential (P.E, P.G., Ph.D., etc.): RS

Title: Wastewater System Supervisor

Organization Name: City of Lubbock

Mailing Address: P.O. Box 2000

City, State, Zip Code: Lubbock, TX 79457

Phone No.: 806-775-3223 Ext.: N/A Fax No.: 806-775-3246

E-mail Address: chenderson@mylubbock.us

Check one or both: ☒ Administrative Contact ☒ Technical Contact

B. Prefix (Mr., Ms., Miss): Ms.

First and Last Name: Cassandra Villarreal

Credential (P.E, P.G., Ph.D., etc.): M.S.

Title: Environmental Scientist

Organization Name: Freese and Nichols, Inc

Mailing Address: 801 Cherry St, Suite 2800

City, State, Zip Code: Fort Worth, TX 76102

Phone No.: 817-735-7294 Ext.: N/A Fax No.: 817-735-7492

E-mail Address: cassandra.villarreal@freese.com

Check one or both: ☒ Administrative Contact ☒ Technical Contact

Section 5. Permit Contact Information (Instructions Page 30)

Provide two names of individuals that can be contacted throughout the permit term.

A. Prefix (Mr., Ms., Miss): Mr.

First and Last Name: Tray Payne

Credential (P.E, P.G., Ph.D., etc.): N/A

Title: Mayor

Organization Name: City of Lubbock

Mailing Address: PO Box 2000

City, State, Zip Code: Lubbock, TX 79457

Phone No.: 806-775-2010 Ext.: N/A Fax No.: 806-775-3335

E-mail Address: Traypayne@mylubbock.us

B. Prefix (Mr., Ms., Miss): Ms.

First and Last Name: Shelia Patterson Harris

Credential (P.E, P.G., Ph.D., etc.): N/A

Title: Councilwoman District 2

Organization Name: City of Lubbock

Mailing Address: PO Box 2000

City, State, Zip Code: Lubbock, TX 79457

Phone No.: 806-775-2007 Ext.: N/A Fax No.: 806-775-3344

E-mail Address: SPattersonHarris@mylubbock.us

Section 6. Billing Information (Instructions Page 30)

The permittee is responsible for paying the annual fee. The annual fee will be assessed to permits ***in effect on September 1 of each year***. The TCEQ will send a bill to the address provided in this section. The permittee is responsible for terminating the permit when it is no longer needed (using form TCEQ-20029).

Prefix (Mr., Ms., Miss): Ms.

First and Last Name: Mary Gonzales

Credential (P.E, P.G., Ph.D., etc.): N/A

Title: Wastewater Treatment Plant Supervisor

Organization Name: City of Lubbock

Mailing Address: PO Box 2000

City, State, Zip Code: Lubbock, TX 79457

Phone No.: 806-775-3229 Ext.: N/A Fax No.: 805-775-3246

E-mail Address: mhgonzales@mylubbock.us

Section 7. DMR/MER Contact Information (Instructions Page 31)

Provide the name and complete mailing address of the person delegated to receive and submit Discharge Monitoring Reports (EPA 3320-1) or maintain Monthly Effluent Reports.

Prefix (Mr., Ms., Miss): Mr.

First and Last Name: L. Wood Franklin

Credential (P.E, P.G., Ph.D., etc.): P.E.

Title: Division Director of Public Works

Organization Name: City of Lubbock

Mailing Address: PO Box 2000

City, State, Zip Code: Lubbock, TX 79457

Phone No.: 806-775-2343 Ext.: N/A Fax No.: 806-775-3344

E-mail Address: wfranklin@mylubbock.us

DMR data is required to be submitted electronically. Create an account at:

https://www.tceq.texas.gov/permitting/netdmr/netdmr.html.

Section 8. Public Notice Information (Instructions Page 31)

A. Individual Publishing the Notices

Prefix (Mr., Ms., Miss): Mr.

First and Last Name: Craig Henderson

Credential (P.E, P.G., Ph.D., etc.): R.S.

Title: Wastewater System Supervisor

Organization Name: City of Lubbock

Mailing Address: PO Box 2000

City, State, Zip Code: Lubbock, TX 79457

Phone No.: 806-775-3223 Ext.: N/A Fax No.: 806-775-3246

E-mail Address: chenderson@mylubbock.us

B. Method for Receiving Notice of Receipt and Intent to Obtain a Water Quality Permit Package

Indicate by a check mark the preferred method for receiving the first notice and instructions:

☒ E-mail Address

☐ Fax

☒ Regular Mail

C. Contact person to be listed in the Notices

Prefix (Mr., Ms., Miss): Mr.

First and Last Name: Craig Henderson

Credential (P.E, P.G., Ph.D., etc.): R.S.

Title: Wastewater System Supervisor

Organization Name: City of Lubbock

Phone No.: 806-775-3223 Ext.: N/A

E-mail: chenderson@mylubbock.us

D. Public Viewing Information

If the facility or outfall is located in more than one county, a public viewing place for each county must be provided.

Public building name: Mahon Library / City Hall - Wilson

Location within the building: Entryway main lobby / City Hall Main Office - Wilson

Physical Address of Building: 1306 9th Street – Lubbock / 1601 10th Street - Wilson

City: Lubbock/Wilson County: Lubbock/Lynn

Contact Name: Craig Henderson

Phone No.: 806-775-3223 Ext.: N/A

E. Bilingual Notice Requirements:

This information **is required** for **new, major amendment, minor amendment or minor modification, and renewal applications**.

This section of the application is only used to determine if alternative language notices will be needed. Complete instructions on publishing the alternative language notices will be in your public notice package.

Please call the bilingual/ESL coordinator at the nearest elementary and middle schools and obtain the following information to determine whether an alternative language notices are required.

1. Is a bilingual education program required by the Texas Education Code at the elementary or middle school nearest to the facility or proposed facility?

   ☒ Yes ☐ No

   If **no**, publication of an alternative language notice is not required; **skip to** Section 9 below.

2. Are the students who attend either the elementary school or the middle school enrolled in a bilingual education program at that school?

   ☐ Yes ☒ No

3. Do the students at these schools attend a bilingual education program at another location?

   ☒ Yes ☐ No

4. Would the school be required to provide a bilingual education program but the school has waived out of this requirement under 19 TAC §89.1205(g)?

   ☐ Yes ☒ No

5. If the answer is yes to question 1, 2, 3, or 4, public notices in an alternative language are required. Which language is required by the bilingual program? Spanish

F. Public Involvement Plan Form

Complete the Public Involvement Plan Form (TCEQ Form 20960) for each application for a **new permit or major amendment to a permit** and include as an attachment.

Attachment: AR-3

Section 9. Regulated Entity and Permitted Site Information (Instructions Page 33)

A. If the site is currently regulated by TCEQ, provide the Regulated Entity Number (RN) issued to this site. **RN**101609949

Search the TCEQ's Central Registry at http://www15.tceq.texas.gov/crpub/ to determine if the site is currently regulated by TCEQ.

B. Name of project or site (the name known by the community where located):

Southeast Water Reclamation Plant

C. Owner of treatment facility: City of Lubbock

Ownership of Facility: ☒ Public ☐ Private ☐ Both ☐ Federal

D. Owner of land where treatment facility is or will be:

Prefix (Mr., Ms., Miss): N/A

First and Last Name: City of Lubbock

Mailing Address: PO Box 2000

City, State, Zip Code: Lubbock, TX 79457

Phone No.: 806-775-2343 E-mail Address: wfranklin@mylubbock.us

If the landowner is not the same person as the facility owner or co-applicant, attach a lease agreement or deed recorded easement. See instructions.

Attachment: N/A

E. Owner of effluent disposal site:

Prefix (Mr., Ms., Miss): N/A

First and Last Name: Attachment AR-4

Mailing Address: Attachment AR-4

City, State, Zip Code: Attachment AR-4

Phone No.: N/A E-mail Address: N/A

If the landowner is not the same person as the facility owner or co-applicant, attach a lease agreement or deed recorded easement. See instructions.

Attachment: AR-4

F. Owner of sewage sludge disposal site (if authorization is requested for sludge disposal on property owned or controlled by the applicant):

Prefix (Mr., Ms., Miss): N/A

First and Last Name: N/A

Mailing Address: N/A

City, State, Zip Code: N/A

Phone No.: N/A E-mail Address: N/A

If the landowner is not the same person as the facility owner or co-applicant, attach a lease agreement or deed recorded easement. See instructions.

Attachment: N/A

Section 10. TPDES Discharge Information (Instructions Page 34)

A. Is the wastewater treatment facility location in the existing permit accurate?

☒ Yes ☐ No

If **no**, **or a new permit application**, please give an accurate description:

N/A

B. Are the point(s) of discharge and the discharge route(s) in the existing permit correct?

☒ Yes ☐ No

If **no**, **or a new or amendment permit application**, provide an accurate description of the point of discharge and the discharge route to the nearest classified segment as defined in 30 TAC Chapter 307:

The location on file for Outfall 007 is correct: via Outfall 007 to the North Fork Double Mountain Fork Brazos River, thence to Buffalo Springs Lake, thence to Lake Ransom Canyon, thence to the North Fork Double Mountain Fork Brazos River, thence to the Double Mountain Fork Brazos River, in Segment No. 1241 of the Brazos River Basin. The nearest classified segment is the Double Mountain Fork Brazos River (Segment No. 1241).

City nearest the outfall(s): Lubbock and Wilson

County in which the outfalls(s) is/are located: Lubbock and Lynn

Outfall Latitude: AR-5 Longitude: AR-5

C. Is or will the treated wastewater discharge to a city, county, or state highway right-of-way, or a flood control district drainage ditch?

☐ Yes ☒ No

If **yes**, indicate by a check mark if:

☐ Authorization granted ☐ Authorization pending

For **new and amendment** applications, provide copies of letters that show proof of contact and the approval letter upon receipt.

Attachment: N/A

D. For all applications involving an average daily discharge of 5 MGD or more, provide the names of all counties located within 100 statute miles downstream of the point(s) of discharge.

Lubbock, Crosby, Garza, Kent

Section 11. TLAP Disposal Information (Instructions Page 36)

A. For TLAPs, is the location of the effluent disposal site in the existing permit accurate?

☒ Yes ☐ No

If **no, or a new or amendment permit application**, provide an accurate description of the disposal site location:

N/A

B. City nearest the disposal site: Lubbock

C. County in which the disposal site is located: Lubbock

E. For **TLAPs**, describe the routing of effluent from the treatment facility to the disposal site:

Attachment AR-5

F. For **TLAPs**, please identify the nearest watercourse to the disposal site to which rainfall runoff might flow if not contained:

North Fork Double Mountain Fork Brazos River

Section 12. Miscellaneous Information (Instructions Page 37)

A. Is the facility located on or does the treated effluent cross American Indian Land?

☐ Yes ☒ No

B. If the existing permit contains an onsite sludge disposal authorization, is the location of the sewage sludge disposal site in the existing permit accurate?

☐ Yes ☐ No ☒ Not Applicable

If No, or if a new onsite sludge disposal authorization is being requested in this permit application, provide an accurate location description of the sewage sludge disposal site.

N/A

C. Did any person formerly employed by the TCEQ represent your company and get paid for service regarding this application?

☐ Yes ☒ No

If yes, list each person formerly employed by the TCEQ who represented your company and was paid for service regarding the application:

N/A

D. Do you owe any fees to the TCEQ?

☐ Yes ☒ No

If **yes**, provide the following information:

Account number: N/A Amount past due: N/A

E. Do you owe any penalties to the TCEQ?

☐ Yes ☒ No

If **yes**, please provide the following information:

Enforcement order number: N/A Amount past due: N/A

Section 13. Attachments (Instructions Page 38)

Indicate which attachments are included with the Administrative Report. Check all that apply:

☐ Lease agreement or deed recorded easement, if the land where the treatment facility is located or the effluent disposal site are not owned by the applicant or co-applicant.

☒ Original full-size USGS Topographic Map with the following information:

- Applicant's property boundary
- Treatment facility boundary
- Labeled point of discharge for each discharge point (TPDES only)
- Highlighted discharge route for each discharge point (TPDES only)
- Onsite sewage sludge disposal site (if applicable)
- Effluent disposal site boundaries (TLAP only)
- New and future construction (if applicable)
- 1 mile radius information
- 3 miles downstream information (TPDES only)
- All ponds.

☐ Attachment 1 for Individuals as co-applicants

☒ Other Attachments. Please specify: AR-1 (ePay copy), AR-2 (Core Data Form), AR-3 (PIP), AR-4 (Effluent Disposal Site), AR-5 (Outfall Coordinates and Description), AR-6 (USGS Topo)

Section 14. Signature Page (Instructions Page 39)

If co-applicants are necessary, each entity must submit an original, separate signature page.

Permit Number: WQ0010353002

Applicant: City of Lubbock

Certification:

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under 30 Texas Administrative Code § 305.44 to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signatory name (typed or printed): W. Jarrett Atkinson

Signatory title: City Manager

Signature: W. Jarrett Atkinson Date: 5/7/2024

(Use blue ink)

Subscribed and Sworn to before me by the said W. Jarrett Atkinson

on this 7th day of May, 20 24.

My commission expires on the 3rd day of April, 20 24.

Magen D. Murchison

Notary Public

[SEAL]

Lubbock

County, Texas

MAGEN D. MURCHISON
Notary Public, State of Texas
Notary ID# 12937411-2
My Commission Expires 04-03-2025

Section 15. Plain Language Summary (Instructions Page 40)

If you are subject to the alternative language notice requirements in 30 Texas Administrative Code §39.426, **you must provide a translated copy of the completed plain language summary in the appropriate alternative language as part of your application package**. For your convenience, a Spanish template has been provided below.

ENGLISH TEMPLATE FOR TPDES or TLAP NEW/RENEWAL/AMENDMENT APPLICATIONS

DOMESTIC WASTEWATER

The following summary is provided for this pending water quality permit application being reviewed by the Texas Commission on Environmental Quality as required by 30 Texas Administrative Code Chapter 39. The information provided in this summary may change during the technical review of the application and are not federal enforceable representations of the permit application.

The City of Lubbock (CN600130736) operates the Southeast Water Reclamation Plant (RN101609949), which is designed for maximum flexibility of operation. The facilities include a preliminary treatment system, two separate Treatment Trains, interconnected effluent pumping stations, and a solids treatment system. The facility is located at 3603 Guava Avenue, Lubbock, Lubbock County, Texas 79404.

This application is to authorize an increase in the discharge of treated wastewater of Outfall 007 from a volume not to exceed an annual average of 14,500,000 gallons per day to 24,400,000 gallons per day. This amendment includes improving effluent quality by modifying existing treatment units and incorporating biological nutrient removal (BNR).

Discharges from the facility are expected to contain five-day carbonaceous biochemical oxygen demand (CBOD5), total suspended solids (TSS), ammonia nitrogen (NH3-N), and Escherichia coli. Additional potential pollutants are included in the Domestic Technical Report 1.0, Section 7—Pollutant Analysis of Treated Effluent and Domestic Worksheet 4.0 in the permit application package. Domestic wastewater is treated by preliminary treatment, which consists of screening, grit removal, and fine screens. Treatment Train #3 is an activated sludge plant that is proposed to be upgraded to a BNR facility. The treatment units include two primary clarifiers, three activated sludge BNR basins, two secondary clarifiers, five cloth media filter units, and a low-pressure, high-output ultraviolet (UV) disinfection system. The BNR basins consist of pre-anoxic, anaerobic, anoxic, and oxic/ aerobic zones. The effluent from Treatment Train #3 is routed to effluent pump station 2 (EP2). Solids are treated in an anaerobic digester prior to dewatering. Digested sludge is dewatered with centrifuges. The sludge treatment system includes anaerobic digesters, three rotary drum thickeners, and three centrifuges.

PLANTILLA EN ESPAÑOL PARA SOLICITUDES NUEVAS/RENOVACIONES/ENMIENDAS TPDES o TLAP

AGUAS RESIDUALES DOMÉSTICAS

El siguiente resumen se proporciona para esta solicitud de permiso de calidad del agua pendiente que está siendo revisada por la Comisión de Calidad Ambiental de Texas según lo requerido por el Capítulo 39 del Código Administrativo de Texas 30. La información proporcionada en este resumen puede cambiar durante la revisión técnica de la solicitud y no son representaciones federales exigibles de la solicitud de permiso.

La ciudad de Lubbock (CN600130736) opera la Planta de Recuperación de Agua del Sureste (RN101609949), que está diseñada para brindar la máxima flexibilidad de operación. Las instalaciones incluyen un sistema de tratamiento preliminar, dos Trenes de Tratamiento separados, estaciones de bombeo de efluentes interconectadas y un sistema de tratamiento de sólidos. La instalación está ubicada en 3603 Guava Avenue, Lubbock, condado de Lubbock, Texas 79404.

Esta solicitud es para autorizar un aumento en la descarga de aguas residuales tratadas del Emisario 007 de un volumen que no exceda un promedio anual de 14,500,000 galones por día a 24,400,000 galones por día. Esta enmienda incluye mejorar la calidad del efluente modificando las unidades de tratamiento existentes e incorporando la eliminación biológica de nutrientes (BNR).

Se espera que las descargas de la instalación contengan demanda bioquímica de oxígeno carbonoso (CBOD5) de cinco días, sólidos suspendidos totales (SST), nitrógeno amoniacal (NH3-N) y Escherichia coli. Se incluyen contaminantes potenciales adicionales en el Informe Técnico Nacional 1.0, Sección 7—Análisis de Contaminantes del Efluente Tratado y Hoja de Trabajo Doméstico 4.0 en el paquete de solicitud de permiso. Las aguas residuales domésticas se tratan mediante un tratamiento preliminar, que consiste en cribas, desgranadoras y cribas finas. El Tren de Tratamiento #3 es una planta de lodos activados que se propone actualizar a una instalación BNR. Las unidades de tratamiento incluyen dos clarificadores primarios, tres tanques BNR de lodos activados, dos clarificadores secundarios, cinco unidades de filtrado de medios de tela y un sistema de desinfección ultravioleta (UV) de baja presión y alto rendimiento. Las cuencas del BNR constan de zonas preanóxica, anaeróbica, anóxica y óxica/aeróbica. El efluente del Tren de Tratamiento #3 se dirige a la estación de bombeo de efluentes 2 (EP2). Los sólidos se tratan en un digestor anaeróbico antes de la deshidratación. Los lodos digeridos se deshidratan con centrífugas. El sistema de tratamiento de lodos incluye digestores anaeróbicos, tres espesadores de tambor rotatorio y tres centrífugas.

DOMESTIC ADMINISTRATIVE REPORT 1.1

The following information is required for new and amendment applications.

Section 1. Affected Landowner Information (Instructions Page 41)

A. Indicate by a check mark that the landowners map or drawing, with scale, includes the following information, as applicable:

- ☒ The applicant's property boundaries
- ☒ The facility site boundaries within the applicant's property boundaries
- ☒ The distance the buffer zone falls into adjacent properties and the property boundaries of the landowners located within the buffer zone
- ☒ The property boundaries of all landowners surrounding the applicant's property (Note: if the application is a major amendment for a lignite mine, the map must include the property boundaries of all landowners adjacent to the new facility (ponds).)
- ☒ The point(s) of discharge and highlighted discharge route(s) clearly shown for one mile downstream
- ☒ The property boundaries of the landowners located on both sides of the discharge route for one full stream mile downstream of the point of discharge
- ☐ The property boundaries of the landowners along the watercourse for a one-half mile radius from the point of discharge if the point of discharge is into a lake, bay, estuary, or affected by tides
- ☐ The boundaries of the effluent disposal site (for example, irrigation area or subsurface drainfield site) and all evaporation/holding ponds within the applicant's property
- ☐ The property boundaries of all landowners surrounding the effluent disposal site
- ☐ The boundaries of the sludge land application site (for land application of sewage sludge for beneficial use) and the property boundaries of landowners surrounding the applicant's property boundaries where the sewage sludge land application site is located
- ☐ The property boundaries of landowners within one-half mile in all directions from the applicant's property boundaries where the sewage sludge disposal site (for example, sludge surface disposal site or sludge monofill) is located

B. ☒ Indicate by a check mark that a separate list with the landowners' names and mailing addresses cross-referenced to the landowner's map has been provided.

C. Indicate by a check mark in which format the landowners list is submitted:

☐ USB Drive ☒ Four sets of labels

D. Provide the source of the landowners' names and mailing addresses: Lubbock Central Appraisal District

E. As required by *Texas Water Code § 5.115*, is any permanent school fund land affected by this application?

☐ Yes ☒ No

If **yes**, provide the location and foreseeable impacts and effects this application has on the land(s):

N/A

Section 2. Original Photographs (Instructions Page 44)

Provide original ground level photographs. Indicate with checkmarks that the following information is provided.

- ☒ At least one original photograph of the new or expanded treatment unit location
- ☒ At least two photographs of the existing/proposed point of discharge and as much area downstream (photo 1) and upstream (photo 2) as can be captured. If the discharge is to an open water body (e.g., lake, bay), the point of discharge should be in the right or left edge of each photograph showing the open water and with as much area on each respective side of the discharge as can be captured. Only one photo of Outfall 007 could be obtained.
- ☐ At least one photograph of the existing/proposed effluent disposal site
- ☒ A plot plan or map showing the location and direction of each photograph

Section 3. Buffer Zone Map (Instructions Page 44)

A. Buffer zone map. Provide a buffer zone map on 8.5 x 11-inch paper with all of the following information. The applicant's property line and the buffer zone line may be distinguished by using dashes or symbols and appropriate labels.

- The applicant's property boundary;
- The required buffer zone; and
- Each treatment unit; and
- The distance from each treatment unit to the property boundaries.

B. Buffer zone compliance method. Indicate how the buffer zone requirements will be met. Check all that apply.

- ☒ Ownership
- ☐ Restrictive easement
- ☐ Nuisance odor control
- ☐ Variance

C. Unsuitable site characteristics. Does the facility comply with the requirements regarding unsuitable site characteristic found in 30 TAC § 309.13(a) through (d)?

☒ Yes ☐ No

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

SUPPLEMENTAL PERMIT INFORMATION FORM (SPIF)

FOR AGENCIES REVIEWING DOMESTIC TPDES WASTEWATER PERMIT APPLICATIONS

TCEQ USE ONLY:

Application type: _____Renewal _____Major Amendment ____Minor Amendment _____New

County: _____ Segment Number: _____

Admin Complete Date: _____

Agency Receiving SPIF:

_____ Texas Historical Commission _____ U.S. Fish and Wildlife

_____ Texas Parks and Wildlife Department _____ U.S. Army Corps of Engineers

This form applies to TPDES permit applications only. (Instructions, Page 53)

The SPIF must be completed as a separate document. The TCEQ will mail a copy of the SPIF to each agency as required by the TCEQ agreement with EPA. If any of the items are not completely addressed or further information is needed, you will be contacted to provide the information before the permit is issued. Each item must be completely addressed.

Do not refer to a response of any item in the permit application form. Each attachment must be provided with this form separately from the administrative report of the application. The application will not be declared administratively complete without this form being completed in its entirety including all attachments.

The following applies to all applications:

1. Permittee: City of Lubbock

   Permit No. WQ00 10353002 EPA ID No. TX 0106071

   Address of the project (or a location description that includes street/highway, city/vicinity, and county):

   3603 Guava Avenue, Lubbock, TX 79404

Provide the name, address, phone and fax number of an individual that can be contacted to answer specific questions about the property.

Prefix (Mr., Ms., Miss): Mr.

First and Last Name: L. Wood Franklin

Credential (P.E, P.G., Ph.D., etc.): P.E.

Title: Division Director of Public Works

Mailing Address: PO Box 2000

City, State, Zip Code: Lubbock, TX 79457

Phone No.: 806-775-2343 Ext.: N/A Fax No.: N/A

E-mail Address: wfranklin@mylubbock.us

2. List the county in which the facility is located: Lubbock
3. If the property is publicly owned and the owner is different than the permittee/applicant, please list the owner of the property.

N/A

4. Provide a description of the effluent discharge route. The discharge route must follow the flow of effluent from the point of discharge to the nearest major watercourse (from the point of discharge to a classified segment as defined in 30 TAC Chapter 307). If known, please identify the classified segment number.

Attachment AR-5

5. Please provide a separate 7.5-minute USGS quadrangle map with the project boundaries plotted and a general location map showing the project area. Please highlight the discharge route from the point of discharge for a distance of one mile downstream. (This map is required in addition to the map in the administrative report).

Provide original photographs of any structures 50 years or older on the property.

Does your project involve any of the following? Check all that apply.

- ☐ Proposed access roads, utility lines, construction easements
- ☐ Visual effects that could damage or detract from a historic property's integrity
- ☒ Vibration effects during construction or as a result of project design
- ☐ Additional phases of development that are planned for the future
- ☐ Sealing caves, fractures, sinkholes, other karst features

☐ Disturbance of vegetation or wetlands

6. List proposed construction impact (surface acres to be impacted, depth of excavation, sealing of caves, or other karst features):

   There are two areas of construction impact: 0.1 acres at 2-ft depth and 0.4 acres at 10-ft depth

7. Describe existing disturbances, vegetation, and land use:

   Existing disturbances and land use are those associated with operation of a wastewater treatment facility and disposal of treated effluent.

THE FOLLOWING ITEMS APPLY ONLY TO APPLICATIONS FOR NEW TPDES PERMITS AND MAJOR AMENDMENTS TO TPDES PERMITS

8. List construction dates of all buildings and structures on the property:

   Plant 3 was constructed in 1969 and Plant 4 was constructed in 1992.

9. Provide a brief history of the property, and name of the architect/builder, if known.

   There are two treatment facilities remaining on the property. Plant 3 was constructed in 1969 and Plant 4 was built in 1992. The prior land use is not known.

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CHECKLIST OF COMMON DEFICIENCIES

Below is a list of common deficiencies found during the administrative review of domestic wastewater permit applications. To ensure the timely processing of this application, please review the items below and indicate by checking Yes that each item is complete and in accordance applicable rules at 30 TAC Chapters 21, 281, and 305. If an item is not required this application, indicate by checking N/A where appropriate. Please do not submit the application until the items below have been addressed.

Core Data Form (TCEQ Form No. 10400) ☒ Yes
(Required for all applications types. Must be completed in its entirety and signed. Note: Form may be signed by applicant representative.)

Correct and Current Industrial Wastewater Permit Application Forms ☒ Yes
(TCEQ Form Nos. 10053 and 10054. Version dated 6/25/2018 or later.)

Water Quality Permit Payment Submittal Form (Page 19) ☐ Yes
(Original payment sent to TCEQ Revenue Section. See instructions for mailing address.)

7.5 Minute USGS Quadrangle Topographic Map Attached ☒ Yes
(Full-size map if seeking "New" permit. 8 ½ x 11 acceptable for Renewals and Amendments)

Current/Non-Expired, Executed Lease Agreement or Easement Attached ☒ N/A ☐ Yes

Landowners Map ☐ N/A ☒ Yes
(See instructions for landowner requirements)

Things to Know:

- All the items shown on the map must be labeled.
- The applicant's complete property boundaries must be delineated which includes boundaries of contiguous property owned by the applicant.
- The applicant cannot be its own adjacent landowner. You must identify the landowners immediately adjacent to their property, regardless of how far they are from the actual facility.
- If the applicant's property is adjacent to a road, creek, or stream, the landowners on the opposite side must be identified. Although the properties are not adjacent to applicant's property boundary, they are considered potentially affected landowners. If the adjacent road is a divided highway as identified on the USGS topographic map, the applicant does not have to identify the landowners on the opposite side of the highway.

Landowners Cross Reference List ☐ N/A ☒ Yes
(See instructions for landowner requirements)

Landowners Labels or USB Drive attached ☐ N/A ☒ Yes
(See instructions for landowner requirements)

Original signature per 30 TAC § 305.44 – Blue Ink Preferred ☒ Yes
(If signature page is not signed by an elected official or principle executive officer, a copy of signature authority/delegation letter must be attached)

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

DOMESTIC WASTEWATER PERMIT APPLICATION

DOMESTIC TECHNICAL REPORT 1.0

The Following Is Required For All Applications

Renewal, New, And Amendment

Section 1. Permitted or Proposed Flows (Instructions Page 51)

A. Existing/Interim I Phase

Design Flow (MGD): Outfall 001: 9.0, Outfall 002: 14.5, Outfall 003: 12.0, Outfall 004: 9, Outfall 005: 9.0, Outfall 006: 31.5, Outfall 007: 14.5

2-Hr Peak Flow (MGD): Outfall 001:19, Outfall 007:29.9

Estimated construction start date: N/A

Estimated waste disposal start date: N/A

B. Interim II Phase

Design Flow (MGD): N/A

2-Hr Peak Flow (MGD): N/A

Estimated construction start date: N/A

Estimated waste disposal start date: N/A

C. Final Phase

Design Flow (MGD): Outfall 007: 24.4

2-Hr Peak Flow (MGD): Outfall 007: 54.5

Estimated construction start date: January 2026

Estimated waste disposal start date: January 2028

D. Current operating phase: Existing

Provide the startup date of the facility: 06/01/1995

Section 2. Treatment Process (Instructions Page 51)

A. Treatment process description

Provide a detailed description of the treatment process. **Include the type of treatment plant, mode of operation, and all treatment units.** Start with the plant's head works and finish with the point of discharge. Include all sludge processing and drying units. **If more than one phase exists or is proposed in the permit, a description of *each phase* must be provided**. Process description:

Attachment TR-1

Port or pipe diameter at the discharge point, in inches: 001-27", 007-42"

B. Treatment Units

In Table 1.0(1), provide the treatment unit type, the number of units, and dimensions (length, width, depth) **of each treatment unit, accounting for *all* phases of operation**.

Table 1.0(1) – Treatment Units

Treatment Unit Type	Number of Units	Dimensions (L x W x D)
Attachment TR-2		

C. Process flow diagrams

Provide flow diagrams for the existing facilities and **each** proposed phase of construction.

Attachment: TR-3

Section 3. Site Drawing (Instructions Page 52)

Provide a site drawing for the facility that shows the following:

- The boundaries of the treatment facility;
- The boundaries of the area served by the treatment facility;
- If land disposal of effluent, the boundaries of the disposal site and all storage/holding ponds; and
- If sludge disposal is authorized in the permit, the boundaries of the land application or disposal site.

Attachment: TR-4

Provide the name and a description of the area served by the treatment facility.

City of Lubbock

Section 4. Unbuilt Phases (Instructions Page 52)

Is the application for a renewal of a permit that contains an unbuilt phase or phases?

Yes ☐ No ☒

If yes, does the existing permit contain a phase that has not been constructed within five years of being authorized by the TCEQ?

Yes ☐ No ☒

If yes, provide a detailed discussion regarding the continued need for the unbuilt phase. Failure to provide sufficient justification may result in the Executive Director recommending denial of the unbuilt phase or phases.

N/A

Section 5. Closure Plans (Instructions Page 53)

Have any treatment units been taken out of service permanently, or will any units be taken out of service in the next five years?

Yes ☒ No ☐

If yes, was a closure plan submitted to the TCEQ?

Yes ☒ No ☐

If yes, provide a brief description of the closure and the date of plan approval.

A Closure Report for the City of Lubbock Southeast Water Reclamation Plant No.2 – TPDES WQ0010353002 was approved by TCEQ on October 20, 2020. See Attachment TR-5.

Section 6. Permit Specific Requirements (Instructions Page 53)

For applicants with an existing permit, check the *Other Requirements* or *Special Provisions* of the permit.

A. Summary transmittal

Have plans and specifications been approved for the existing facilities and each proposed phase?

Yes ☒ No ☐

If yes, provide the date(s) of approval for each phase: N/A

Provide information, including dates, on any actions taken to meet a requirement or provision pertaining to the submission of a summary transmittal letter. Provide a copy of an approval letter from the TCEQ, if applicable.

Plans and specifications for existing facilities have been approved. Dates of approval are unknown.

B. Buffer zones

Have the buffer zone requirements been met?

Yes ☒ No ☐

Provide information below, including dates, on any actions taken to meet the conditions of the buffer zone. If available, provide any new documentation relevant to maintaining the buffer zones.

All buffer zones are maintained according to TPDES Permit, Other Requirement No. 5.

C. Other actions required by the current permit

Does the *Other Requirements* or *Special Provisions* section in the existing permit require submission of any other information or other required actions? Examples include Notification of Completion, progress reports, soil monitoring data, etc.

Yes ☒ No ☐

If yes, provide information below on the status of any actions taken to meet the conditions of an *Other Requirement* or *Special Provision*.

Other Requirements: All irrigation practices and rates applied at land application sites are managed so as to prevent contamination of ground and surface waters as per #13 & #14. Soil sampling of land application sites is performed annually as per #15. Continue to implement City of Lubbock-Lubbock Land Application Site Ground Water Remediation Plan as per #18.

D. Grit and grease treatment

1. Acceptance of grit and grease waste

Does the facility have a grit and/or grease processing facility onsite that treats and decants or accepts transported loads of grit and grease waste that are discharged directly to the wastewater treatment plant prior to any treatment?

Yes ☐ No ☒

If No, stop here and continue with Subsection E. Stormwater Management.

2. Grit and grease processing

Describe below how the grit and grease waste is treated at the facility. In your description, include how and where the grit and grease is introduced to the treatment works and how it is separated or processed. Provide a flow diagram showing how grit and grease is processed at the facility.

N/A

3. Grit disposal

Does the facility have a Municipal Solid Waste (MSW) registration or permit for grit disposal?

Yes ☐ No ☐ ☒N/A

If No, contact the TCEQ Municipal Solid Waste team at 512-239-0000. Note: A registration or permit is required for grit disposal. Grit shall not be combined with treatment plant sludge. See the instruction booklet for additional information on grit disposal requirements and restrictions.

Describe the method of grit disposal.

N/A

4. Grease and decanted liquid disposal

Note: A registration or permit is required for grease disposal. Grease shall not be combined with treatment plant sludge. For more information, contact the TCEQ Municipal Solid Waste team at 512-239-0000.

Describe how the decant and grease are treated and disposed of after grit separation.

N/A

E. Stormwater management

1. Applicability

Does the facility have a design flow of 1.0 MGD or greater in any phase?

Yes ☒ No ☐

Does the facility have an approved pretreatment program, under 40 CFR Part 403?

Yes ☒ No ☐

If no to both of the above, then skip to Subsection F, Other Wastes Received.

2. MSGP coverage

Is the stormwater runoff from the WWTP and dedicated lands for sewage disposal currently permitted under the TPDES Multi-Sector General Permit (MSGP), TXR050000?

Yes ☒ No ☐

If yes, please provide MSGP Authorization Number and skip to Subsection F, Other Wastes Received:

TXR05 CH74 or TXRNE Click here to enter text.

If no, do you intend to seek coverage under TXR050000?

Yes ☐ No ☐

3. Conditional exclusion

Alternatively, do you intend to apply for a conditional exclusion from permitting based TXR050000 (Multi Sector General Permit) Part II B.2 or TXR050000 (Multi Sector General Permit) Part V, Sector T 3(b)?

Yes ☐ No ☒

If yes, please explain below then proceed to Subsection F, Other Wastes Received:

N/A

4. Existing coverage in individual permit

Is your stormwater discharge currently permitted through this individual TPDES or TLAP permit?

Yes ☐ No ☒

If yes, provide a description of stormwater runoff management practices at the site that are authorized in the wastewater permit then skip to Subsection F, Other Wastes Received.

N/A

5. Zero stormwater discharge

Do you intend to have no discharge of stormwater via use of evaporation or other means?

Yes ☐ No ☒

If yes, explain below then skip to Subsection F. Other Wastes Received.

N/A

Note: If there is a potential to discharge any stormwater to surface water in the state as the result of any storm event, then permit coverage is required under the MSGP or an individual discharge permit. This requirement applies to all areas of facilities with treatment plants or systems that treat, store, recycle, or reclaim domestic sewage, wastewater or sewage sludge (including dedicated lands for sewage sludge disposal located within the onsite property boundaries) that meet the applicability criteria of above. You have the option of obtaining coverage under the MSGP for direct discharges, (recommended), or obtaining coverage under this individual permit.

6. Request for coverage in individual permit

Are you requesting coverage of stormwater discharges associated with your treatment plant under this individual permit?

Yes ☐ No ☒

If yes, provide a description of stormwater runoff management practices at the site for which you are requesting authorization in this individual wastewater permit and describe whether you intend to comingle this discharge with your treated effluent or discharge it via a separate dedicated stormwater outfall. Please also indicate if you intend to divert stormwater to the treatment plant headworks and indirectly discharge it to water in the state.

N/A

Note: Direct stormwater discharges to waters in the state authorized through this individual permit will require the development and implementation of a stormwater pollution prevention plan (SWPPP) and will be subject to additional monitoring and reporting requirements. Indirect discharges of stormwater via headworks recycling will require compliance with all individual permit requirements including 2-hour peak flow limitations. All stormwater discharge authorization requests will require additional information during the technical review of your application.

F. Discharges to the Lake Houston Watershed

Does the facility discharge in the Lake Houston watershed?
Yes ☐ No ☒

If yes, a Sewage Sludge Solids Management Plan is required. See Example 5 in the instructions.

G. Other wastes received including sludge from other WWTPs and septic waste

1. Acceptance of sludge from other WWTPs

Does the facility accept or will it accept sludge from other treatment plants at the facility site?
Yes ☐ No ☒

If yes, attach sewage sludge solids management plan. See Example 5 of the instructions.

In addition, provide the date that the plant started accepting sludge or is anticipated to start accepting sludge, an estimate of monthly sludge acceptance (gallons or millions of gallons), an estimate of the BOD_5 concentration of the sludge, and the design BOD_5 concentration of the influent from the collection system. Also note if this information has or has not changed since the last permit action.

N/A

Note: Permits that accept sludge from other wastewater treatment plants may be required to have influent flow and organic loading monitoring.

2. Acceptance of septic waste

Is the facility accepting or will it accept septic waste?

Yes ☒ No ☐

If yes, does the facility have a Type V processing unit?

Yes ☐ No ☒

If yes, does the unit have a Municipal Solid Waste permit?

Yes ☐ No ☐

If yes to any of the above, provide a the date that the plant started accepting septic waste, or is anticipated to start accepting septic waste, an estimate of monthly septic waste acceptance (gallons or millions of gallons), an estimate of the BOD_5 concentration of the septic waste, and the design BOD_5 concentration of the influent from the collection system. Also note if this information has or has not changed since the last permit action.

The facility began accepting waste prior to 1990. There is an average of 227,000 gallons a month, with an average BOD of 5635 mg/L. Septic waste from haulers is discharged into septic bays at the plant and is held until operations staff determines when to slowly release the waste. This information has not changed since the last permit action.

Note: Permits that accept sludge from other wastewater treatment plants may be required to have influent flow and organic loading monitoring.

3. Acceptance of other wastes (not including septic, grease, grit, or RCRA, CERCLA or as discharged by IUs listed in Worksheet 6)

Is the facility accepting or will it accept wastes that are not domestic in nature excluding the categories listed above?

Yes ☐ No ☒

If yes, provide the date that the plant started accepting the waste, an estimate how much waste is accepted on a monthly basis (gallons or millions of gallons), a description of the entities generating the waste, and any distinguishing chemical or other physical characteristic of the waste. Also note if this information has or has not changed since the last permit action.

N/A

Section 7. Pollutant Analysis of Treated Effluent (Instructions Page 58)

Is the facility in operation?

Yes ☒ No ☐

If no, this section is not applicable. Proceed to Section 8.

If yes, provide effluent analysis data for the listed pollutants. ***Wastewater treatment facilities*** complete Table 1.0(2). W***ater treatment facilities*** discharging filter backwash water, complete Table 1.0(3).

Note: The sample date must be within 1 year of application submission.

Table 1.0(2) - Pollutant Analysis for Wastewater Treatment Facilities

Pollutant	**Average Conc.**	**Max Conc.**	**No. of Samples**	**Sample Type**	**Sample Date/Time**
$CBOD_5$, mg/l	2	2	1	Composite	1/2/24 8:55
Total Suspended Solids, mg/l	4	4	1	Composite	1/2/24 8:55
Ammonia Nitrogen, mg/l	0.354	0.354	1	Composite	1/2/24 9:05
Nitrate Nitrogen, mg/l	2.44	2.44	1	Composite	2/21/24 8:45
Total Kjeldahl Nitrogen, mg/l	15.1	15.1	1	Composite	2/21/24 8:45
Sulfate, mg/l	160	160	1	Composite	1/2/24 8:55
Chloride, mg/l	358	358	1	Composite	2/21/24 8:45
Total Phosphorus, mg/l	0.123	0.123	1	Composite	1/2/24 9:05
pH, standard units	7.83	7.83	1	Grab	1/2/24 8:50
Dissolved Oxygen*, mg/l	8.40	8.40	1	Grab	1/2/24 8:50
Chlorine Residual, mg/l	**	**	**	**	**
E.coli (CFU/100ml) freshwater	13	13	1	Composite	1/2/24 8:50
Entercocci (CFU/100ml)	N/A	N/A	N/A	N/A	N/A

Pollutant	Average Conc.	Max Conc.	No. of Samples	Sample Type	Sample Date/Time
saltwater					
Total Dissolved Solids, mg/l	1062	1062	1	Grab	2/21/24 8:40
Electrical Conductivity, µmohs/cm, †	1949	1949	1	Grab	2/21/24 8:40
Oil & Grease, mg/l	<0.43	0.43	4	Grab	11/15/23 15:31
Alkalinity ($CaCO_3$)*, mg/l	258	258	1	Grab	2/21/24 8:57

** Southeast Water Reclamation Plant uses UV disinfection.

*TPDES permits only

†TLAP permits only

Table 1.0(3) - Pollutant Analysis for Water Treatment Facilities

Pollutant	Average Conc.	Max Conc.	No. of Samples	Sample Type	Sample Date/Time
Total Suspended Solids, mg/l					
Total Dissolved Solids, mg/l					
pH, standard units					
Fluoride, mg/l					
Aluminum, mg/l					
Alkalinity ($CaCO_3$), mg/l					

Section 8. Facility Operator (Instructions Page 60)

Facility Operator Name: Mary Gonzales / Craig Henderson

Facility Operator's License Classification and Level: Wastewater Treatment Operator A

Facility Operator's License Number: WW0013455/ WW0012260

Section 9. Sewage Sludge Management and Disposal (Instructions

Page 60)

A. Sludge disposal method

Identify the current or anticipated sludge disposal method or methods from the following list. Check all that apply.

- ☒ Permitted landfill
- ☐ Permitted or Registered land application site for beneficial use
- ☐ Land application for beneficial use authorized in the wastewater permit
- ☐ Permitted sludge processing facility
- ☐ Marketing and distribution as authorized in the wastewater permit
- ☐ Composting as authorized in the wastewater permit
- ☐ Permitted surface disposal site (sludge monofill)
- ☐ Surface disposal site (sludge monofill) authorized in the wastewater permit
- ☐ Transported to another permitted wastewater treatment plant or permitted sludge processing facility. If you selected this method, a written statement or contractual agreement from the wastewater treatment plant or permitted sludge processing facility accepting the sludge must be included with this application.
- ☐ Other: Click here to enter text.

B. Sludge disposal site

Disposal site name: West Texas Disposal Facility and Southwest Landfill

TCEQ permit or registration number: #2252 and #1663B

County where disposal site is located: Lubbock and Randall

C. Sludge transportation method

Method of transportation (truck, train, pipe, other): Truck

Name of the hauler: City of Lubbock

Hauler registration number: TCEQ Transporter #22042

Sludge is transported as a:

Liquid ☐ semi-liquid ☐ semi-solid ☒ solid ☐

Section 10. Permit Authorization for Sewage Sludge Disposal (Instructions Page 60)

A. Beneficial use authorization

Does the existing permit include authorization for land application of sewage sludge for beneficial use?

Yes ☐ No ☒

If yes, are you requesting to continue this authorization to land apply sewage sludge for beneficial use?

Yes ☐ No ☐

If yes, is the completed **Application for Permit for Beneficial Land Use of Sewage Sludge (TCEQ Form No. 10451)** attached to this permit application (see the instructions for details)?

Yes ☐ No ☐

B. Sludge processing authorization

Does the existing permit include authorization for any of the following sludge processing, storage or disposal options?

Sludge Composting	Yes ☐	No ☒
Marketing and Distribution of sludge	Yes ☐	No ☒
Sludge Surface Disposal or Sludge Monofill	Yes ☐	No ☒
Temporary storage in sludge lagoons	Yes ☐	No ☒

If yes to any of the above sludge options and the applicant is requesting to continue this authorization, is the completed **Domestic Wastewater Permit Application: Sewage Sludge Technical Report (TCEQ Form No. 10056)** attached to this permit application?

Yes ☐ No ☐

Section 11. Sewage Sludge Lagoons (Instructions Page 61)

Does this facility include sewage sludge lagoons?

Yes ☐ No ☒

If yes, complete the remainder of this section. If no, proceed to Section 12.

A. Location information

The following maps are required to be submitted as part of the application. For each map, provide the Attachment Number.

- Original General Highway (County) Map:

  Attachment: N/A

- USDA Natural Resources Conservation Service Soil Map:

  Attachment: N/A

- Federal Emergency Management Map:

  Attachment: N/A

- Site map:

  Attachment: N/A

Discuss in a description if any of the following exist within the lagoon area.

Check all that apply.

- ☐ Overlap a designated 100-year frequency flood plain
- ☐ Soils with flooding classification
- ☐ Overlap an unstable area
- ☐ Wetlands
- ☐ Located less than 60 meters from a fault
- ☐ None of the above

Attachment: N/A

If a portion of the lagoon(s) is located within the 100-year frequency flood plain, provide the protective measures to be utilized including type and size of protective structures:

N/A

B. Temporary storage information

Provide the results for the pollutant screening of sludge lagoons. These results are in addition to pollutant results in Section 7 of Technical Report 1.0.

Nitrate Nitrogen, mg/kg: N/A

Total Kjeldahl Nitrogen, mg/kg: N/A

Total Nitrogen (=nitrate nitrogen + TKN), mg/kg: N/A

Phosphorus, mg/kg: N/A

Potassium, mg/kg: N/A

pH, standard units: N/A

Ammonia Nitrogen mg/kg: N/A

Arsenic: N/A

Cadmium: N/A

Chromium: N/A

Copper: N/A

Lead: N/A

Mercury: N/A

Molybdenum: N/A

Nickel: N/A

Selenium: N/A

Zinc: N/A

Total PCBs: N/A

Provide the following information:

Volume and frequency of sludge to the lagoon(s): N/A

Total dry tons stored in the lagoons(s) per 365-day period: N/A

Total dry tons stored in the lagoons(s) over the life of the unit: N/A

C. Liner information

Does the active/proposed sludge lagoon(s) have a liner with a maximum hydraulic conductivity of $1x10^{-7}$ cm/sec?

Yes ☐ No ☐

If yes, describe the liner below. Please note that a liner is required.

N/A

D. Site development plan

Provide a detailed description of the methods used to deposit sludge in the lagoon(s):

N/A

Attach the following documents to the application.

- Plan view and cross-section of the sludge lagoon(s)

  Attachment: N/A

- Copy of the closure plan

  Attachment: N/A

- Copy of deed recordation for the site

  Attachment: N/A

- Size of the sludge lagoon(s) in surface acres and capacity in cubic feet and gallons

  Attachment: N/A

- Description of the method of controlling infiltration of groundwater and surface water from entering the site

  Attachment: N/A

- Procedures to prevent the occurrence of nuisance conditions

  Attachment: N/A

E. Groundwater monitoring

Is groundwater monitoring currently conducted at this site, or are any wells available for groundwater monitoring, or are groundwater monitoring data otherwise available for the sludge lagoon(s)?

Yes ☐ No ☒

If groundwater monitoring data are available, provide a copy. Provide a profile of soil types encountered down to the groundwater table and the depth to the shallowest groundwater as a separate attachment.

Attachment: N/A

Section 12. Authorizations/Compliance/Enforcement

(Instructions Page 63)

A. Additional authorizations

Does the permittee have additional authorizations for this facility, such as reuse authorization, sludge permit, etc?

Yes ☒ No ☐

If yes, provide the TCEQ authorization number and description of the authorization:

Permits and authorizations include Water Right/Use Permit No. 3985B, TCEQ Certificate of Adjudication 27, Convenience and Necessity 20230, Transporter Registration 22042, Municipal Solid Waste #69, West Texas Disposal Facility #2252, and Southwest Landfill #1663B, Reuse Authorization R10353002, Air New Source Permit Registration ID 70798.

B. Permittee enforcement status

Is the permittee currently under enforcement for this facility?

Yes ☐ No ☒

Is the permittee required to meet an implementation schedule for compliance or enforcement?

Yes ☐ No ☒

If yes to either question, provide a brief summary of the enforcement, the implementation schedule, and the current status:

N/A

Section 13. RCRA/CERCLA Wastes (Instructions Page 63)

A. RCRA hazardous wastes

Has the facility received in the past three years, does it currently receive, or will it receive RCRA hazardous waste?

Yes ☐ No ☒

B. Remediation activity wastewater

Has the facility received in the past three years, does it currently receive, or will it receive CERCLA wastewater, RCRA remediation/corrective action wastewater or other remediation activity wastewater?

Yes ☐ No ☒

C. Details about wastes received

If yes to either Subsection A or B above, provide detailed information concerning these wastes with the application.

Attachment: N/A

Section 14. Laboratory Accreditation (Instructions Page 64)

All laboratory tests performed must meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification*, which includes the following general exemptions from National Environmental Laboratory Accreditation Program (NELAP) certification requirements:

- The laboratory is an in-house laboratory and is:
  - periodically inspected by the TCEQ; or
  - located in another state and is accredited or inspected by that state; or
  - performing work for another company with a unit located in the same site; or
  - performing pro bono work for a governmental agency or charitable organization.
- The laboratory is accredited under federal law.
- The data are needed for emergency-response activities, and a laboratory accredited under the Texas Laboratory Accreditation Program is not available.
- The laboratory supplies data for which the TCEQ does not offer accreditation.

The applicant should review *30 TAC Chapter 25* for specific requirements.

The following certification statement shall be signed and submitted with every application. See the *Signature Page* section in the Instructions, for a list of designated representatives who may sign the certification.

CERTIFICATION:

I certify that all laboratory tests submitted with this application meet the requirements of *30 TAC Chapter 25, Environmental Testing Laboratory Accreditation and Certification.*

Printed Name: W. Jarrett Atkinson

Title: City Manager

Signature: _____

Date: 5/7/2024

DOMESTIC TECHNICAL REPORT 1.1

The following is required for new and amendment applications

Section 1. Justification for Permit (Instructions Page 66)

A. Justification of permit need

Provide a detailed discussion regarding the need for any phase(s) not currently permitted. Failure to provide sufficient justification may result in the Executive Director recommending denial of the proposed phase(s) or permit.

Attachment TR-6

B. Regionalization of facilities

Provide the following information concerning the potential for regionalization of domestic wastewater treatment facilities:

1. Municipally incorporated areas

If the applicant is a city, then Item 1 is not applicable. Proceed to Item 2 Utility CCN areas.

Is any portion of the proposed service area located in an incorporated city?

Yes ☐ No ☐ Not Applicable ☒

If yes, within the city limits of: N/A

If yes, attach correspondence from the city.

Attachment: N/A

If consent to provide service is available from the city, attach a justification for the proposed facility and a cost analysis of expenditures that includes the cost of connecting to the city versus the cost of the proposed facility or expansion attached.

Attachment: N/A

2. Utility CCN areas

Is any portion of the proposed service area located inside another utility's CCN area?

Yes ☐ No ☒

If yes, attach a justification for the proposed facility and a cost analysis of expenditures that includes the cost of connecting to the CCN facilities versus the cost of the proposed facility or expansion.

Attachment: N/A

3. Nearby WWTPs or collection systems

Are there any domestic permitted wastewater treatment facilities or collection systems located within a three-mile radius of the proposed facility?

Yes ☐ No ☒

If yes, attach a list of these facilities that includes the permittee's name and permit number, and an area map showing the location of these facilities.

Attachment: N/A

If yes, attach copies of your certified letters to these facilities **and** their response letters concerning connection with their system.

Attachment: N/A

Does a permitted domestic wastewater treatment facility or a collection system located within three (3) miles of the proposed facility currently have the capacity to accept or is willing to expand to accept the volume of wastewater proposed in this application?

Yes ☐ No ☒

If yes, attach an analysis of expenditures required to connect to a permitted wastewater treatment facility or collection system located within 3 miles versus the cost of the proposed facility or expansion.

Attachment: N/A

Section 2. Organic Loading (Instructions Page 67)

Is this facility in operation?

Yes ☒ No ☐

If no, proceed to Item B, Proposed Organic Loading.

If yes, provide organic loading information in Item A, Current Organic Loading

A. Current organic loading

Facility Design Flow (flow being requested in application): Outfall 007: 24.4

Average Influent Organic Strength or BOD_5 Concentration in mg/l: 275

Average Influent Loading (lbs/day = total average flow X average BOD_5 conc. X 8.34): 55,961.4

Provide the source of the average organic strength or BOD_5 concentration.

Influent concentrations from Discharge Monitoring Reports

B. Proposed organic loading

This table must be completed if this application is for a facility that is not in operation or if this application is to request an increased flow that will impact organic loading.

Table 1.1(1) – Design Organic Loading

Source	Total Average Flow (MGD)	Influent BOD_5 Concentration (mg/l)
Municipality	8.1 (SEWRP No. 3)	275
Subdivision		
Trailer park – transient		
Mobile home park		
School with cafeteria and showers		
School with cafeteria, no showers		
Recreational park,		

Source	Total Average Flow (MGD)	Influent BOD_5 Concentration (mg/l)
overnight use		
Recreational park, day use		
Office building or factory		
Motel		
Restaurant		
Hospital		
Nursing home		
Other		
TOTAL FLOW from all sources	4.46 (Outfall 007)	
AVERAGE BOD_5 from all sources		275

Section 3. Proposed Effluent Quality and Disinfection (Instructions Page 68)

A. Existing/Interim I Phase Design Effluent Quality

Biochemical Oxygen Demand (5-day), mg/l: 5 (Apr-Oct); 10 (Nov-Mar)

Total Suspended Solids, mg/l: 15

Ammonia Nitrogen, mg/l: 1.9 (Apr-Oct); 5 (Nov-Mar) Outfall 007

Total Phosphorus, mg/l: 1.0

Dissolved Oxygen, mg/l: 6.0

Other: E. coli 126 CFU

B. Interim II Phase Design Effluent Quality

Biochemical Oxygen Demand (5-day), mg/l: N/A

Total Suspended Solids, mg/l: N/A

Ammonia Nitrogen, mg/l: N/A

Total Phosphorus, mg/l: N/A

Dissolved Oxygen, mg/l: N/A

Other: N/A

C. Final Phase Design Effluent Quality

Biochemical Oxygen Demand (5-day), mg/l: 5 (Apr-Oct); 10 (Nov-Mar)

Total Suspended Solids, mg/l: 15

Ammonia Nitrogen, mg/l: 1.0 (Apr-Oct); 5 (Nov-Mar)

Total Phosphorus, mg/l: 1.0

Dissolved Oxygen, mg/l: 6.0

Other: E. coli 126 CFU

D. Disinfection Method

Identify the proposed method of disinfection.

☐ Chlorine: Click here to enter text mg/l after Click here to enter text minutes detention time at peak flow

Dechlorination process: Click here to enter text

☒ Ultraviolet Light: 9.9 seconds contact time at peak flow

☐ Other: Click here to enter text

Section 4. Design Calculations (Instructions Page 68)

Attach design calculations and plant features for each proposed phase. Example 4 of the instructions includes sample design calculations and plant features.

Attachment: TR-7

Section 5. Facility Site (Instructions Page 68)

A. 100-year floodplain

Will the proposed facilities be located above the 100-year frequency flood level?

Yes ☒ No ☐

If no, describe measures used to protect the facility during a flood event. Include a site map showing the location of the treatment plant within the 100-year frequency flood level. If applicable, provide the size and types of protective structures.

N/A

Provide the source(s) used to determine 100-year frequency flood plain.

FEMA Panel 0320E

For a new or expansion of a facility, will a wetland or part of a wetland be filled?

Yes ☐ No ☒

If yes, has the applicant applied for a US Corps of Engineers 404 Dredge and Fill Permit?

Yes ☐ No ☐

If yes, provide the permit number: Click here to enter text.

If no, provide the approximate date you anticipate submitting your application to the Corps: Click here to enter text.

B. Wind rose

Attach a wind rose. **Attachment**: TR-8

Section 6. Permit Authorization for Sewage Sludge Disposal (Instructions Page 69)

A. Beneficial use authorization

Are you requesting to include authorization to land apply sewage sludge for beneficial use on property located adjacent to the wastewater treatment facility under the wastewater permit?

Yes ☐ No ☒

If yes, attach the completed Application for Permit for Beneficial Land Use of Sewage Sludge (TCEQ Form No. 10451)

Attachment: N/A

B. Sludge processing authorization

Identify the sludge processing, storage or disposal options that will be conducted at the wastewater treatment facility:

☐ Sludge Composting

☐ Marketing and Distribution of sludge

☐ Sludge Surface Disposal or Sludge Monofill

If any of the above sludge options are selected, attach a completed DOMESTIC WASTEWATER PERMIT APPLICATION: SEWAGE SLUDGE TECHNICAL REPORT (TCEQ Form No. 10056).

Attachment: Click here to enter text.

Section 7. Sewage Sludge Solids Management Plan (Instructions Page 69)

Attach a solids management plan to the application.

Attachment: TR-9

The sewage sludge solids management plan must contain the following information:

- Treatment units and processes dimensions and capacities
- Solids generated at 100, 75, 50, and 25 percent of design flow
- Mixed liquor suspended solids operating range at design and projected actual flow
- Quantity of solids to be removed and a schedule for solids removal
- Identification and ownership of the ultimate sludge disposal site
- For facultative lagoons, design life calculations, monitoring well locations and depths, and the ultimate disposal method for the sludge from the facultative lagoon

An example of a sewage sludge solids management plan has been included as Example 5 of the instructions.

DOMESTIC TECHNICAL REPORT WORKSHEET 2.0

RECEIVING WATERS

The following is required for all TPDES permit applications

Section 1. Domestic Drinking Water Supply (Instructions Page 73)

Is there a surface water intake for domestic drinking water supply located within 5 miles downstream from the point or proposed point of discharge?

Yes ☐ No ☒

If yes, provide the following:
Owner of the drinking water supply: N/A

Distance and direction to the intake: N/A

Attach a USGS map that identifies the location of the intake.

Attachment: N/A

Section 2. Discharge into Tidally Affected Waters (Instructions Page 73)

Does the facility discharge into tidally affected waters?

Yes ☐ **No** ☒

If yes, complete the remainder of this section. If no, proceed to Section 3.

A. Receiving water outfall

Width of the receiving water at the outfall, in feet: N/A

B. Oyster waters

Are there oyster waters in the vicinity of the discharge?

Yes ☐ No ☐

If yes, provide the distance and direction from outfall(s).

N/A

C. Sea grasses

Are there any sea grasses within the vicinity of the point of discharge?

Yes ☐ No ☐

If yes, provide the distance and direction from the outfall(s).

N/A

Section 3. Classified Segments (Instructions Page 73)

Is the discharge directly into (or within 300 feet of) a classified segment?

Yes ☐ No ☒

If yes, this Worksheet is complete.

If no, complete Sections 4 and 5 of this Worksheet.

Section 4. Description of Immediate Receiving Waters (Instructions Page 75)

Name of the immediate receiving waters: North Fork of the Double Mountain Fork of the Brazos River

A. Receiving water type

Identify the appropriate description of the receiving waters.

☒ Stream

☐ Freshwater Swamp or Marsh

☐ Lake or Pond

Surface area, in acres: N/A

Average depth of the entire water body, in feet: N/A

Average depth of water body within a 500-foot radius of discharge point, in feet: N/A

☐ Man-made Channel or Ditch

☐ Open Bay

☐ Tidal Stream, Bayou, or Marsh

☐ Other, specify: Click here to enter text.

B. Flow characteristics

If a stream, man-made channel or ditch was checked above, provide the following. For existing discharges, check one of the following that best characterizes the area *upstream* of the discharge. For new discharges, characterize the area *downstream* of the discharge (check one).

☐ Intermittent - dry for at least one week during most years

☒ Intermittent with Perennial Pools - enduring pools with sufficient habitat to maintain significant aquatic life uses

☐ Perennial - normally flowing

Check the method used to characterize the area upstream (or downstream for new dischargers).

☐ USGS flow records

☐ Historical observation by adjacent landowners

☒ Personal observation

☐ Other, specify: Click here to enter text.

C. Downstream perennial confluences

List the names of all perennial streams that join the receiving water within three miles downstream of the discharge point.

N/A

D. Downstream characteristics

Do the receiving water characteristics change within three miles downstream of the discharge (e.g., natural or man-made dams, ponds, reservoirs, etc.)?

Yes ☐ No ☒

If yes, discuss how.

N/A

E. Normal dry weather characteristics

Provide general observations of the water body during normal dry weather conditions.

Outfall 001: The outfall structure is surrounded by riprap. The right bank of the creek upstream of the outfall contains rip rap that extends to the outfall. The creek bottom is sandy with rocky substrate. Mesohabitats include riffles and glides in the area. Upstream of the outfall, under the bridge, the banks are lined with concrete and riprap.

Outfall 007: The outfall structure is surrounded by vegetation. The effluent cascades down into the river. The river banks are sandy and lined with vegetation.

Date and time of observation: 2/26/2024 @ 5:06 PM

Was the water body influenced by stormwater runoff during observations?

Yes ☐ No ☒

Section 5. General Characteristics of the Waterbody (Instructions Page 74)

A. Upstream influences

Is the immediate receiving water upstream of the discharge or proposed discharge site influenced by any of the following? Check all that apply.

☐ Oil field activities
☒ Urban runoff
☒ Upstream discharges
☒ Agricultural runoff
☐ Septic tanks
☐ Other(s), specify N/A

B. Waterbody uses

Observed or evidences of the following uses. Check all that apply.

☒ Livestock watering
☐ Contact recreation

☐ Irrigation withdrawal ☐ Non-contact recreation

☐ Fishing ☐ Navigation

☐ Domestic water supply ☐ Industrial water supply

☐ Park activities ☐ Other(s), specify N/A

C. Waterbody aesthetics

Check one of the following that best describes the aesthetics of the receiving water and the surrounding area.

☐ Wilderness: outstanding natural beauty; usually wooded or unpastured area; water clarity exceptional

☒ Natural Area: trees and/or native vegetation; some development evident (from fields, pastures, dwellings); water clarity discolored

☐ Common Setting: not offensive; developed but uncluttered; water may be colored or turbid

☐ Offensive: stream does not enhance aesthetics; cluttered; highly developed; dumping areas; water discolored

DOMESTIC WORKSHEET 3.0

LAND DISPOSAL OF EFFLUENT

The following is required for all permit applications

Renewal, New, and Amendments

Section 1. Type of Disposal System (Instructions Page 77)

Identify the method of land disposal:

- ☒ Surface application
- ☐ Irrigation
- ☐ Drip irrigation system
- ☐ Evaporation
- ☐ Evapotranspiration beds
- ☐ Other (describe in detail): Click here to enter text
- ☐ Subsurface application
- ☐ Subsurface soils absorption
- ☐ Subsurface area drip dispersal system

NOTE: All applicants without authorization or proposing new/amended subsurface disposal MUST complete and submit Worksheet 7.0.

For existing authorizations, provide Registration Number: LLAS-RN102976461, HLAS-RN107931396

Section 2. Land Application Site(s) (Instructions Page 77)

In table 3.0(1), provide the requested information for the land application sites. Include the agricultural or cover crop type (wheat, cotton, alfalfa, bermuda grass, native grasses, etc.), land use (golf course, hayland, pastureland, park, row crop, etc.), irrigation area, amount of effluent applied, and whether or not the public has access to the area. Specify the amount of land area and the amount of effluent that will be allotted to each agricultural or cover crop, if more than one crop will be used.

Table 3.0(1) – Land Application Site Crops

Crop Type & Land Use	Irrigation Area (acres)	Effluent Application (GPD)	Public Access? Y/N
LLAS	5,424	TR-10	N

Crop Type & Land Use	Irrigation Area (acres)	Effluent Application (GPD)	Public Access? Y/N
HLAS	3,400	TR-10	N

Section 3. Storage and Evaporation Lagoons/Ponds (Instructions Page 77)

Table 3.0(2) – Storage and Evaporation Ponds

Pond Number	Surface Area (acres)	Storage Volume (acre-feet)	Dimensions	Liner Type
LLAS	49	1229	1594.8' x 1608.8'	Geotextile membrane topped w/60mil HDPE membrane
HLAS (3)	173	2390	1180.5' x 1795.2' 1108.1' x 1913.8' 1974.5' x 1996.6'	Clay liner w/min thickness 12"

Attach a copy of a liner certification that was prepared, signed, and sealed by a Texas licensed professional engineer for each pond.

Attachment: TR-11

Section 4. Flood and Runoff Protection (Instructions Page 77)

Is the land application site within the 100-year frequency flood level?

Yes ☐ No ☒

If yes, describe how the site will be protected from inundation.

N/A

Provide the source used to determine the 100-year frequency flood level:

FEMA Map

Provide a description of tailwater controls and rainfall run-on controls used for the land application site.

LLAS and HLAS rainfall run-off is controlled by containment on property as per Multi-Sector General Permit and Storm Water Pollution Prevention Plans.

Section 5. Annual Cropping Plan (Instructions Page 77)

Attach an Annual Cropping Plan which includes a discussion of each of the following items. If not applicable, provide a detailed explanation indicating why.

Attachment: TR-10

- Soils map with crops
- Cool and warm season plant species
- Crop yield goals
- Crop growing season
- Crop nutrient requirements
- Additional fertilizer requirements
- Minimum/maximum harvest height (for grass crops)
- Supplemental watering requirements
- Crop salt tolerances
- Harvesting method/number of harvests
- Justification for not removing existing vegetation to be irrigated

Section 6. Well and Map Information (Instructions Page 78)

Attach a USGS map with the following information shown and labeled. If not applicable, provide a detailed explanation (on a separate page) indicating why.

Attachment: TR-12

- The boundaries of the land application site(s)
- Waste disposal or treatment facility site(s)
- On-site buildings
- Buffer zones
- Effluent storage and tailwater control facilities
- All water wells within 1 mile of the disposal site or property boundaries
- All springs and seeps onsite and within 500 feet of the property boundaries
- All surface waters in the state onsite and within 500 feet of the property boundaries
- All faults and sinkholes onsite and within 500 feet of the property

List and cross reference all water wells shown on the USGS map in the following table. Attach additional pages as necessary to include all of the wells.

Table 3.0(3) – Water Well Data

Well ID	Well Use	Producing? Y/N	Open, cased, capped, or plugged?	Proposed Best Management Practice
	Attachment	TR-12	Choose an item.	
			Choose an item.	
			Choose an item.	
			Choose an item.	
			Choose an item.	

If water quality data or well log information is available please include the information in an attachment listed by Well ID.

Attachment: TR-12

Section 7. Groundwater Quality (Instructions Page 79)

Attach a Groundwater Quality Technical Report which assesses the impact of the wastewater disposal system on groundwater. This report shall include an evaluation of the water wells (including the information in the well table provided in Item 6. above), the wastewater application rate, and pond liners. Indicate by a check mark that this report is provided.

Attachment: TR-13 - Summary of Annual Groundwater Quality Report. Full report submitted to TCEQ in May 2018 as per permit requirement.

Are groundwater monitoring wells available onsite? Yes ☒ No ☐

Do you plan to install ground water monitoring wells or lysimeters around the land application site? Yes ☐ No ☒

If yes, then provide the proposed location of the monitoring wells or lysimeters on a site map.

Attachment: N/A

Section 8. Soil Map and Soil Analyses (Instructions Page 79)

A. Soil map

Attach a USDA Soil Survey map that shows the area to be used for effluent disposal.

Attachment: TR-14

B. Soil analyses

Attach the laboratory results sheets from the soil analyses. **Note**: for renewal applications, the current annual soil analyses required by the permit are acceptable as long as the test date is less than one year prior to the submission of the application.

Attachment: TR-15

List all USDA designated soil series on the proposed land application site. Attach additional pages as necessary.

Table 3.0(4) – Soil Data

Soil Series	Depth from Surface	Permeability	Available Water Capacity	Curve Number
Attachment TR-15				

Section 9. Effluent Monitoring Data (Instructions Page 80)

Is the facility in operation?

Yes ☒ No ☐

If no, this section is not applicable and the worksheet is complete.

If yes, provide the effluent monitoring data for the parameters regulated in the existing permit. If a parameter is not regulated in the existing permit, enter N/A.

Table 3.0(5) – Effluent Monitoring Data

Date	30 Day Avg Flow MGD	BOD_5 mg/l	TSS mg/l	pH	Chlorine Residual mg/l	Acres irrigated
	TR-16					

Date	30 Day Avg Flow MGD	BOD_5 mg/l	TSS mg/l	pH	Chlorine Residual mg/l	Acres irrigated

Provide a discussion of all persistent excursions above the permitted limits and any corrective actions taken.

N/A

DOMESTIC WORKSHEET 3.1

SURFACE LAND DISPOSAL OF EFFLUENT

The following is required for new and major amendment applications. Renewal and minor amendments applicants may be asked for the worksheet on a case by case basis.

Section 1. Surface Disposal (Instructions Page 81)

Complete the item that applies for the method of disposal being used.

A. Irrigation

Area under irrigation, in acres: LLAS and HLAS: 4686 acres

Design application frequency:

hours/day 24 **And** days/week 7

Land grade (slope):

average percent (%):<1

maximum percent (%):<2

Design application rate in acre-feet/acre/year: 4.8

Design total nitrogen loading rate, in lbs N/acre/year: 194

Soil conductivity (mmhos/cm): **LLAS: 0.40, HLAS: 0.90**

Method of application: Center Pivot Irrigation

Attach a separate engineering report with the water balance and storage volume calculations, method of application, irrigation efficiency, and nitrogen balance.

Attachment: TR-17

B. Evaporation ponds

Daily average effluent flow into ponds, in gallons per day: N/A

Attach a separate engineering report with the water balance and storage volume calculations.

Attachment: N/A

C. Evapotranspiration beds

Number of beds: N/A

Area of bed(s), in acres: N/A

Depth of bed(s), in feet: N/A

Void ratio of soil in the beds: N/A

Storage volume within the beds, in acre-feet: N/A

Attach a separate engineering report with the water balance and storage volume calculations, and a description of the lining.

Attachment: N/A

D. Overland flow

Area used for application, in acres: N/A

Slopes for application area, percent (%): N/A

Design application rate, in gpm/foot of slope width: N/A

Slope length, in feet: N/A

Design BOD_5 loading rate, in lbs BOD_5/acre/day: N/A

Design application frequency:

hours/day: N/A **And** days/week: N/A

Attach a separate engineering report with the method of application and design requirements according to *30 TAC Chapter 217*.

Attachment: N/A

Section 2. Edwards Aquifer (Instructions Page 82)

Is the facility subject to *30 TAC Chapter 213*, Edwards Aquifer Rules?

Yes ☐ No ☒

If yes, attach a report concerning the recharge zone.

Attachment: N/A

DOMESTIC WORKSHEET 4.0

POLLUTANT ANALYSES REQUIREMENTS*

The following is required for facilities with a permitted or proposed flow of 1.0 MGD or greater, facilities with an approved pretreatment program, or facilities classified as a major facility. See instructions for further details.

This worksheet is not required for minor amendments without renewal

Section 1. Toxic Pollutants (Instructions Page 87)

For pollutants identified in Table 4.0(1), indicate the type of sample.

Grab ☒ Composite ☒

Date and time sample(s) collected: 11/16/23 9:40; 2/28/24 6:00

Table 4.0(1) – Toxics Analysis

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Acrylonitrile	<50	<50	1	50
Aldrin	<0.01	<0.01	1	0.01
Aluminum	50.2	50.2	1	2.5
Anthracene	<10	<10	1	10
Antimony	<5.0	<5.0	1	5
Arsenic	2.92	2.92	1	0.5
Barium	68.0	68.0	1	3
Benzene	<10	<10	1	10
Benzidine	<50	<50	1	50
Benzo(a)anthracene	<5	<5	1	5

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Benzo(a)pyrene	<5	<5	1	5
Bis(2-chloroethyl)ether	<10	<10	1	10
Bis(2-ethylhexyl)phthalate	<10	<10	1	10
Bromodichloromethane	<10	<10	1	10
Bromoform	<10	<10	1	10
Cadmium	<1	<1	1	1
Carbon Tetrachloride	<2	<2	1	2
Carbaryl	<5	<5	1	5
Chlordane*	<0.2	<0.2	1	0.2
Chlorobenzene	<10	<10	1	10
Chlorodibromomethane	<10	<10	1	10
Chloroform	<10	<10	1	10
Chlorpyrifos	<0.05	<0.05	1	0.05
Chromium (Total)	<3.0	<3.0	1	3
Chromium (Tri) **(*1)**	<3.0	<3.0	1	N/A
Chromium (Hex)	<3.0	<3.0	1	3
Copper	<2.0	<2.0	1	2
Chrysene	<5	<5	1	5
p-Chloro-m-Cresol	<10	<10	1	10
4,6-Dinitro-o-Cresol	<50	<50	1	50
p-Cresol	<10	<10	1	10

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Cyanide **(*2)**	<10	<10	1	10
4,4'- DDD	<0.1	<0.1	1	0.1
4,4'- DDE	<0.1	<0.1	1	0.1
4,4'- DDT	<0.02	<0.02	1	0.02
2,4-D	<0.7	<0.7	1	0.7
Demeton (O and S)	<0.20	<0.20	1	0.20
Diazinon	<0.1	<0.1	1	0.5/0.1
1,2-Dibromoethane	<10	<10	1	10
m-Dichlorobenzene	<10	<10	1	10
o-Dichlorobenzene	<10	<10	1	10
p-Dichlorobenzene	<10	<10	1	10
3,3'-Dichlorobenzidine	<5	<5	1	5
1,2-Dichloroethane	<10	<10	1	10
1,1-Dichloroethylene	<10	<10	1	10
Dichloromethane	<20	<20	1	20
1,2-Dichloropropane	<10	<10	1	10
1,3-Dichloropropene	<10	<10	1	10
Dicofol	<1	<1	1	1
Dieldrin	<0.02	<0.02	1	0.02
2,4-Dimethylphenol	<10	<10	1	10
Di-n-Butyl Phthalate	<10	<10	1	10

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Diuron	<0.09	<0.09	1	0.09
Endosulfan I (alpha)	<0.01	<0.01	1	0.01
Endosulfan II (beta)	<0.02	<0.02	1	0.02
Endosulfan Sulfate	<0.1	<0.1	1	0.1
Endrin	<0.02	<0.02	1	0.02
Ethylbenzene	<10	<10	1	10
Fluoride	<500	<500	1	500
Guthion	<0.1	<0.1	1	0.1
Heptachlor	<0.01	<0.01	1	0.01
Heptachlor Epoxide	<0.01	<0.01	1	0.01
Hexachlorobenzene	<5	<5	1	5
Hexachlorobutadiene	<10	<10	1	10
Hexachlorocyclohexane (alpha)	<0.05	<0.05	1	0.05
Hexachlorocyclohexane (beta)	<0.05	<0.05	1	0.05
gamma-Hexachlorocyclohexane (Lindane)	<0.05	<0.05	1	0.05
Hexachlorocyclopentadiene	<10	<10	1	10
Hexachloroethane	<20	<20	1	20
Hexachlorophene	<10	<10	1	10
Lead	<0.5	<0.5	1	0.5
Malathion	<0.1	<0.1	1	0.1

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Mercury	<0.005	<0.005	1	0.005
Methoxychlor	<2	<2	1	2
Methyl Ethyl Ketone	<50	<50	1	50
Mirex	<0.02	<0.02	1	0.02
Nickel	3.18	3.18	1	2
Nitrate-Nitrogen	2440	2440	1	100
Nitrobenzene	<10	<10	1	10
N-Nitrosodiethylamine	<20	<20	1	20
N-Nitroso-di-n-Butylamine	<20	<20	1	20
Nonylphenol	<333	<333	1	333
Parathion (ethyl)	<0.1	<0.1	1	0.1
Pentachlorobenzene	<20	<20	1	20
Pentachlorophenol	<5	<5	1	5
Phenanthrene	<10	<10	1	10
Polychlorinated Biphenyls (PCB's) **(*3)**	<0.2	<0.2	1	0.2
Pyridine	<20	<20	1	20
Selenium	<5	<5	1	5
Silver	<0.05	<0.05	1	0.5
1,2,4,5-Tetrachlorobenzene	<20	<20	1	20
1,1,2,2-Tetrachloroethane	<10	<10	1	10

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Tetrachloroethylene	<10	<10	1	10
Thallium	<0.5	<0.5	1	0.5
Toluene	<10	<10	1	10
Toxaphene	<0.3	<0.3	1	0.3
2,4,5-TP (Silvex)	<0.3	<0.3	1	0.3
Tributyltin (see instructions for explanation)	N/A	N/A	N/A	0.01
1,1,1-Trichloroethane	<10	<10	1	10
1,1,2-Trichloroethane	<10	<10	1	10
Trichloroethylene	<10	<10	1	10
2,4,5-Trichlorophenol	<50	<50	1	50
TTHM (Total Trihalomethanes)	<10	<10	1	10
Vinyl Chloride	<10	<10	1	10
Zinc	15.4	15.4	1	5

(*1) Determined by subtracting hexavalent Cr from total Cr.

(*2) Cyanide, amenable to chlorination or weak-acid dissociable.

(*3) The sum of seven PCB congeners 1242, 1254, 1221, 1232, 1248, 1260, and 1016.

Section 2. Priority Pollutants

For pollutants identified in Tables 4.0(2)A-E, indicate type of sample.

Grab ☒ Composite ☒

Date and time sample(s) collected: 11/16/23 9:40; 2/28/24 6:00

Table 4.0(2)A – Metals, Cyanide, Phenols

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Antimony	<5.0	<5.0	1	5
Arsenic	2.92	2.92	1	0.5
Beryllium	<0.5	<0.5	1	0.5
Cadmium	<1.0	<1.0	1	1
Chromium (Total)	<3.0	<3.0	1	3
Chromium (Hex)	<3.0	<3.0	1	3
Chromium (Tri) (*1)	<3.0	<3.0	1	N/A
Copper	<2.0	<2.0	1	2
Lead	<0.5	<0.5	1	0.5
Mercury	<0.005	<0.005	1	0.005
Nickel	<2.0	<2.0	1	2
Selenium	<5.0	<5.0	1	5
Silver	<0.5	<0.5	1	0.5
Thallium	<0.5	<0.5	1	0.5
Zinc	15.4	15.4	1	5
Cyanide (*2)	<10.0	<10.0	1	10
Phenols, Total	<10.0	<10.0	1	10

(*1) Determined by subtracting hexavalent Cr from total Cr.

(*2) Cyanide, amenable to chlorination or weak-acid dissociable

Table 4.0(2)B – Volatile Compounds

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Acrolein	<50	<50	1	50
Acrylonitrile	<50	<50	1	50
Benzene	<10	<10	1	10
Bromoform	<10	<10	1	10
Carbon Tetrachloride	<2	<2	1	2
Chlorobenzene	<10	<10	1	10
Chlorodibromomethane	<10	<10	1	10
Chloroethane	<50	<50	1	50
2-Chloroethylvinyl Ether	<10	<10	1	10
Chloroform	<10	<10	1	10
Dichlorobromomethane [Bromodichloromethane]	<10	<10	1	10
1,1-Dichloroethane	<10	<10	1	10
1,2-Dichloroethane	<10	<10	1	10
1,1-Dichloroethylene	<10	<10	1	10
1,2-Dichloropropane	<10	<10	1	10
1,3-Dichloropropylene [1,3-Dichloropropene]	<10	<10	1	10
1,2-Trans-Dichloroethylene	<10	<10	1	10
Ethylbenzene	<10	<10	1	10
Methyl Bromide	<50	<50	1	50
Methyl Chloride	<50	<50	1	50
Methylene Chloride	<20	<20	1	20
1,1,2,2-Tetrachloroethane	<10	<10	1	10
Tetrachloroethylene	<10	<10	1	10

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Toluene	<10	<10	1	10
1,1,1-Trichloroethane	<10	<10	1	10
1,1,2-Trichloroethane	<10	<10	1	10
Trichloroethylene	<10	<10	1	10
Vinyl Chloride	<10	<10	1	10

Table 4.0(2)C – Acid Compounds

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
2-Chlorophenol	<10	<10	1	10
2,4-Dichlorophenol	<10	<10	1	10
2,4-Dimethylphenol	<10	<10	1	10
4,6-Dinitro-o-Cresol	<50	<50	1	50
2,4-Dinitrophenol	<50	<50	1	50
2-Nitrophenol	<20	<20	1	20
4-Nitrophenol	<50	<50	1	50
P-Chloro-m-Cresol	<10	<10	1	10
Pentalchlorophenol	<5	<5	1	5
Phenol	<10	<10	1	10
2,4,6-Trichlorophenol	<10	<10	1	10

Table 4.0(2)D – Base/Neutral Compounds

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Acenaphthene	<10	<10	1	10
Acenaphthylene	<10	<10	1	10
Anthracene	<10	<10	1	10
Benzidine	<50	<50	1	50
Benzo(a)Anthracene	<5	<5	1	5
Benzo(a)Pyrene	<5	<5	1	5
3,4-Benzofluoranthene	<10	<10	1	10
Benzo(ghi)Perylene	<20	<20	1	20
Benzo(k)Fluoranthene	<5	<5	1	5
Bis(2-Chloroethoxy)Methane	<10	<10	1	10
Bis(2-Chloroethyl)Ether	<10	<10	1	10
Bis(2-Chloroisopropyl)Ether	<10	<10	1	10
Bis(2-Ethylhexyl)Phthalate	<10	<10	1	10
4-Bromophenyl Phenyl Ether	<10	<10	1	10
Butyl benzyl Phthalate	<10	<10	1	10
2-Chloronaphthalene	<10	<10	1	10
4-Chlorophenyl phenyl ether	<10	<10	1	10
Chrysene	<5	<5	1	5
Dibenzo(a,h)Anthracene	<5	<5	1	5
1,2-(o)Dichlorobenzene	<10	<10	1	10
1,3-(m)Dichlorobenzene	<10	<10	1	10
1,4-(p)Dichlorobenzene	<10	<10	1	10
3,3-Dichlorobenzidine	<5	<5	1	5
Diethyl Phthalate	<10	<10	1	10
Dimethyl Phthalate	<10	<10	1	10

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Di-n-Butyl Phthalate	<10	<10	1	10
2,4-Dinitrotoluene	<10	<10	1	10
2,6-Dinitrotoluene	<10	<10	1	10
Di-n-Octyl Phthalate	<10	<10	1	10
1,2-Diphenylhydrazine (as Azo-benzene)	<20	<20	1	20
Fluoranthene	<10	<10	1	10
Fluorene	<10	<10	1	10
Hexachlorobenzene	<5	<5	1	5
Hexachlorobutadiene	<10	<10	1	10
Hexachlorocyclo-pentadiene	<10	<10	1	10
Hexachloroethane	<20	<20	1	20
Indeno(1,2,3-cd)pyrene	<5	<5	1	5
Isophorone	<10	<10	1	10
Naphthalene	<10	<10	1	10
Nitrobenzene	<10	<10	1	10
N-Nitrosodimethylamine	<50	<50	1	50
N-Nitrosodi-n-Propylamine	<20	<20	1	20
N-Nitrosodiphenylamine	<20	<20	1	20
Phenanthrene	<10	<10	1	10
Pyrene	<10	<10	1	10
1,2,4-Trichlorobenzene	<10	<10	1	10

Table 4.0(2)E - Pesticides

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
Aldrin	<0.01	<0.01	1	0.01
alpha-BHC (Hexachlorocyclohexane)	<0.05	<0.05	1	0.05
beta-BHC (Hexachlorocyclohexane)	<0.05	<0.05	1	0.05
gamma-BHC (Hexachlorocyclohexane)	<0.05	<0.05	1	0.05
delta-BHC (Hexachlorocyclohexane)	<0.05	<0.05	1	0.05
Chlordane	<0.2	<0.2	1	0.2
4,4-DDT	<0.02	<0.02	1	0.02
4,4-DDE	<0.1	<0.1	1	0.1
4,4,-DDD	<0.1	<0.1	1	0.1
Dieldrin	<0.02	<0.02	1	0.02
Endosulfan I (alpha)	<0.01	<0.01	1	0.01
Endosulfan II (beta)	<0.02	<0.02	1	0.02
Endosulfan Sulfate	<0.1	<0.1	1	0.1
Endrin	<0.02	<0.02	1	0.02
Endrin Aldehyde	<0.1	<0.1	1	0.1
Heptachlor	<0.01	<0.01	1	0.01
Heptachlor Epoxide	<0.01	<0.01	1	0.01
PCB-1242	<0.2	<0.2	1	0.2
PCB-1254	<0.2	<0.2	1	0.2
PCB-1221	<0.2	<0.2	1	0.2
PCB-1232	<0.2	<0.2	1	0.2

Pollutant	AVG Effluent Conc. (µg/l)	MAX Effluent Conc. (µg/l)	Number of Samples	MAL (µg/l)
PCB-1248	<0.2	<0.2	1	0.2
PCB-1260	<0.2	<0.2	1	0.2
PCB-1016	<0.2	<0.2	1	0.2
Toxaphene	<0.3	<0.3	1	0.3

* For PCBS, if all are non-detects, enter the highest non-detect preceded by a "<".

Section 3. Dioxin/Furan Compounds

A. Indicate which of the following compounds from may be present in the influent from a contributing industrial user or significant industrial user. Check all that apply.

☐ 2,4,5-trichlorophenoxy acetic acid
Common Name 2,4,5-T, CASRN 93-76-5

☐ 2-(2,4,5-trichlorophenoxy) propanoic acid
Common Name Silvex or 2,4,5-TP, CASRN 93-72-1

☐ 2-(2,4,5-trichlorophenoxy) ethyl 2,2-dichloropropionate
Common Name Erbon, CASRN 136-25-4

☐ 0,0-dimethyl 0-(2,4,5-trichlorophenyl) phosphorothioate
Common Name Ronnel, CASRN 299-84-3

☐ 2,4,5-trichlorophenol
Common Name TCP, CASRN 95-95-4

☐ hexachlorophene
Common Name HCP, CASRN 70-30-4

For each compound identified, provide a brief description of the conditions of its/their presence at the facility.

Click here to enter text

B. Do you know or have any reason to believe that 2,3,7,8 Tetrachlorodibenzo-P-Dioxin (TCDD) or any congeners of TCDD may be present in your effluent?

Yes ☐ No ☐

If **yes**, provide a brief description of the conditions for its presence.

Click here to enter text.

If any of the compounds in Subsection A **or** B are present, complete Table 4.0(2)F.

For pollutants identified in Table 4.0(2)F, indicate the type of sample.

Grab ☐ Composite ☐

Date and time sample(s) collected: Click here to enter text.

TABLE 4.0(2)F - DIOXIN/FURAN COMPOUNDS

Compound	**Toxic Equivalency Factors**	**Wastewater Concentration (ppq)**	**Wastewater Equivalents (ppq)**	**Sludge Concentration (ppt)**	**Sludge Equivalents (ppt)**	**MAL (ppq)**
2,3,7,8 TCDD	1					10
1,2,3,7,8	0.5					50
2,3,7,8 HxCDDs	0.1					50
1,2,3,4,6,7,8 HpCDD	0.01					50
2,3,7,8 TCDF	0.1					10
1,2,3,7,8 PeCDF	0.05					50
2,3,4,7,8 PeCDF	0.5					50
2,3,7,8 HxCDFs	0.1					50
2,3,4,7,8	0.01					50
OCDD	0.0003					100
OCDF	0.0003					100
PCB 77	0.0001					0.5
PCB 81	0.0003					0.5

Compound	Toxic Equivalency Factors	Wastewater Concentration (ppq)	Wastewater Equivalents (ppq)	Sludge Concentration (ppt)	Sludge Equivalents (ppt)	MAL (ppq)
PCB 126	0.1					0.5
PCB 169	0.03					0.5
Total						

DOMESTIC WORKSHEET 5.0

TOXICITY TESTING REQUIREMENTS

The following is required for facilities with a currently-operating design flow greater than or equal to 1.0 MGD, with an EPA-approved pretreatment program (or those that are required to have one under 40 CFR Part 403), or are required by the TCEQ to perform Whole Effluent Toxicity testing. This worksheet is not required for minor amendments without renewal.

Section 1. Required Tests (Instructions Page 97)

Indicate the number of 7-day chronic or 48-hour acute Whole Effluent Toxicity (WET) tests performed in the four and one-half years prior to submission of the application.

7-day Chronic: 22

48-hour Acute: 15

Section 2. Toxicity Reduction Evaluations (TREs)

Has this facility completed a TRE in the past four and a half years? Or is the facility currently performing a TRE?

Yes ☐ No ☒

If yes, describe the progress to date, if applicable, in identifying and confirming the toxicant.

N/A

Section 3. Summary of WET Tests

If the required biomonitoring test information has not been previously submitted via both the Discharge Monitoring Reports (DMRs) and the Table 1 (as found in the permit), provide a summary of the testing results for all valid and invalid tests performed over the past four and one-half years. Make additional copies of this table as needed.

Table 5.0(1) – Summary of WET Tests

Test Date	Test Species	NOEC Survival	NOEC Sub-lethal
	Submitted via DMRs		

DOMESTIC WORKSHEET 6.0

INDUSTRIAL WASTE CONTRIBUTION

The following is required for all publicly owned treatment works (POTWs)

Section 1. All POTWs (Instructions Page 99)

A. Industrial users

Provide the number of each of the following types of industrial users (IUs) that discharge to your POTW and the daily flows from each user. See the Instructions for definitions of Categorical IUs, Significant IUs – non-categorical, and Other IUs.

If there are no users, enter 0 (zero).

Categorical IUs:

Number of IUs: 4

Average Daily Flows, in MGD: 326,998

Significant IUs – non-categorical:

Number of IUs: 9

Average Daily Flows, in MGD: 740,551

Other IUs:

Number of IUs: 0

Average Daily Flows, in MGD: 0

B. Treatment plant interference

In the past three years, has your POTW experienced treatment plant interference (see instructions)?

Yes ☐ No ☒

If yes, identify the dates, duration, description of interference, and probable cause(s) and possible source(s) of each interference event. Include the names of the IUs that may have caused the interference.

N/A

C. Treatment plant pass through

In the past three years, has your POTW experienced pass through (see instructions)?

Yes ☐ No ☒

If yes, identify the dates, duration, a description of the pollutants passing through the treatment plant, and probable cause(s) and possible source(s) of each pass through event. Include the names of the IUs that may have caused pass through.

N/A

D. Pretreatment program

Does your POTW have an approved pretreatment program?

Yes ☒ No ☐

If yes, complete Section 2 only of this Worksheet.

Is your POTW required to develop an approved pretreatment program?

Yes ☐ No ☐

If yes, complete Section 2.c. and 2.d. only, and skip Section 3.

If no to either question above, skip Section 2 and complete Section 3 for each significant industrial user and categorical industrial user.

Section 2. POTWs with Approved Programs or Those Required to Develop a Program (Instructions Page 100)

A. Substantial modifications

Have there been any **substantial modifications** to the approved pretreatment program that have not been submitted to the TCEQ for approval according to *40 CFR §403.18*?

Yes ☐ No ☒

If yes, identify the modifications that have not been submitted to TCEQ, including the purpose of the modification.

N/A

B. Non-substantial modifications

Have there been any **non-substantial modifications** to the approved pretreatment program that have not been submitted to TCEQ for review and acceptance?

Yes ☐ No ☒

If yes, identify all non-substantial modifications that have not been submitted to TCEQ, including the purpose of the modification.

N/A

C. Effluent parameters above the MAL

In Table 6.0(1), list all parameters measured above the MAL in the POTW's effluent monitoring during the last three years. Submit an attachment if necessary.

Table 6.0(1) – Parameters Above the MAL

Pollutant	Concentration	MAL	Units	Date
Aluminum	50.2	2.5	ug/L	11/16/23
Arsenic	2.92	0.5	ug/L	11/16/23
Barium	68	3	ug/L	11/16/23
Nickel	3.18	2	ug/L	11/16/23
Zinc	15.4	5	ug/L	11/16/23

D. Industrial user interruptions

Has any SIU, CIU, or other IU caused or contributed to any problems (excluding interferences or pass throughs) at your POTW in the past three years?

Yes ☐ No ☒

If yes, identify the industry, describe each episode, including dates, duration, description of the problems, and probable pollutants.

N/A

Section 3. Significant Industrial User (SIU) Information and Categorical Industrial User (CIU) (Instructions Page 100)

A. General information

Section 3 N/A

Company Name: Click here to enter text.

SIC Code: Click here to enter text.

Telephone number: Click here to enter text. Fax number: Click here to enter text.

Contact name: Click here to enter text.

Address: Click here to enter text.

City, State, and Zip Code: Click here to enter text.

B. Process information

Describe the industrial processes or other activities that affect or contribute to the SIU(s) or CIU(s) discharge (i.e., process and non-process wastewater).

Click here to enter text.

C. Product and service information

Provide a description of the principal product(s) or services performed.

Click here to enter text.

D. Flow rate information

See the Instructions for definitions of "process" and "non-process wastewater."

Process Wastewater:

Discharge, in gallons/day: Click here to enter text.

Discharge Type: ☐ Continuous ☐ Batch ☐ Intermittent

Non-Process Wastewater:

Discharge, in gallons/day: Click here to enter text.

Discharge Type: ☐ Continuous ☐ Batch ☐ Intermittent

E. Pretreatment standards

Is the SIU or CIU subject to technically based local limits as defined in the instructions?

Yes ☐ No ☐

Is the SIU or CIU subject to categorical pretreatment standards found in *40 CFR Parts 405-471*?

Yes ☐ No ☐

If subject to categorical pretreatment standards, indicate the applicable category and subcategory for each categorical process.

Category: Click here to enter text.
Subcategories: Click here to enter text.

Category: Click here to enter text.
Subcategories: Click here to enter text.

Category: Click here to enter text.
Subcategories: Click here to enter text.

Category: Click here to enter text.
Subcategories: Click here to enter text.

Category: Click here to enter text.
Subcategories: Click here to enter text.

F. Industrial user interruptions

Has the SIU or CIU caused or contributed to any problems (e.g., interferences, pass through, odors, corrosion, blockages) at your POTW in the past three years?

Yes ☐ No ☐

If yes, identify the SIU, describe each episode, including dates, duration, description of problems, and probable pollutants.

Click here to enter text

ATTACHMENT AR-1

Copy of ePay Voucher

Your transaction is complete. Thank you for using TCEQ ePay.

Note: It may take up to 3 working days for this electronic payment to be processed and be reflected in the TCEQ ePay system. Print this receipt and the vouchers for your records. An email receipt has also been sent.

Transaction Information

Trace Number: 582EA000608848
Date: 05/02/2024 10:23 AM
Payment Method: CC - Authorization 0000088936
ePay Actor: DONNIE RAY CARRASCO
Actor Email: dcarrasco@mylubbock.us
IP: 208.84.91.39
TCEQ Amount: $2,050.00
Texas.gov Price: $2,096.38*

* This service is provided by Texas.gov, the official website of Texas. The price of this service includes funds that support the ongoing operations and enhancements of Texas.gov, which is provided by a third party in partnership with the State.

Payment Contact Information

Name: DONNIE RAY CARRASCO
Company: CITY OF LUBBOCK
Address: 3603 GUAVA AVENUE, LUBBOCK, TX 79404
Phone: 806-775-2621

Cart Items

Click on the voucher number to see the voucher details.

Voucher	Fee Description	AR Number	Amount
703855	WW PERMIT - FACILITY WITH FLOW >= 1.0 MGD - NEW AND MAJOR AMENDMENTS		$2,000.00
703856	30 TAC 305.53B WQ NOTIFICATION FEE		$50.00
		TCEQ Amount:	$2,050.00

ePay Again | Exit ePay

Note: It may take up to 3 working days for this electronic payment to be processed and be reflected in the TCEQ ePay system. Print this receipt for your records.

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Important: Credit card payments made to TCEQ prior to October 1st, 2020, incurred Texas.gov costs which were paid by TCEQ. Effective October 1st, 2020, customers choosing to make payment to TCEQ by credit card will be required to pay the **non-refundable** Texas.gov costs at time of payment. The Texas.gov costs support the ongoing operations and enhancements of Texas.gov, which is provided by a third party in partnership with the State.

Transaction Information

Date: 05/02/2024
Payment Method: CC
ePay User: DONNIE RAY CARRASCO
Actor Email: dcarrasco@mylubbock.us
IP: 208.84.91.39
TCEQ Amount: $2,050.00
Texas.gov Price: $2,096.38*

* This service is provided by Texas.gov, the official website of Texas. The price of this service includes funds that support the ongoing operations and enhancements of Texas.gov, which is provided by a third party in partnership with the State.

Payment Contact Information

Contact Name: DONNIE RAY CARRASCO
Company: CITY OF LUBBOCK
Address: 3603 GUAVA AVENUE
LUBBOCK, TX 79404
Phone: 806-775-2621

Cart Items

Fee Description	AR Number	Amount
30 TAC 305.53B WQ NOTIFICATION FEE		$50.00
WW PERMIT - FACILITY WITH FLOW >= 1.0 MGD - NEW AND MAJOR AMENDMENTS		$2,000.00
	TCEQ Amount:	$2,050.00

Payment Confirmation

Press the **Make Payment** button to pay for your items. You will be **redirected** to a secure Common Checkout web application to process your transaction. Please **DO NOT** close your browser until you have been returned to the TCEQ ePay application. If you have made a payment and you are not returned to the TCEQ ePay application, please do not try to pay again. Please contact the STEERS/ePay Help Line at 512-239-6925 or email steers@tceq.texas.gov to see if your payment was successful.

Make Payment Cancel

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TCEQ ePay Voucher Receipt

Transaction Information

Voucher Number:	703856
Trace Number:	582EA000608848
Date:	05/02/2024 10:23 AM
Payment Method:	CC - Authorization 0000088936
Voucher Amount:	$50.00
Fee Type:	30 TAC 305.53B WQ NOTIFICATION FEE
ePay Actor:	DONNIE RAY CARRASCO

Payment Contact Information

Name:	DONNIE RAY CARRASCO
Company:	CITY OF LUBBOCK
Address:	3603 GUAVA AVENUE, LUBBOCK, TX 79404
Phone:	806-775-2621

ATTACHMENT AR-2

Core Data Form

TCEQ Use Only

TCEQ Core Data Form

For detailed instructions on completing this form, please read the Core Data Form Instructions or call 512-239-5175.

SECTION I: General Information

1. Reason for Submission (*If other is checked please describe in space provided.*)	
☐ New Permit, Registration or Authorization (*Core Data Form should be submitted with the program application.*)	
☒ Renewal (*Core Data Form should be submitted with the renewal form*)	☒ Other **Amendment**

2. Customer Reference Number (*if issued*)	Follow this link to search for CN or RN numbers in Central Registry**	**3. Regulated Entity Reference Number** (*if issued*)
CN 600130736		**RN 101609949**

SECTION II: Customer Information

4. General Customer Information	**5. Effective Date for Customer Information Updates** (mm/dd/yyyy)	5/6/2024
☐ New Customer ☒ Update to Customer Information ☐ Change in Regulated Entity Ownership ☐ Change in Legal Name (Verifiable with the Texas Secretary of State or Texas Comptroller of Public Accounts)		
The Customer Name submitted here may be updated automatically based on what is current and active with the Texas Secretary of State (SOS) or Texas Comptroller of Public Accounts (CPA).		
6. Customer Legal Name (*If an individual, print last name first: eg: Doe, John*)	*If new Customer, enter previous Customer below:*	
City of Lubbock		

7. TX SOS/CPA Filing Number	**8. TX State Tax ID** (11 digits)	**9. Federal Tax ID** (9 digits)	**10. DUNS Number** (*if applicable*)

11. Type of Customer:	☐ Corporation	☐ Individual	Partnership: ☐ General ☐ Limited
Government: ☒ City ☐ County ☐ Federal ☐ Local ☐ State ☐ Other		☐ Sole Proprietorship	☐ Other:

12. Number of Employees	**13. Independently Owned and Operated?**
☐ 0-20 ☐ 21-100 ☐ 101-250 ☐ 251-500 ☒ 501 and higher	☒ **Yes** ☐ **No**

14. Customer Role (Proposed or Actual) – *as it relates to the Regulated Entity listed on this form. Please check one of the following*			
☐ Owner	☐ Operator	☒ Owner & Operator	☐ Other:
☐ Occupational Licensee	☐ Responsible Party	☐ VCP/BSA Applicant	

15. Mailing Address:	P.O. Box 2000							
	City	Lubbock	**State**	TX	**ZIP**	79457	**ZIP + 4**	

16. Country Mailing Information (*if outside USA*)	**17. E-Mail Address** (*if applicable*)
	wfranklin@mylubbock.us

18. Telephone Number	**19. Extension or Code**	**20. Fax Number** (*if applicable*)

(806) 775-2343		( ) -

SECTION III: Regulated Entity Information

21. General Regulated Entity Information *(If 'New Regulated Entity" is selected, a new permit application is also required.)*

☐ New Regulated Entity ☐ Update to Regulated Entity Name ☒ Update to Regulated Entity Information

The Regulated Entity Name submitted may be updated, in order to meet TCEQ Core Data Standards (removal of organizational endings such as Inc, LP, or LLC).

22. Regulated Entity Name *(Enter name of the site where the regulated action is taking place.)*

Southwest Water Reclamation Plant

23. Street Address of the Regulated Entity: ***(No PO Boxes)***	3603 E Guava Avenue							
	City	Lubbock	**State**	TX	**ZIP**	79404	**ZIP + 4**	
24. County	Lubbock							

If no Street Address is provided, fields 25-28 are required.

25. Description to Physical Location:	N/A		
26. Nearest City		**State**	**Nearest ZIP Code**
Lubbock		TX	79457

Latitude/Longitude are required and may be added/updated to meet TCEQ Core Data Standards. (Geocoding of the Physical Address may be used to supply coordinates where none have been provided or to gain accuracy).

27. Latitude (N) In Decimal:	33.561757		**28. Longitude (W) In Decimal:**	-101.8011	
Degrees	Minutes	Seconds	Degrees	Minutes	Seconds
33	33	42.3252	-101	48	3.96

29. Primary SIC Code (4 digits)	**30. Secondary SIC Code** (4 digits)	**31. Primary NAICS Code** (5 or 6 digits)	**32. Secondary NAICS Code** (5 or 6 digits)
4952		221320	

33. What is the Primary Business of this entity? *(Do not repeat the SIC or NAICS description.)*

Wastewater treatment

34. Mailing Address:	**P.O. Box 2000**							
	City	**Lubbock**	**State**	**TX**	**ZIP**	**79547**	**ZIP + 4**	
35. E-Mail Address:	**wfranklin@mylubbock.us**							

36. Telephone Number	**37. Extension or Code**	**38. Fax Number** *(if applicable)*
(806) 775-2343		**( ) -**

39. TCEQ Programs and ID Numbers Check all Programs and write in the permits/registration numbers that will be affected by the updates submitted on this form. See the Core Data Form instructions for additional guidance.

☐ Dam Safety	☐ Districts	☐ Edwards Aquifer	☐ Emissions Inventory Air	☐ Industrial Hazardous Waste
☐ Municipal Solid Waste	☐ New Source Review Air	☐ OSSF	☐ Petroleum Storage Tank	☐ PWS
☐ Sludge	☒ Storm Water	☐ Title V Air	☐ Tires	☐ Used Oil
	TXR05CH74			
☐ Voluntary Cleanup	☒ Wastewater	☐ Wastewater Agriculture	☐ Water Rights	☒ Other: Pretreatment
	WQ0010353002			TX0106071000

SECTION IV: Preparer Information

40. Name:	Cassandra Villarreal	**41. Title:**	Environmental Scientist

42. Telephone Number	**43. Ext./Code**	**44. Fax Number**	**45. E-Mail Address**
(817) 735-7294		(817) 735-7492	cassandra.villarreal@freese.com

SECTION V: Authorized Signature

46. By my signature below, I certify, to the best of my knowledge, that the information provided in this form is true and complete, and that I have signature authority to submit this form on behalf of the entity specified in Section II, Field 6 and/or as required for the updates to the ID numbers identified in field 39.

Company:	Freese and Nichols, Inc	**Job Title:**	Enviornmental Scientist
Name *(In Print)*:	Cassandra Villarreal	**Phone:**	(817) 735- **7294**
Signature:	CVillarreal	**Date:**	5/6/2024

ATTACHMENT AR-3

Public Involvement Plan

Texas Commission on Environmental Quality

Public Involvement Plan Form for Permit and Registration Applications

The Public Involvement Plan is intended to provide applicants and the agency with information about how public outreach will be accomplished for certain types of applications in certain geographical areas of the state. It is intended to apply to new activities; major changes at existing plants, facilities, and processes; and to activities which are likely to have significant interest from the public. This preliminary screening is designed to identify applications that will benefit from an initial assessment of the need for enhanced public outreach.

All applicable sections of this form should be completed and submitted with the permit or registration application. For instructions on how to complete this form, see TCEQ-20960-inst.

Section 1. Preliminary Screening

☐ New Permit or Registration Application

☒ New Activity – modification, registration, amendment, facility, etc. (see instructions)

If neither of the above boxes are checked, completion of the form is not required and does not need to be submitted.

Section 2. Secondary Screening

☒ Requires public notice,

☐ Considered to have significant public interest, **and**

☒ Located within any of the following geographical locations:

- Austin
- Dallas
- Fort Worth
- Houston
- San Antonio
- West Texas
- Texas Panhandle
- Along the Texas/Mexico Border
- Other geographical locations should be decided on a case-by-case basis

If all the above boxes are not checked, a Public Involvement Plan is not necessary. Stop after Section 2 and submit the form.

☒ Public Involvement Plan not applicable to this application. Provide **brief** explanation.

This permit has not had significant public interest in the last permit cycles.

Section 3. Application Information

Type of Application (check all that apply):

Air ☐ Initial ☐ Federal ☐ Amendment ☐ Standard Permit ☐ Title V

Waste ☐ Municipal Solid Waste ☐ Industrial and Hazardous Waste ☐ Scrap Tire
☐ Radioactive Material Licensing ☐ Underground Injection Control

Water Quality

☐ Texas Pollutant Discharge Elimination System (TPDES)

- ☐ Texas Land Application Permit (TLAP)
- ☐ State Only Concentrated Animal Feeding Operation (CAFO)
- ☐ Water Treatment Plant Residuals Disposal Permit

☐ Class B Biosolids Land Application Permit

☐ Domestic Septage Land Application Registration

Water Rights New Permit

☐ New Appropriation of Water

☐ New or existing reservoir

Amendment to an Existing Water Right

☐ Add a New Appropriation of Water

☐ Add a New or Existing Reservoir

☐ Major Amendment that could affect other water rights or the environment

Section 4. Plain Language Summary

Provide a brief description of planned activities.

Section 5. Community and Demographic Information

Community information can be found using EPA's EJ Screen, U.S. Census Bureau information, or generally available demographic tools.

Information gathered in this section can assist with the determination of whether alternative language notice is necessary. Please provide the following information.

(City)

(County)

(Census Tract)

Please indicate which of these three is the level used for gathering the following information.

☐ City ☐ County ☐ Census Tract

(a) Percent of people over 25 years of age who at least graduated from high school

(b) Per capita income for population near the specified location

(c) Percent of minority population and percent of population by race within the specified location

(d) Percent of Linguistically Isolated Households by language within the specified location

(e) Languages commonly spoken in area by percentage

(f) Community and/or Stakeholder Groups

(g) Historic public interest or involvement

Section 6. Planned Public Outreach Activities

(a) Is this application subject to the public participation requirements of Title 30 Texas Administrative Code (30 TAC) Chapter 39?

☐ Yes ☐ No

(b) If yes, do you intend at this time to provide public outreach other than what is required by rule?

☐ Yes ☐ No

If Yes, please describe.

If you answered "yes" that this application is subject to 30 TAC Chapter 39, answering the remaining questions in Section 6 is not required.

(c) Will you provide notice of this application in alternative languages?

☐ Yes ☐ No

Please refer to Section 5. If more than 5% of the population potentially affected by your application is Limited English Proficient, then you are required to provide notice in the alternative language.

If yes, how will you provide notice in alternative languages?

☐ Publish in alternative language newspaper

☐ Posted on Commissioner's Integrated Database Website

☐ Mailed by TCEQ's Office of the Chief Clerk

☐ Other (specify)

(d) Is there an opportunity for some type of public meeting, including after notice?

☐ Yes ☐ No

(e) If a public meeting is held, will a translator be provided if requested?

☐ Yes ☐ No

(f) Hard copies of the application will be available at the following (check all that apply):

☐ TCEQ Regional Office ☐ TCEQ Central Office

☐ Public Place (specify)

Section 7. Voluntary Submittal

For applicants voluntarily providing this Public Involvement Plan, who are not subject to formal public participation requirements.

Will you provide notice of this application, including notice in alternative languages?

☐ Yes ☐ No

What types of notice will be provided?

☐ Publish in alternative language newspaper

☐ Posted on Commissioner's Integrated Database Website

☐ Mailed by TCEQ's Office of the Chief Clerk

☐ Other (specify)

ATTACHMENT AR-4

Effluent Disposal Site Lease Information

CITY OF LUBBOCK
SOUTHEAST WATER RECLAMATION PLANT
TPDES PERMIT APPLICATION

OWNERS OF EFFLUENT DISPOSAL SITE

The Lubbock Land Application Site is approximately 6,000 acres. The majority of the site (approximately 5,100 acres) is owned by the City of Lubbock. Various private landowners own the remaining approximately 1100 acres. Below is a list of private landowners, their mailing addresses, and approximate acreages. Attached is a copy of each long-term agreement and owner's affidavit authorizing the use of the land for effluent disposal.

Donna Adams (320 ac)
7327 East FM 40
Lubbock, TX 79403

Fred Jones (300 ac)
64 East Canyon View Drive
Ransom Canyon, TX 79366

J. H. Green Trust (320 ac)
P. O. Box 1204
Duncan, OK 73534-1204

Rodney Schoppa (160 ac)
2605 CR 2800
Lubbock, TX 79403

Resolution No. 2017-R0189
Item No. 6.18
May 25, 2017

RESOLUTION

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LUBBOCK:

THAT the Mayor of the City of Lubbock is hereby authorized and directed to execute for and on behalf of the City of Lubbock, an Agreement for provision of treated wastewater effluent at Farm Number 1259, by and between the City of Lubbock and Blake Petree, and related documents. Said Agreement is attached hereto and incorporated in this Resolution as if fully set forth herein and shall be included in the minutes of the City Council.

Passed by the City Council on May 25, 2017.

DANIEL M. POPE, MAYOR

ATTEST:

Rebecca Garza, City Secretary

APPROVED AS TO CONTENT:

Aubrey A. Spear, P.E., Director of Water Utilities

APPROVED AS TO FORM:

Amy L. Sims, Deputy City Attorney

RES.WastewaterAgreement-BP-1259
(4-19-17)

Resolution No. 2017-R0189

STATE OF TEXAS §
§
§
COUNTY OF LUBBOCK §

AGREEMENT REGARDING TREATED WASTEWATER EFFLUENT

WHEREAS, Blake Petree of 12208 CR 7120, Slaton, Texas, 79364 (herein called "USER") is the owner, lessee or tenant of land described as Farm Number 1259 (herein called "Land"); and

WHEREAS, the City of Lubbock, Texas (herein called "OPERATOR") operates and manages a treated wastewater effluent disposal site reference to which is hereby made for all pertinent purposes; and

WHEREAS, User desires to take treated wastewater effluent from Operator who disposes, in part, of such treated wastewater effluent at the Lubbock Land Application Site. **NOW THEREFORE**:

USER AND OPERATOR CONTRACT AND AGREE AS FOLLOWS:

1. User has **322.5** acres that comprises the Land, which will be irrigated by treated wastewater effluent furnished by the Operator. Operator shall furnish treated wastewater effluent to the User at no charge to be used on the Land as permitted in the Operator's TCEQ Permit No. 10353-02 (herein called the "Permit").

2. User agrees to utilize and dispose of treated wastewater effluent furnished by the Operator under this agreement solely in accordance with all terms and conditions of the Permit, the associated Groundwater Remediation Plan, and any other related permits governing the disposal of treated wastewater effluent by agricultural irrigation. Terms include, but are not limited to, establishing tailwater control facilities and establishing measures that preclude the discharge of effluent to ground and surface waters. User also agrees to follow cropping plans authorized in the Permit, which call for a continuous cropping system such as a cotton/wheat rotation. User herein grants the Operator all rights of entry to the Land and the permission to drill and periodically monitor test well(s), which may be required by the Permit, the associated Groundwater Remediation Plan, or any other related permits governing the disposal of treated wastewater effluent. The treated

wastewater effluent supplied to User pursuant to this Agreement shall only be utilized solely on the Lands and shall not be otherwise transferred or utilized on any other property.

3. User understands and agrees that the provision of treated wastewater effluent is interruptible and may cease at any time due to decisions unilaterally made by the Operator, or regulatory directive. User agrees to take the treated wastewater effluent as-is at the point of delivery identified in Exhibit A, which is incorporated as if fully set forth herein. Operator may deliver the wastewater effluent hereunder at a rate of delivery deemed advisable by it, in its sole discretion.

4. THE OPERATOR MAKES NO REPRESENTATION OR WARRANTY AS TO THE QUALITY OF THE TREATED WASTEWATER EFFLUENT SUPPLIED HEREUNDER, AND USER HEREBY RELEASES OPERATOR AND AGREES TO INDEMNIFY AND HOLD HARMLESS OPERATOR, ITS RESPECTIVE OFFICERS, AGENTS, EMPLOYEES AND ELECTED OFFICIALS FROM AND AGAINST ANY AND ALL CLAIMS, LIABILITIES, DEMANDS, LOSSES OR CAUSES OF ACTION OF ANY KIND OR NATURE, INCLUDING WITHOUT LIMITATION, ALL COSTS AND EXPENSES IN THE DEFENSE THEREOF, ARISING FROM OR RELATED TO THE USE OR CONSUMPTION, IN ANY WAY, MANNER OR FORM, THE WASTEWATER EFFLUENT SUPPLIED HEREUNDER, INCLUDING WITHOUT LIMITATION, ANY SUCH CLAIMS, LOSSES OR DAMAGES CAUSED, IN WHOLE OR IN PART, BY THE NEGLIGENCE OF ANY KIND, TYPE OR DEGREE OF OPERATOR.

5. The initial term of this agreement shall be for five (5) years commencing no later than the date of execution of this Agreement. Thereafter, this Agreement shall be automatically renewed for one (1) successive term of five (5) years unless canceled in writing by either party no less than ninety (90) days prior to expiration.

6. Operator reserves the right to exercise any right or remedy available to it by law, contract, equity, or otherwise, including without limitation, the right to seek any and all forms of relief in a court of competent jurisdiction. Further, Operator shall not be subject to any

arbitration process prior to exercising its unrestricted right to seek judicial remedy. The remedies set forth herein are cumulative and not exclusive, and may be exercised concurrently. To the extent of any conflict between this provision and another provision in, or related to, this document, the former shall control.

Executed this 25th day of May, 2017

CITY OF LUBBOCK:

Daniel M. Pope, MAYOR

Rebecca Garza, City Secretary

APPROVED AS TO CONTENT:

Mary H. Gonzales, Wastewater Superintendent

Aubrey Spear, P.E., Director of Water Utilities

APPROVED AS TO FORM:

Amy L. Sims, Deputy City Attorney

USER:

By: [Signature]

INSURANCE (Copies of Endorsements will be Required)

TYPE OF INSURANCE

GENERAL LIABILITY

- ☐ Commercial General Liability
- ☐ Claims Made
- ☐ W/Heavy Equipment
- ☐ Other _____
- ☐ Occurrence
- ☐ XCU
- ☐ To Include Products of Complete Operation Endorsements

COMBINED SINGLE LIMIT

General Aggregate _____
Products-Comp/Op AGG _____
Personal & Adv. Injury _____
Contractual Liability _____

Fire Damage (Any one Fire) _____
Med Exp (Any one Person) _____

PROFESSIONAL LIABILITY

☐ _____

General Aggregate _____

AUTOMOTIVE LIABILITY

☐ Any Auto

Aggregate _____

EXCESS LIABILITY

☐ Umbrella Form

Each Occurrence _____
Aggregate _____

GARAGE LIABILITY

☐ Any Auto
☐ _____

Other than Auto Only:

Auto Only - Each Accident _____
Each Accident _____
Aggregate _____

☐ **BUILDER'S RISK** ☐ 100% of the Total Contract Price
☐ **INSTALLATION FLOATER** ☐ 100% of the Total Material Costs
☐ **POLLUTION**
☐ **CARGO**
☐ **WORKERS COMPENSATION** or ☐ **OCCUPATIONAL MEDICAL AND DISABILITY**
☐ **EMPLOYERS' LIABILITY**

OTHER: COPIES OF ENDOSEMENTS ARE REQUIRED

☐ City of Lubbock named as additional insured on Auto/General Liability on a primary and non-contributory basis
☐ To include Products of Completed Operations endorsement.
☐ Waiver of subrogation in favor of the City of Lubbock on all coverages

IMPORTANT: All procurements **MUST** be reviewed by Risk Management for determination of insurance requirements, if any, prior to submission of this form to the Purchasing Department.

☐ No Insurance is required for purchase only of equipment.

Signature of Risk Management Coordinator _____ Date 2/14/17

CONTRACT INFORMATION (Part 2 Required for Contract Award) MAY 15 2017

(Type or Print all information with the exception of Signatures and Signature Dates)

City Council Agenda Date:
(Submit Texas Ethics Commission Form 1295 – Contact Purchasing)

Check all that apply: ☐ Revenue Generating ☐ Grant Funds
(*If either is selected, the Risk Management Coordinator signature is not required)

Risk Manager: Date:

Director of Fiscal Policy: Chyl Bracey Date: 4-19-17

City Manager Direct Report: Date: 4/19/17

Originating Department and *Individual Responsible for Ensuring Contract Terms and Contract Compliance:
(Executed contracts will be available on Laserfiche. Contact IT for Access.)

Department: Water Reclamation *Name: Mary Gonzales

Phone Number: 775-3229 Title: Water Reclamation Superintendent

Information for Vendor/Contractor/Agency or Other Entity City of Lubbock is contracting with:

Name of Entity: Blake Petree

Address: 12208 CR 7120
(This address will be used to mail Contract)

City: Slaton State: Texas Zip: 79364

Contact Name: Blake Petree

Phone No.: (806) 239-5089 Fax No.: Email:
(Scanned Contract will be E-mailed)

Notice to Proceed + ☐ Working ☐ Calendar Days **Not to Exceed Amount: $**

Original Contract Amount: $0.00

☐ Amendment

No.: of Amount:$
No.: of Amount:$
No.: of Amount:$

New Contract Amount: $

☐ Change Order

No.: of Amount:$
No.: of Amount:$
No.: of Amount:$

New Contract Amount: $

Part 2 requires one copy of the original contract or amendment/change order

Contract Checklist (*Not applicable to Change Orders or Amendments*)

1. Is the individual or owner of this business an officer or employee of the City of Lubbock. Note: If Yes, City policy may not allow us to write a contract for this individual/vendor. If unsure, check with Legal
2. If federal or state funded, does the contract include all clauses required by federal or state statutes, and executive orders and their implementing regulations?
3. If the purchase/transaction involves the purchase, lease, or acceptance as a gift of real estate, has an environmental site assessment (ESA) been performed on the property? If No, contact Environmental Compliance at (806) 775-2989

REQUEST TO PURCHASE GOODS OR SERVICES & CONTRACT INFORMATION (Part 1 Initial Procurement Process)

Document # 13303

Description of Goods or Services to be purchased — Estimated Amount $0.00

Use of water from Lubbock Land Application Site reservoir for irrigation of crops on Farm Number 1259, that are not for human consumption

Requesting Department: Water Reclamation — Contact Name: Mary Gonzales

Title: Water Reclamation Superintendent — Tel # 775-3229 — E-mail # mhgonzales@mylubbock.us

Will Vendor be on City Property? ☒ No ☐ Maybe (Explain below) ☐ Yes (Explain below)

How will this be delivered?

Explain

Reviewed by [signature] — Signature (Expenditures under $25,000 - Dept. Head; over $25,000 - Director) — Director of Water Utilities — Title (Director or Department Head ONLY)

Specifications/Scope of Work Attached (Email to mahargrd@mylubbock.us)

AUTHORIZATION REQUIRED FOR THE FOLLOWING IF APPLICABLE

☐ Asbestos may be present in the building, but sampling has shown none of the materials to be disturbed contain asbestos for the proposal scope of work (If the original scope of work changes, the Asbestos Coordinator must be notified)

☐ The work area contains asbestos materials that must be addressed before continuing the proposed work (The contractor must contact the Asbestos Coordinator prior to performing any work)

☐ The work proposed is exterior to the building, therefore it is the responsibility of the Contractor to follow all state, local and federal regulations regarding worker safety and waste disposal

Signature of Asbestos Coordinator *(for ANY project involving a City facility)* — Date

Signature of Facilities Director *(for ANY project involving a City facility)* — Date

City departments must obtain review and approval of specifications from the Fleet Services Director when specifications include rolling stock (e.g., autos, trucks, off-road equipment, farm equipment, trailers, utility/service bodies, etc.) *If Federal funds are involved, please see 49 CFR 663, Pre-award/Post Delivery of Rolling Stock.*

Signature of Fleet Services Director — Date

City departments must obtain approval from the Director of Information Technology when specifications include the configuration of any computer systems, computer hardware, computer software, or computer peripherals

Signature of Director of Information Technology — Date

FUNDING

Charge Advertising & Reproduction

Capital Projects 8304 20000 — Cost Center/Grants 8304 — Appropriated Amount: Available Amount

Cost Center/Project No 6421 — Account — Phase (Phase is only for Capital Projects)

Cost Center/Project No — Account — Phase — State Funding

Cost Center/Project No — Account — Phase — Federal Funding

Senior Financial Analyst Signature [signature] — Budget Director Signature [signature]

GENERAL SERVICES

Purchase Order Only Enter a Requisition Number

Term Contract of 5 year(s) + Renewals

Is this a One Time Service? ☐ Yes ☒ No — Items can be awarded on an ☐ item-by-item ☒ all-or-none

PUBLIC WORKS PROJECTS / JOC (Job Order Contract)

Estimated Engineer Amount listed on Bid Sync $_____

PROJECT NUMBER — NUMBER OF DAYS FOR COMPLETION OF WORK — ☐ Calendar or ☐ Working Days

LIQUIDATED DAMAGES per Day - Amount must be reasonable amount of anticipated or actual damages for each day the completion of work is delayed – generally not enforceable if damages are intended to serve as a penalty or are far in excess of the amount of damages that may be reasonably forecast (If blank, $25/day will be used)

BASIS FOR LIQUIDATED DAMAGES AMOUNT: (If blank, Liquidated Damages amount will default to $25/day)

PUR-12 (REV 2016)

LEASE AGREEMENT

THIS AGREEMENT, made this 18 day of July, 2016, by and between JOHN RAY GREEN, Trustee of Carrie Flynn Trust, Ruby Raynes Trust, Rufus J. Green Trust , Hubert Green Trust, and Earl Ray Green Trust, with a mailing address of P. O. Box 1204, Duncan, Oklahoma 73534, hereinafter called "LESSOR" and, BLAKE PETREE, with a mailing address of 12208 CR7120, Slaton, Texas 79364, hereinafter called "LESSEE":

WITNESSETH:

Lessor does hereby demise and let unto Lessee for agricultural purposes only the following described premises, situated in Lubbock County, State of Texas, to-wit:

> The West Half of Survey 74, Block A, abstract 803, containing 322.5 acres, more or less, LESS AND EXCEPT all the oil, gas, coal, petroleum and other minerals and mineral rights in and under said property, and that may be produced therefrom,

from the date set out above, until the 31st day of December, 2017, unless terminated before such time under the provisions of this instrument.

This lease is subject to the following terms and conditions:

(1) Lessee agrees to pay Lessor as rent for such premises one-fourth (1/4th) of the gross price received for cotton at the gin, after ginning, and one-third (1/3rd) of the gross price received for all feed and grains, and Lessee agrees that all expenses of producing and harvesting the crop shall be taken out of the three-fourths (3/4ths) gross price of the cotton crop and the two-thirds (2/3rds) gross price of the feed crop reserved unto Lessee, with the exception of the fertilizer applied to the cotton, for which Lessor shall pay one-fourth (1/4th) of the total fertilizer cost. Said rentals called for herein to be paid to Lessor by mailing the check for Lessor's share of the crop from the purchasing cotton gin, grain elevator, or other purchaser, to the Lessor's address above.

(2) Lessee agrees that when the produced crops are sold, that Lessee will require the purchaser of the crop to show the total gross proceeds on each check as to pounds of feed and bales of cotton sold and the price received per pound of feed and per bale of cotton.

(3) Lessee covenants that he will till and cultivate said premises in a good, skillful and farmerlike manner and according to the usual course of husbandry practiced in the area. Further, Lessee agrees that he will neither sublet nor assign this lease or any rights thereunder unless he shall first have obtained the written consent thereto of Lessor.

(4) Lessor shall have the right, in person or by agent, to enter upon the premises and make inspections, repairs or improvements. In the event this lease is not renewed within the time hereinafter provided, Lessor, or the incoming Lessee shall have the right, before this lease expires,

Resolution No. 2017-R0190
Item No. 6.18
May 25, 2017

RESOLUTION

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LUBBOCK:

THAT the Mayor of the City of Lubbock is hereby authorized and directed to execute for and on behalf of the City of Lubbock, an Agreement for provision of treated wastewater effluent at Farm Number 6761, by and between the City of Lubbock and Fred Jones, and related documents. Said Agreement is attached hereto and incorporated in this Resolution as if fully set forth herein and shall be included in the minutes of the City Council.

Passed by the City Council on May 25, 2017.

DANIEL M. POPE, MAYOR

ATTEST:

Rebecca Garza, City Secretary

APPROVED AS TO CONTENT:

Aubrey A. Spear, P.E., Director of Water Utilities

APPROVED AS TO FORM:

Amy L. Sims, Deputy City Attorney

RES.WastewaterAgreement-FJ-6761
(5-09-17)

Resolution No. 2017-R0190

STATE OF TEXAS §
§
§
COUNTY OF LUBBOCK §

AGREEMENT REGARDING TREATED WASTEWATER EFFLUENT

WHEREAS, Fred Jones of 64 East Canyon View Drive, Ransom Canyon, Texas, 79366 (herein called "USER") is the owner, lessee or tenant of land described as Farm Number 6761 (herein called "Land"); and

WHEREAS, the City of Lubbock, Texas (herein called "OPERATOR") operates and manages a treated wastewater effluent disposal site reference to which is hereby made for all pertinent purposes; and

WHEREAS, User desires to take treated wastewater effluent from Operator who disposes, in part, of such treated wastewater effluent at the Lubbock Land Application Site. **NOW THEREFORE:**

USER AND OPERATOR CONTRACT AND AGREE AS FOLLOWS:

1. User has 140 acres that comprises the Land, which will be irrigated by treated wastewater effluent furnished by the Operator. Operator shall furnish treated wastewater effluent to the User at no charge to be used on the Land as permitted in the Operator's TCEQ Permit No. 10353-02 (herein called the "Permit").

2. User agrees to utilize and dispose of treated wastewater effluent furnished by the Operator under this agreement solely in accordance with all terms and conditions of the Permit, the associated Groundwater Remediation Plan, and any other related permits governing the disposal of treated wastewater effluent by agricultural irrigation. Terms include, but are not limited to, establishing tailwater control facilities and establishing measures that preclude the discharge of effluent to ground and surface waters. User also agrees to follow cropping plans authorized in the Permit, which call for a continuous cropping system such as a cotton/wheat rotation. User herein grants the Operator all rights of entry to the Land and the permission to drill and periodically monitor test well(s), which may be required by the Permit, the associated Groundwater Remediation Plan, or any other related permits governing the disposal of treated wastewater effluent. The treated

wastewater effluent supplied to User pursuant to this Agreement shall only be utilized solely on the Lands and shall not be otherwise transferred or utilized on any other property.

3. User understands and agrees that the provision of treated wastewater effluent is interruptible and may cease at any time due to decisions unilaterally made by the Operator, or regulatory directive. User agrees to take the treated wastewater effluent as-is at the point of delivery identified in Exhibit A, which is incorporated as if fully set forth herein. Operator may deliver the wastewater effluent hereunder at a rate of delivery deemed advisable by it, in its sole discretion.

4. THE OPERATOR MAKES NO REPRESENTATION OR WARRANTY AS TO THE QUALITY OF THE TREATED WASTEWATER EFFLUENT SUPPLIED HEREUNDER, AND USER HEREBY RELEASES OPERATOR AND AGREES TO INDEMNIFY AND HOLD HARMLESS OPERATOR, ITS RESPECTIVE OFFICERS, AGENTS, EMPLOYEES AND ELECTED OFFICIALS FROM AND AGAINST ANY AND ALL CLAIMS, LIABILITIES, DEMANDS, LOSSES OR CAUSES OF ACTION OF ANY KIND OR NATURE, INCLUDING WITHOUT LIMITATION, ALL COSTS AND EXPENSES IN THE DEFENSE THEREOF, ARISING FROM OR RELATED TO THE USE OR CONSUMPTION, IN ANY WAY, MANNER OR FORM, THE WASTEWATER EFFLUENT SUPPLIED HEREUNDER, INCLUDING WITHOUT LIMITATION, ANY SUCH CLAIMS, LOSSES OR DAMAGES CAUSED, IN WHOLE OR IN PART, BY THE NEGLIGENCE OF ANY KIND, TYPE OR DEGREE OF OPERATOR.

5. The initial term of this agreement shall be for five (5) years commencing no later than the date of execution of this Agreement. Thereafter, this Agreement shall be automatically renewed for one (1) successive term of five (5) years unless canceled in writing by either party no less than ninety (90) days prior to expiration.

6. Operator reserves the right to exercise any right or remedy available to it by law, contract, equity, or otherwise, including without limitation, the right to seek any and all forms of relief in a court of competent jurisdiction. Further, Operator shall not be subject to any

arbitration process prior to exercising its unrestricted right to seek judicial remedy. The remedies set forth herein are cumulative and not exclusive, and may be exercised concurrently. To the extent of any conflict between this provision and another provision in, or related to, this document, the former shall control.

Executed this _25th_ day of _____May_____, 20_17

CITY OF LUBBOCK:

_____
Daniel M. Pope, MAYOR

_____
Rebecca Garza, City Secretary

APPROVED AS TO CONTENT:

_____
Mary H. Gonzales, Wastewater Superintendent

_____
Aubrey Spear, P.E., Director of Water Utilities

APPROVED AS TO FORM:

_____
Amy L. Sims, Deputy City Attorney

USER:

By: _____
[Signature]

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY
CERTIFICATION OF FILING

Certificate Number:
2017-208410

Date Filed:
05/16/2017

Date Acknowledged:
05/17/2017

1 Name of business entity filing form, and the city, state and country of the business entity's place of business.

Fred Jones Farms
Ransom Canyon, TX United States

2 Name of governmental entity or state agency that is a party to the contract for which the form is being filed.

CITY OF LUBBOCK-LAS

3 Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the services, goods, or other property to be provided under the contract.

13302 -
6761 REGARDING TREATED WASTE WATER

4 Name of Interested Party	City, State, Country (place of business)	Nature of interest (check applicable)	
		Controlling	Intermediary

5 Check only if there is NO Interested Party. [X]

6 AFFIDAVIT

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

_____
Signature of authorized agent of contracting business entity

AFFIX NOTARY STAMP / SEAL ABOVE

Sworn to and subscribed before me, by the said _____, this the _____ day of _____, 20_____, to certify which, witness my hand and seal of office.

_____
Signature of officer administering oath | Printed name of officer administering oath | Title of officer administering oath

CERTIFICATE OF INTERESTED PARTIES

FORM 1295

Complete Nos. 1 - 4 and 6 if there are interested parties.
Complete Nos. 1, 2, 3, 5, and 6 if there are no interested parties.

OFFICE USE ONLY
CERTIFICATION OF FILING

Certificate Number:
2017-208410

Date Filed:
05/16/2017

Date Acknowledged:

1 **Name of business entity filing form, and the city, state and country of the business entity's place of business.**

Fred Jones Farms
Ransom Canyon, TX United States

2 **Name of governmental entity or state agency that is a party to the contract for which the form is being filed.**

CITY OF LUBBOCK-LAS

3 **Provide the identification number used by the governmental entity or state agency to track or identify the contract, and provide a description of the services, goods, or other property to be provided under the contract.**

13302 -
6761 REGARDING TREATED WASTE WATER

4 Name of Interested Party	City, State, Country (place of business)	Nature of interest (check applicable)	
		Controlling	Intermediary

5 **Check only if there is NO Interested Party.** [X]

6 **AFFIDAVIT**

I swear, or affirm, under penalty of perjury, that the above disclosure is true and correct.

SHELIA D. MITCHELL
Notary Public, State of Texas
Notary ID# 325179-7
My Commission Expires 11-15-2020

AFFIX NOTARY STAMP / SEAL ABOVE

Signature of authorized agent of contracting business entity

Sworn to and subscribed before me, by the said Fred JONES, this the 17 day of May, 20 17, to certify which, witness my hand and seal of office.

Signature of officer administering oath	Printed name of officer administering oath	Title of officer administering oath
Shelia D. Mitchell	SHELIA D. MITCHELL	Notary

Resolution No. 2020-R0197
Item No. 7.10
June 23, 2020

RESOLUTION

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LUBBOCK:

THAT the Mayor of the City of Lubbock is hereby authorized and directed to execute for and on behalf of the City of Lubbock, an Agreement for provision of treated wastewater effluent at Farm Number 5799, by and between the City of Lubbock and Blake Petree, and related documents. Said Agreement is attached hereto and incorporated in this Resolution as if fully set forth herein and shall be included in the minutes of the City Council.

Passed by the City Council on this June 23, 2020.

DANIEL M. POPE, MAYOR

ATTEST:

Rebecca Garza, City Secretary

APPROVED AS TO CONTENT:

Aubrey A. Spear, P.E., Director of Water Utilities

APPROVED AS TO FORM:

Ryan Brooke, Assistant City Attorney

RES.Wastewater Agreement-Blake Petree
6.11.20

Resolution No. 2020-R0197

STATE OF TEXAS §
§
§
COUNTY OF LUBBOCK §

AGREEMENT REGARDING TREATED WASTEWATER EFFLUENT

WHEREAS, Blake Petree of 9321 CR 6840, Slaton, Texas, 79364 (herein called "USER") is the owner, lessee or tenant of land described as Farm Number 5799 (herein called "Land"); and

WHEREAS, the City of Lubbock, Texas (herein called "OPERATOR") operates and manages a treated wastewater effluent disposal site reference to which is hereby made for all pertinent purposes; and

WHEREAS, User leases the Land for agricultural use; and

WHEREAS, User desires to take treated wastewater effluent from Operator who disposes, in part, of such treated wastewater effluent at the Lubbock Land Application Site. **NOW THEREFORE**: **USER AND OPERATOR CONTRACT AND AGREE AS FOLLOWS**:

1. User has **160** acres that comprises the Land, which will be irrigated by treated wastewater effluent furnished by the Operator. Operator shall furnish treated wastewater effluent to the User at no charge to be used on the Land as permitted in the Operator's TCEQ Permit No. 10353-02 (herein called the "Permit").

2. User agrees to utilize and dispose of treated wastewater effluent furnished by the Operator under this agreement solely in accordance with all terms and conditions of the Permit, the associated Groundwater Remediation Plan, and any other related permits governing the disposal of treated wastewater effluent by agricultural irrigation. Terms include, but are not limited to, establishing tailwater control facilities and establishing measures that preclude the discharge of effluent to ground and surface waters. User also agrees to follow cropping plans authorized in the Permit, which call for a continuous cropping system such

as a cotton/wheat rotation. User herein grants the Operator all rights of entry to the Land and the permission to drill and periodically monitor test well(s), which may be required by the Permit, the associated Groundwater Remediation Plan, or any other related permits governing the disposal of treated wastewater effluent. The treated wastewater effluent supplied to User pursuant to this Agreement shall only be utilized solely on the Lands and shall not be otherwise transferred or utilized on any other property.

3. User understands and agrees that the provision of treated wastewater effluent is interruptible and may cease at any time due to decisions unilaterally made by the Operator, or regulatory directive. User agrees to take the treated wastewater effluent as-is at the point of delivery identified in Exhibit A, which is incorporated as if fully set forth herein. Operator may deliver the wastewater effluent hereunder at a rate of delivery deemed advisable by it, in its sole discretion.

4. THE OPERATOR MAKES NO REPRESENTATION OR WARRANTY AS TO THE QUALITY OF THE TREATED WASTEWATER EFFLUENT SUPPLIED HEREUNDER, AND USER HEREBY RELEASES OPERATOR AND AGREES TO INDEMNIFY AND HOLD HARMLESS OPERATOR, ITS RESPECTIVE OFFICERS, AGENTS, EMPLOYEES AND ELECTED OFFICIALS FROM AND AGAINST ANY AND ALL CLAIMS, LIABILITIES, DEMANDS, LOSSES OR CAUSES OF ACTION OF ANY KIND OR NATURE, INCLUDING WITHOUT LIMITATION, ALL COSTS AND EXPENSES IN THE DEFENSE THEREOF, ARISING FROM OR RELATED TO THE USE OR CONSUMPTION, IN ANY WAY, MANNER OR FORM, THE WASTEWATER EFFLUENT SUPPLIED HEREUNDER, INCLUDING WITHOUT LIMITATION, ANY SUCH CLAIMS, LOSSES OR DAMAGES CAUSED, IN WHOLE

OR IN PART, BY THE NEGLIGENCE OF ANY KIND, TYPE OR DEGREE OF OPERATOR.

5. The initial term of this agreement shall be for two (2) years commencing no later than the date of execution of this Agreement. Thereafter, this Agreement shall be automatically renewed for one (1) successive term of two (2) years unless canceled in writing by either party no less than ninety (90) days prior to expiration. Operator may terminate this Agreement, for any reason or convenience, upon thirty (30) days written notice to User.

6. Operator reserves the right to exercise any right or remedy available to it by law, contract, equity, or otherwise, including without limitation, the right to seek any and all forms of relief in a court of competent jurisdiction. Further, Operator shall not be subject to any arbitration process prior to exercising its unrestricted right to seek judicial remedy. The remedies set forth herein are cumulative and not exclusive, and may be exercised concurrently. To the extent of any conflict between this provision and another provision in, or related to, this document, the former shall control.

7. This Agreement represents the entire and sole agreement between User and the City with respect to the subject matter hereof and supersedes any and all prior negotiations, understandings, representations or other agreements, whether written or oral. This Agreement may not be modified or amended except in writing and duly authorized and executed by each party hereto.

8. If any provision of this Agreement is declared invalid or unenforceable, such provision shall be deemed modified to the extent necessary to render it valid and enforceable so long as said modification is reasonably within the intent the parties as originally expressed. In the event such provision may not be so modified, the unenforceability or invalidity of any

provision shall not affect any other provision of this Agreement, and this Agreement shall continue in force and effect as if such provision had not been included in this Agreement.

9. THIS AGREEMENT IS TO BE CONSTRUED UNDER, AND GOVERNED BY, TEXAS LAW WITHOUT REGARD TO CONFLICT OF LAW RULES THAT WOULD DIRECT APPLICATION OF THE LAWS OF ANY OTHER JURISDICTION. THE OBLIGATIONS OF THE PARTIES CREATED BY THIS AGREEMENT ARE PERFORMABLE, AT LEAST IN PART, IN LUBBOCK COUNTY, TEXAS. VENUE FOR ANY ACTION BROUGHT PURSUANT TO THIS AGREEMENT, OR ACTIVITY CONTEMPLATED HEREBY, SHALL EXCLUSIVELY BE IN COURTS OF COMPETENT JURISDICTION LOCATED IN LUBBOCK COUNTY, TEXAS.

Executed this 23rd day of June, 2020.

CITY OF LUBBOCK:

Daniel M. Pope, MAYOR

USER:

Blake Petree

ATTEST:

Rebecca Garza, City Secretary

APPROVED AS TO CONTENT:

Aubrey Spear, P.E., Director of Water Utilities

APPROVED AS TO FORM:

Ryan Brooke, Assistant City Attorney

Other Real Property – Wastewater Farm-Petree Leased Adams Farm – 6.11.20

Guidelines and Objectives of Lease Agreement

We have been pleased with our relationship with renters historically. Having been both operators and farm owners, we hope to understand both sides of the situation. This agreement applies to FSN 5799 which is located at 2605 CR 2800.

Lease Agreement
Seven year

Leasing Option
The leaser or the leasee has the option to terminate this lease at any time during the term of the lease.

Notification no later than October by either party to terminate preferred. If new farm programs require extended sign-up periods, times maybe changed; otherwise this agreement shall end on the last day September. Crops will be harvested by leaser if any.

Lease Rates
Harvested and delivered to the gin or elevator.

Cotton- ¼ owners and ¾ tenants
Secondary crops- ¼ owners and ¾ tenants

Feed Grains
Planting of Corn, Sorghum, Soybeans, Vegetables, Hay, and Grazing- 1/3 owner and 2/3 tenant, unless owner and tenant agree upon different rental rates.

Fertilizer
Owner pays proportional part, depending on the crop.
Fertilizer should be used to maximize yields.
Fertilizer should be obtained with the lowest cost per pound available. If financial institution objects in financing fertilizer, the owner should be notified in writing. The use of fertilizer on irrigated crops is preferred. The leaser wants to be notified if irrigation water is to be applied to land that has not been fertilized adequately for maximum yields.

Noxious Weeds
Type of weed control will be preformed at renter's discretion. Weeds will be controlled in the crop all year long by chemical, mechanical, or manual means.

Bindweed - the leaser is requested to spot apply chemicals on small patches of bindweed when found in fields or along turn rows. Leaser will pay proportional part.

Turn rows, oil well pads, and around out buildings will be kept free of weeds all year long by chemical, mechanical, or manual means.

Sale of Crop
Except for unusual circumstances crop rental will be divided across scale for owner or what is most beneficial to both owner and tenant. A printout from the gin or elevator with total bale listings or pounds, and selling price will be provided to the leaser after sale of crop and in a timely manner.

Planting
Early planting of crop is desirable.

Irrigation
Pre-plant irrigation is essential and yields the most return for dollars invested. It also provides for the early planting and carries through if pump or underground pipe breakdowns occur.
Leaser takes care of pumps below the ground surface and the tenant is responsible for above ground problems.
Crops will be irrigated throughout the growing season to provide for maximum production. Irrigation water will be kept on the property and all rules of the High Plains Underground Water District and TNRCC will be followed. If possible the leaser will work with the City of Lubbock to obtain and utilize City of Lubbock Farm water.

Insects
Insects will be controlled to provide maximum production. Leaser will be responsible for ¼ costs and tenant will be responsible for ¾ costs for cotton. On other crops the Leaser will pay proportional part.

Farm Service Agency
All paper work will be taken care of by the Leasee in a timely manner and to the benefit of both the Leaser and Leasee

Rodney Schoppa
Leaser

2-20-2020
Date

Leasee
B & R Petree

2-27-2020
Date

Guidelines and Objectives of Lease Agreement

We have been pleased with our relationship with renters historically. Having been both operators and farm owners, we hope to understand both sides of the situation. This agreement applies to FSN 5799 which is located at 2605 CR 2800.

Lease Agreement
Seven year

Leasing Option
The leaser or the leasee has the option to terminate this lease at any time during the term of the lease.

Notification no later than October by either party to terminate preferred. If new farm programs require extended sign-up periods, times maybe changed; otherwise this agreement shall end on the last day September. Crops will be harvested by leaser if any.

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Early planting of crop is desirable.

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Leaser takes care of pumps below the ground surface and the tenant is responsible for above ground problems.
Crops will be irrigated throughout the growing season to provide for maximum production. Irrigation water will be kept on the property and all rules of the High Plains Underground Water District and TNRCC will be followed. If possible the leaser will work with the City of Lubbock to obtain and utilize City of Lubbock Farm water.

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Insects will be controlled to provide maximum production. Leaser will be responsible for ¼ costs and tenant will be responsible for ¾ costs for cotton. On other crops the Leaser will pay proportional part.

Farm Service Agency
All paper work will be taken care of by the Leasee in a timely manner and to the benefit of both the Leaser and Leasee

Rodney Schoppa
Leaser

2-20-2020
Date

Leasee
B & R Petree

2-27-2020
Date

Resolution No. 2020-R0071
Item No. 7.15
February 25, 2020

RESOLUTION

BE IT RESOLVED BY THE CITY COUNCIL OF THE CITY OF LUBBOCK:

THAT the Mayor of the City of Lubbock is hereby authorized and directed to execute for and on behalf of the City of Lubbock, an Agreement Regarding Treated Wastewater Effluent by and between the City of Lubbock and Brandon Petree d/b/a/ Petree Farms for Farm Number 5471, and all related documents. Said Agreement is attached hereto and incorporated in this resolution as if fully set forth herein and shall be included in the minutes of the City Council.

Passed by the City Council on February 25, 2020.

DANIEL M. POPE, MAYOR

ATTEST:

Rebecca Garza, City Secretary

APPROVED AS TO CONTENT:

Aubrey A. Spear, P.E., Director of Water Utilities

APPROVED AS TO FORM:

Amy L. Sims, Deputy City Attorney

Resolution No. 2020-R0071

STATE OF TEXAS §
§
§
COUNTY OF LUBBOCK §

AGREEMENT REGARDING TREATED WASTEWATER EFFLUENT

WHEREAS, Brandon Petree d/b/a Petree Farms of 5810 CR 3700, Slaton, Texas, 79364 (herein called "USER") is the owner, lessee or tenant of land described as Farm Number ~~4357~~ 5471 (herein called "Land"); and

WHEREAS, the City of Lubbock, Texas (herein called "OPERATOR") operates and manages a treated wastewater effluent disposal site reference to which is hereby made for all pertinent purposes; and

WHEREAS, User leases the Land for agricultural use; and

WHEREAS, User desires to take treated wastewater effluent from Operator who disposes, in part, of such treated wastewater effluent at the Lubbock Land Application Site. **NOW THEREFORE:**

USER AND OPERATOR CONTRACT AND AGREE AS FOLLOWS:

1. User has 320 acres that comprises the Land, which will be irrigated by treated wastewater effluent furnished by the Operator. Operator shall furnish treated wastewater effluent to the User at no charge to be used on the Land as permitted in the Operator's TCEQ Permit No. 10353-02 (herein called the "Permit").

2. User agrees to utilize and dispose of treated wastewater effluent furnished by the Operator under this agreement solely in accordance with all terms and conditions of the Permit, the associated Groundwater Remediation Plan, and any other related permits governing the disposal of treated wastewater effluent by agricultural irrigation. Terms include, but are not limited to, establishing tailwater control facilities and establishing measures that preclude the discharge of effluent to ground and surface waters. User also agrees to follow cropping plans authorized in the Permit, which call for a continuous cropping system such as a cotton/wheat rotation. User herein grants the Operator all rights of entry to the Land and the permission to drill and periodically monitor test well(s), which may be required by the Permit, the associated Groundwater Remediation Plan, or

any other related permits governing the disposal of treated wastewater effluent. The treated wastewater effluent supplied to User pursuant to this Agreement shall only be utilized solely on the Lands and shall not be otherwise transferred or utilized on any other property.

3. User understands and agrees that the provision of treated wastewater effluent is interruptible and may cease at any time due to decisions unilaterally made by the Operator, or regulatory directive. User agrees to take the treated wastewater effluent as-is at the point of delivery identified in Exhibit A, which is incorporated as if fully set forth herein. Operator may deliver the wastewater effluent hereunder at a rate of delivery deemed advisable by it, in its sole discretion.

4. THE OPERATOR MAKES NO REPRESENTATION OR WARRANTY AS TO THE QUALITY OF THE TREATED WASTEWATER EFFLUENT SUPPLIED HEREUNDER, AND USER HEREBY RELEASES OPERATOR AND AGREES TO INDEMNIFY AND HOLD HARMLESS OPERATOR, ITS RESPECTIVE OFFICERS, AGENTS, EMPLOYEES AND ELECTED OFFICIALS FROM AND AGAINST ANY AND ALL CLAIMS, LIABILITIES, DEMANDS, LOSSES OR CAUSES OF ACTION OF ANY KIND OR NATURE, INCLUDING WITHOUT LIMITATION, ALL COSTS AND EXPENSES IN THE DEFENSE THEREOF, ARISING FROM OR RELATED TO THE USE OR CONSUMPTION, IN ANY WAY, MANNER OR FORM, THE WASTEWATER EFFLUENT SUPPLIED HEREUNDER, INCLUDING WITHOUT LIMITATION, ANY SUCH CLAIMS, LOSSES OR DAMAGES CAUSED, IN WHOLE OR IN PART, BY THE NEGLIGENCE OF ANY KIND, TYPE OR DEGREE OF OPERATOR.

5. The initial term of this agreement shall be for two (_2_) years commencing no later than the date of execution of this Agreement. Thereafter, this Agreement shall be automatically renewed for one (1) successive term of five (5) years unless canceled in writing by either party no less than ninety (90) days prior to expiration.

6. Operator reserves the right to exercise any right or remedy available to it by law, contract, equity, or otherwise, including without limitation, the right to seek any and all forms of

relief in a court of competent jurisdiction. Further, Operator shall not be subject to any arbitration process prior to exercising its unrestricted right to seek judicial remedy. The remedies set forth herein are cumulative and not exclusive, and may be exercised concurrently. To the extent of any conflict between this provision and another provision in, or related to, this document, the former shall control.

Executed this 25th day of February, 2020.

CITY OF LUBBOCK:

Daniel M. Pope, MAYOR

Rebecca Garza, City Secretary

APPROVED AS TO CONTENT:

Aubrey Spear, P.E., Director of Water Utilities

APPROVED AS TO FORM:

Amy L. Sims, Deputy City Attorney

USER:

By: [Signature]

FARM LEASE

This lease agreement is made between Brandon Petree d/b/a "Petree Farms Inc.", an individual ("Lessee"), residing at 5810 CR 3700 Slaton TX 79364, and DONNA ADAMS, surviving spouse of Thomas Adams, Deceased, and individual ("Lessor"),whose address for the purpose of this Lease is 1502 North CR 3100, Lubbock, Lubbock County, Texas 79403.

1. Property Rights

Lease of Property

1.1. Lessor owns the following described Property which Lessor leases to Lessee, Consisting of 481.7 acres, more or less, located in Lubbock County, Texas ("the Farm"):

R138204-162.7 acres, more or less, out of Section 4, Block I, AB 441 TR-B, Lubbock, County, Texas;

R138300-160 acres, more or less, out of SW/4 of Section 23, Block I, AB 26, Lubbock County, Texas; and

R68303-159 acres, more or less, the NW/4 out of Section 3, Block RG, AB 287, Lubbock County, Texas.

There are no improvements situated upon the Farm except underground pipe and irrigation well casing by Lessor and pumps and pivot irrigation systems owned by RICHARD C. ADAMS d/b/a "Richard Adams Farms".

(Note: References above are to the Lubbock Central Appraisal District Owner Identification Numbers.)

1.2. The property is leased to the tenant for agricultural and related purposes.

Lessor's Reservation of Rights

1.3. Lessor reserves the right to enter the leased premises for the following purposes: to consult with the Lessee or to inspect the condition of the property.

Sublease and Assignment

1.4. Lessee may neither assign this Lease nor sublet any portion of the Farm without the prior written consent of Lessor. This Lease shall bind and inure to the benefit of the Lessee and any Lessor-approved successor, assignee, or sublessee and to the benefit of the Lessor and Lessor's successors and assigns. Notwithstanding the foregoing, for purposes of this Lease, Lessor hereby gives approval to the future assignment or sublease of this Lease to Lessor's sons,

at such time and under such terms and conditions as Lessee may, in his sole discretion determine.

Nothing contained herein shall prohibit or prevent Lessor from assigning Lessor's rights and interests under this lease to BONNIE ADAMS or CASSIE VAN SLYKE.

2. Term of Lease

2.1. The term of this Lease shall be for a period of ten (10) years, from and including January 1, 2020 to and including December 31, 2029, unless the Lease is sooner terminated by mutual agreement in writing signed by both parties. If not terminated earlier, and if Lessee is current in all obligations hereunder and not in default, this Lease shall automatically renew and extend under the same terms and conditions as are in existence at the time for additional ten (10) years periods from and after the date of the end of each ten (10)year period.

Notwithstanding the foregoing, either party may give the other written notice that any such renewal and extension shall not take place and this Lease shall be terminated effective the end of that current ten (10) year lease period, which written notice must be given not later than July 1 of the fifth year of any ten(10) year lease period. If any such notice of termination is given, the parties hereto shall nevertheless be bound to perform under this Lease for the remaining lease period. If no notice is given, this Lease shall continue as herein set out.

3. Rent

3.1. Lessee agrees to pay to Lessor as rental for the Farm, one-fourth (1/4) of all of the crops harvested from the said Farm by Tenant during the term and any extensions of this Lease. Lessee shall bear all costs of production, harvest and delivery of such crops to the gin or elevator; provided however, Lessor shall pay one-fourth (1/4) of Lessee's fertilizer expenses and one-fourth (1/4) of multi-peril crop insurance premiums incurred by Lessee. Lessor shall receive its pro-rata share (one-fourth [1/4]) of all government payments payable through the U.S. Department of Agriculture. Lessor shall timely pay all ad valorem property taxes assessed against the Farm. Lessee shall timely pay all ad valorem taxes assessed against Lessee's personal property.

4. Land use

4.1. The leased land is to be used for agricultural purposes on all suitable land located on the Farm.

4.2. Lessee shall cultivate the Farm in an efficient and economic manner, using all modern methods of farming that are customarily practiced in the area.

5. Maintenance, Improvement, and Conservation

5.1. Lessor owns all the irrigation wells and underground irrigation pipe situated on the Farm. Lessee agrees and covenants to oversee the repair and maintenance of all Lessor owned irrigation wells on the Farm in good repair as is necessary for the proper irrigation of the Farm for the Term of this Lease, the cost of which shall be paid 100% by Lessor. Lessor shall also be responsible or full cost or repair and maintenance of any new or additional permanent irrigation improvements place upon the Farm.

5.2. Lessee owns the pivot irrigation systems including pumps situated on the Farm. Lessee will keep and maintain such pivot irrigation systems and pumps in good repair as is necessary for proper irrigation of the Farm for the Term of this Lease. Lessee will pay 100% of the cost necessary for such repair

and maintenance of the pivot systems and pumps. Nothing contained herein shall prohibit or prevent Lessee from repairing and replacing pumps and irrigation systems owned by Lessee as necessary.

5.3. With the exception of Lessee's pivot system and any of Lessee's above surface irrigation equipment and underground pumps, all other alterations, additions, or improvements made by Lessee shall become the property of Lessor at the termination of this Lease; however, at Lessor's election, upon termination of this Lease, Lessee shall promptly remove all alterations, additions, and improvements, and any other property placed on the Farm by Lessee, and Lessee shall repair any damage cause by such removal.

5.4. Lessee will control soil erosion and keep ditches, drains and watercourses in good order.

5.5. Lessee shall pay all utility charges for electricity, heat, water, gas and power used in and about the Farm. Lessee shall pay these charges before they become delinquent. Lessee shall have no obligation for the payment of such costs and charges arising from domestic usages.

5.6. Lessee shall timely pay all taxes assessed against his farm equipment and rolling stock.

6. Termination and Breach

6.1. If Lessor or Lessee fails to perform and discharge any obligation under this Lease, the other party shall have the right to terminate this Lease after giving written notice of such breach and thirty (30) days opportunity to cure. No waiver of a breach shall be valid unless the specific breach in question is waived in writing.

7. Notices

7.1. Any Notices required under this lease must be in writing and are effective when hand-delivered, mailed by certified mail return receipt requested to the intended recipient address as shown in the opening paragraph of this Lease.

Lessor also consents to receipt of any Notices from Lessee at the following email address, donnatommyadams@gmail.com.

Lessee also consent to receipt of any Notices from Lessor at the following email address, brandon.petree@yahoo.com.

8. Change in Identity of Lessee

8.1. Lessor recognizes that Lessee is an individual. In the event of the Lessee's death, disability or retirement then, and in that event, Lessee's son/sons Blake & Jake Petree shall continue to carry out the duties and act as Lessee under this Agreement for the remaining term and any extension of this Lease, upon execution of a written agreement to be bound and acceptance of the obligations under this Lease by son/sons Blake + Jake Petree.

Nothing contained herein shall prohibit or prevent Lessor from assigning Lessor's rights and interests under this lease to BONNIE ADAMS or CASSIE VAN SLYKE.

9. General Provisions

Disavowal of Partnership

9.1. This Lease shall not give rise to a partnership between the parties. Neither party shall have the authority to bind the other without the other party's written consent.

Government Programs

9.2. Lessee and Lessor intend to participate in all government farm programs elected by Lessee.

Indemnity

9.3. Lessee agrees to indemnify and hold Lessor harmless against any and all claims, demands, damages, costs and expenses, including reasonable attorneys' fees, arising from the conduct or management of Lessee's business or Lessee's use of the Farm, or from any negligent act or omission by Lessee, or Lessee's agents, servants, employees, contractors, guests, or invitees on or about the Farm. If any action or proceeding is brought against lessor arising from any of these circumstances, Lessee further agrees to defend the action or proceeding with legal counsel acceptable to Lessor.

Lessor agrees to indemnify and hold Lessee harmless against any and all claims, demands, damages, costs, and expenses, including reasonable attorney's fees, arising from Lessor's ownership or any use of the Farm by Lessor, or from any negligent act or omission by Lessor, or Lessor's agents, employees, contractors, guests, or invitees on or about the Farm. If any action or proceeding is brought against Lessee arising from any of these circumstances, Lessor further agrees to defend the action or proceeding with legal counsel acceptable to Lessee.

Record Keeping

9.4. Lessee agrees to maintain records on all agricultural and financial matters relating to the Farm. Specifically, Lessee shall maintain records on all of the following: location and amount of land planted and the date planted; soil cultivation preparation, including amount, type and dates of fertilizer applications and tillage practices/ and per-acre yields of crops. Lessor and lessor's authorized representative shall have the right to inspect these records at all reasonable times.

Taxes and Assessments

9.5. Lessor is responsible for all property taxes and assessments relating to the Farm.

Local Custom

9.6. The local farming customs in effect in Lubbock County, Texas at the time of this Lease are incorporated into this Lease.

Entire Agreement

9.7. This Lease contains the entire agreement of the parties relating to its subject matter. Any oral representations or modifications concerning this Lease shall be of no force and effect.

Amendments in Writing

9.8. Any subsequent amendment or modification of this Lease must be in writing, agreed and executed by both parties.

Force Majeure

9.9. Neither Lessor nor Lessee shall be required to perform any obligation under this Lease as long as performance is delayed or prevented by force majeure. *Force majeure* shall mean acts of God, drought, floods, material or labor restrictions by any governmental authority, and any other cause not

reasonably within the control of either party, and which, by the exercise of due diligence, Lessor or Lessee is unable, wholly or in part, to prevent or overcome.

Arbitration

9.10. In the event that any dispute arises under this agreement, the parties agree to resolve it by binding arbitration. Each party shall select an arbitrator, who will jointly select a third arbitrator.

Joint and Several

9.11. Each of the individuals named and acting as Lessee under this Lease shall have joint and several responsibility for performing the duties imposed upon Lessee hereunder.

Binding Effect

9.12. This Lease and all its terms and conditions shall be binding upon and inure to the benefit of all who sign it and their legal representatives, heirs, successors and assigns and shall be governed by the laws of the State of Texas. This lease is performable in all respects in Lubbock County, Texas.

Execution

9.13. This Lease may be executed in multiple counterparts by the parties hereto, each counterpart is an original and all counterparts collectively, shall constitute one agreement.

LESSOR:	LESSEE:
DONNA ADAMS	BRANDON PETREE
Date: 8-16, 2019	Date: 8-16, 2019
Effective January 1, 2020	Effective January 1, 2020

ATTACHMENT AR-5

Outfall Descriptions and Locations

CITY OF LUBBOCK
SOUTHEAST WATER RECLAMATION PLANT

DESCRIPTION OF DISCHARGES AND EFFLUENT ROUTES TO DISPOSAL SITES

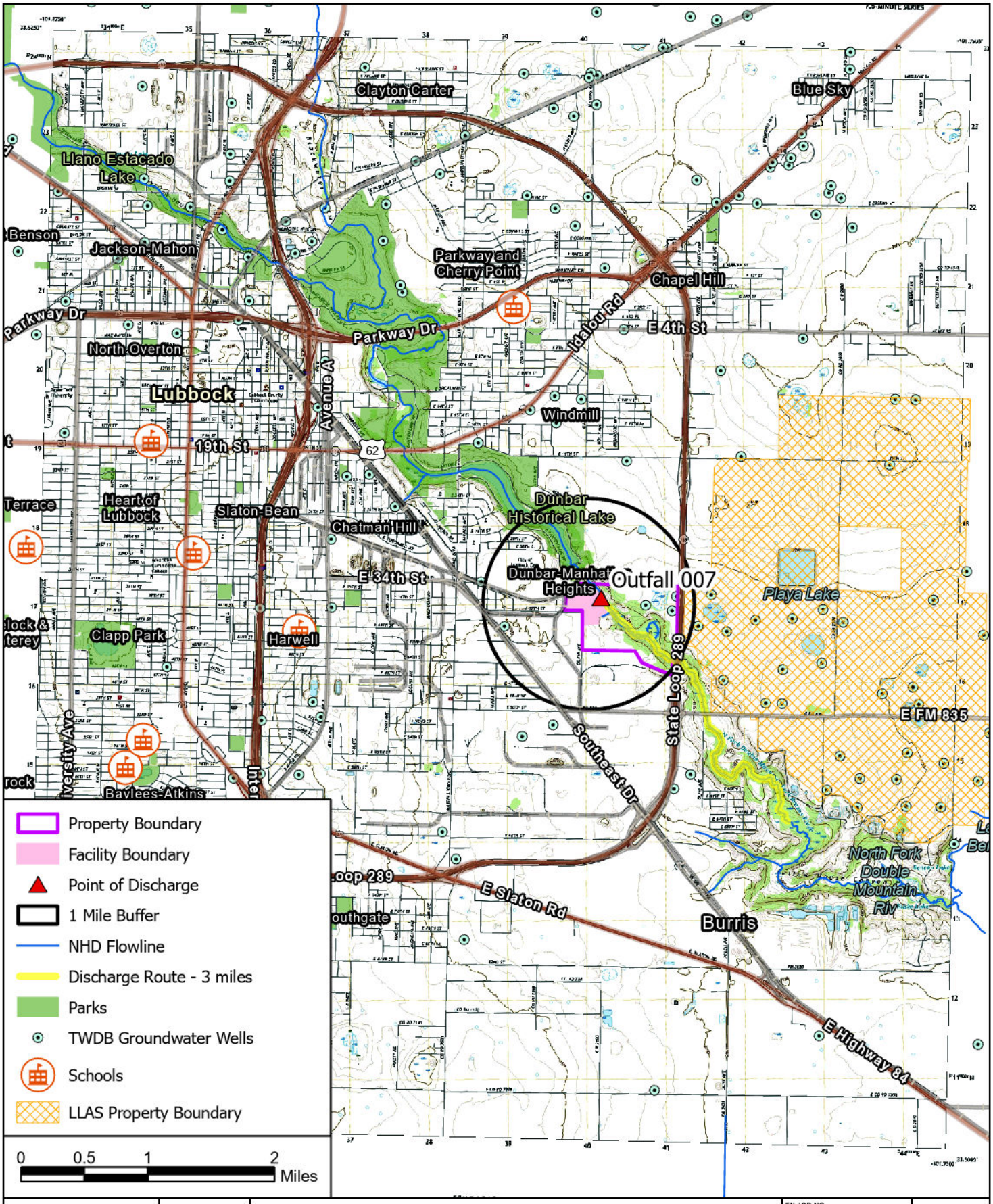
The point of discharge, the discharge route, and routings of effluent to the effluent disposal (irrigation) sites that are described in the existing Texas Pollutant Discharge Elimination System (TPDES) permit for the Southeast Water Reclamation Plant (SEWRP) are correct. The following are descriptions of the existing and proposed points of discharge and discharge routes, and the routes of effluent to the irrigation sites.

Outfall	Latitude	Longitude	Discharge Route
001	33.513247	-101.659514	Treated wastewater is discharged via pipeline extending approximately 14 miles to a point two miles downstream of Lake Ransom where Fann-to-Market Road 400 intersects the North Fork Double Mountain Fork Brazos River, thence to the North Fork Double Mountain Fork Brazos River; thence to the Double Mountain Fork Brazos River in Segment No. 1241 of the Brazos River Basin.
002	33.562778	-101.799167	Treated wastewater is disposed via irrigation of the Lubbock Land Application Site (LLAS), which consists of approximately 5900 irrigable acres. Treated wastewater is transferred from the SEWRP via a 26-inch pipeline that proceeds east across the City's property crossing State Loop 289 to a storage reservoir located on the LLAS. No discharge of pollutants into waters of the State is authorized via this outfall.
003	33.343611	-101.721111	Treated wastewater is disposed via irrigation of the Hancock Land Application Site (HLAS), which consists of approximately 3400 acres. Treated wastewater is transferred to the HLAS via a 24- to 36-inch pipeline that proceeds south along Guava Avenue crossing 50th Street to Southeast Drive (Spur 331); then proceeds southeast along Southeast Drive (Spur 331) crossing State Loop 289; then proceeds along Southeast Drive (Spur 331) and along State Highway 84 for approximately 4.5 miles past State Loop 289 until it reaches the valve station at State Highway 84; then via a 27-inch pipeline that proceeds south along County Road 3000 for approximately 8 miles to the three storage reservoirs located on the HLAS. No discharge of pollutants into waters of the State is authorized via this outfall.
004	33.518056	-101.739167	Treated wastewater is supplied to the Southwestern Public Service Company for industrial reuse (cooling make-up water). No discharge of pollutants into waters of the State is authorized via this outfall.
005	33.562778	-101.799167	Treated wastewater is provided for irrigation by reclaimed water users in accordance with 30 Texas Administrative Code Chapter 210 rules. No discharge of pollutants into waters of the State is authorized via this outfall.

006	N/A	N/A	This outfall is for monitoring the total flow of treated water that is discharged, reused, and disposed of via irrigation. No discharge of pollutants into waters of the State is authorized via this outfall.
007	33.561944	-101.798611	Treated wastewater will be discharged via pipeline to the North Fork Double Mountain Fork Brazos River above Buffalo Springs Lake; thence to the North Fork Double Mountain Fork Brazos River; thence to the Double Mountain Fork Brazos River in Segment No. 1241 of the Brazos River Basin.

ATTACHMENT AR-6

USGS Topographic Map



FREESE AND NICHOLS, INC
801 Cherry Street, Suite 2800
Fort Worth, TX 76102
Phone - (817) 735 - 7300

City of Lubbock

TPDES Permit Amendment

USGS Topographic Map

Quad Name: Lubbock East

FN JOB NO	LUB23850
FILE NAME	TPDES_Figures.aprx
DATE	5/3/2024
DESIGNED	CLV
DRAFTED	CLV

1a

FIGURE

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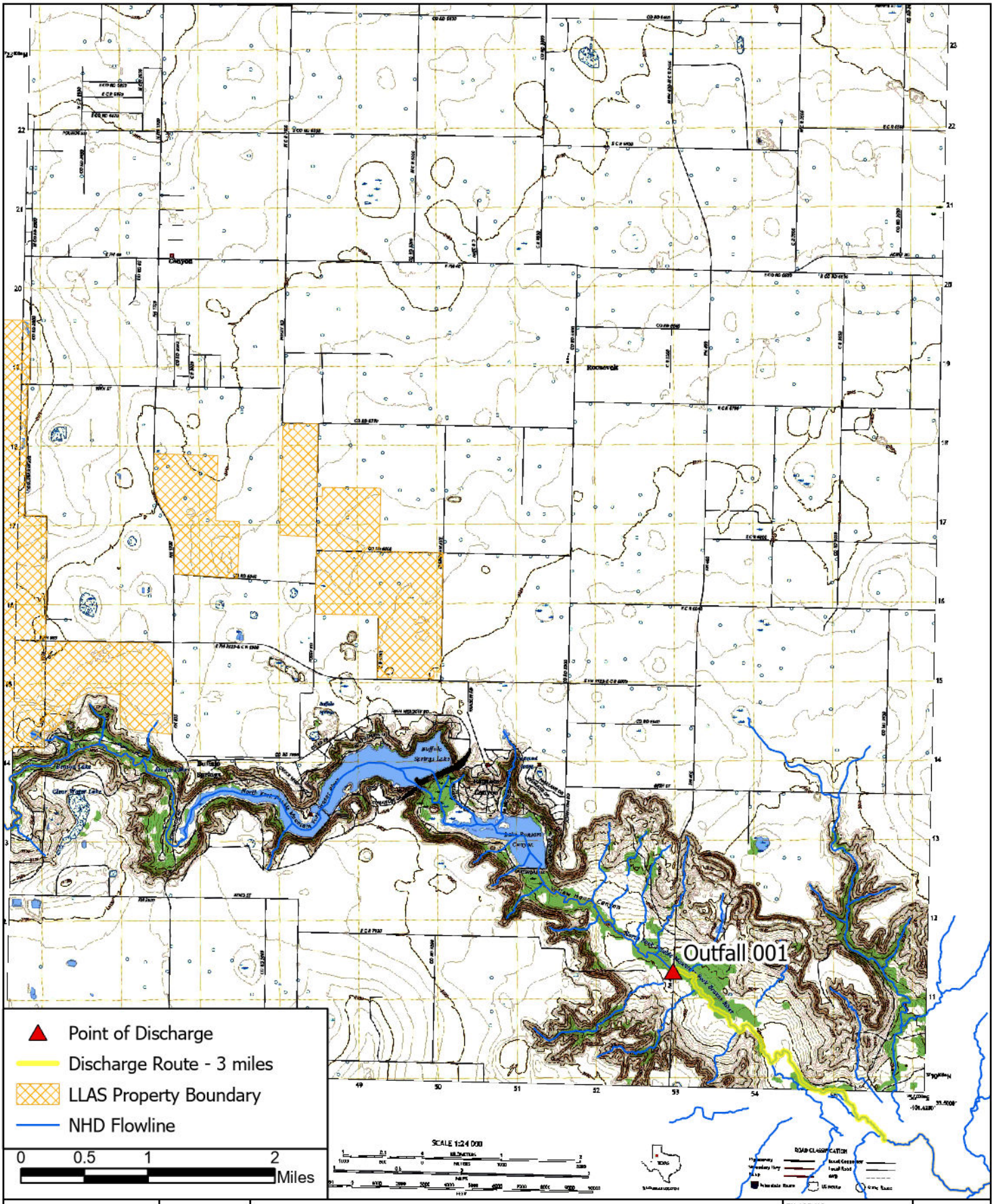


FREESE AND NICHOLS, INC
801 Cherry Street, Suite 2800
Fort Worth, TX 76102
Phone - (817) 735 - 7300

City of Lubbock

TPDES Permit Amendment

USGS Topographic Map

Quad Name: Buffalo Springs Lake

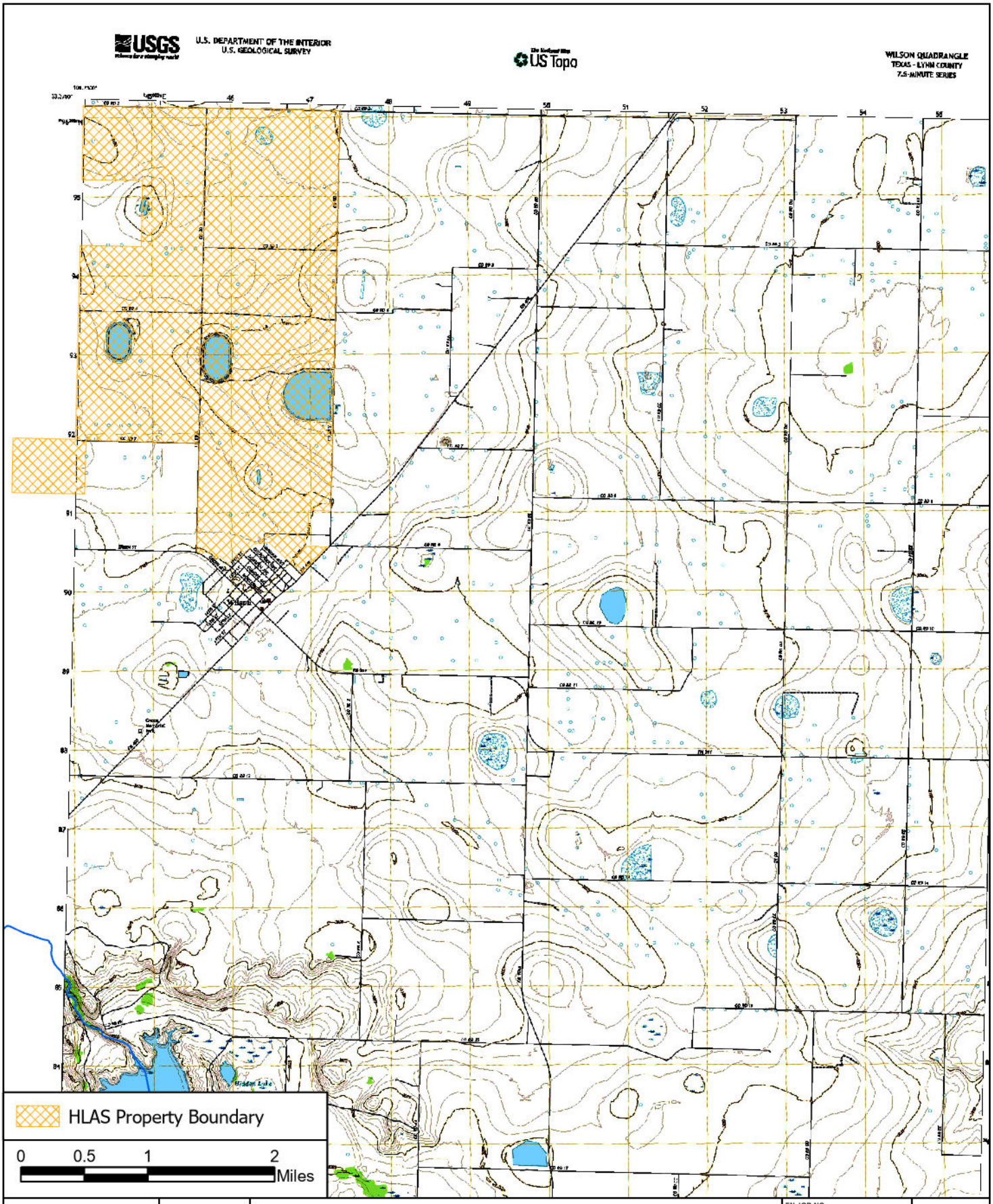
FN JOB NO	LUB23850
FILE NAME	TPDES_Figures.aprx
DATE	5/3/2024
DESIGNED	CLV
DRAFTED	CLV

1b

FIGURE

Path: H:\ENVIRONMENTAL\Working\TPDES_Figures.aprx

NAD 1983 StatePlane Texas South Central FIPS 4204 Feet



FREESE AND NICHOLS
FREESE AND NICHOLS, INC
801 Cherry Street, Suite 2800
Fort Worth, TX 76102
Phone - (817) 735 - 7300

N W E S

City of Lubbock

TPDES Permit Amendment

USGS Topographic Map

Quad Name: Wilson

FN JOB NO	LUB23850
FILE NAME	TPDES_Figures.aprx
DATE	5/21/2024
DESIGNED	CLV
DRAFTED	CLV

1c

FIGURE

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NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

ATTACHMENT AR-7

Affected Landowner Map and Labels

Affected Landowner Map
Cross Referenced List

1
PYCO INDUSTRIES INC
2901 AVE A
LUBBOCK, TX 79404-2231

2
CRBBB PARTNERSHIP LP
5201 19TH ST
LUBBOCK, TX 79407

3
FARMERS CO-OP COMPRESS
PO BOX 2877
LUBBOCK, TX 79408-2877

4
ONCOR ELECTRIC DELIVERY COMPANY LLC
PO BOX 139100
DALLAS, TX 75313-9100

5
PLAINS COTTON COOP ASSOCIATION
PO BOX 2827
LUBBOCK, TX 79408-2827

6
SCHOPPA, RODNEY
2605 CR 2800
LUBBOCK, TX 79403

7
MICKAN RUSSELL
KAY MICKAN SPEER
1405 PONY EXPRESS LANE
COPPERAS COVE, TX 76522

8
GREEN J H TRUSTS
PO BOX 1204
DUNCAN, OK 73534-1204

9
FRITZ, KENNETH
2308 FM 1729
LUBBOCK, TX 79403-7049

10
FRITZ, CAROL A
5815 E FM 835
LUBBOCK, TX 79403-7034

11
TORRES, ALMA
4801 COUNTY ROAD 2800
LUBBOCK, TX 79404

12
BRASHEAR JUSTON THOMAS & DANYELLE MARIE
1909 128TH ST
LUBBOCK, TX 79423-7456

13
KUNKEL CLARK & MARK LEMMONS & CLINT WHITTLE
4905 E FM 835
LUBBOCK, TX 79403

14
ADAMS PROPERTY HOLDINGS LLC
PO BOX 45
IDALOU, TX 79329

15
FITHEN, LESLIE
5437 45TH ST
LUBBOCK, TX 79414

16
TORRES RUDY & ANNETTE
4935 E FM 835
LUBBOCK, TX 79403-9685

17
LUBBOCK RIVERWALK LLC
6301 INDIANA AVE
LUBBOCK, TX 79413

18
MICHAEL ROSS HOLDINGS LLC
6301 INDIANA AVE
LUBBOCK, TX 79413

19
RONNIE ZAHN PAVING INC
6608 MLK BLVD
LUBBOCK, TX 79404

20
ARNETT SAM C III
ABBY F QUINN & WILLIAM A FLYGARE
806 AVE J
LUBBOCK, TX 79401-2717

21 BECK, FRANK W
6406 FM 835
LUBBOCK, TX 79403-7004

22 FOERSTER EARL TRUST & MILTON
GLORIA J KEETON
7412 HURON AVE
LUBBOCK, TX 79424

23 BASF AGRICULTURAL SOLUTIONS SEED US LLC
100 PARK AVE
FLORHAM PARK, NJ 07932

24 JOSEPH ADAM CORPORATION
PO BOX 64791
LUBBOCK, TX 79464-4791

25 GWINN ALY TRUST
JARET W GREASER & BURT C HEINRICH C0-TRS
PO BOX 1378 LUBBOCK, TX 79408

26 PLAYA LAKE FARM & RANCH LP
11107 MIAMI AVE
LUBBOCK, TX 79423

27 MCGEHEE DENNIS H & JULIE
PO BOX 1368
IDALOU, TX 79329

28 FOERSTER, MARC
5907 FM 835
LUBBOCK, TX 79403

29 FALLIN RODNEY & THERESA
5209 E COUNTY ROAD 6610
LUBBOCK, TX 79403

30 NUNEZ ANTONIO & REYNA
6210 E COUNTY ROAD 6450
LUBBOCK, TX 79403

31 LEPRINO FOODS COMPANY
1830 W 38TH AVE
DENVER, CO 80211-2225

32 BASF CORPORATION
100 PARK AVE
FLORHAM PARK, NJ 07932-1089

33 LOS CARNALES MC
4022 WOODROW RD
LUBBOCK, TX 79423

34 ADAMS C POWELL & CAROL
7317 E FM 40 LUBBOCK, TX 79403

35 SIEBER TRUST
PROSPERITY BANK TRUST
1401 AVE Q
LUBBOCK, TX 79401-3819

36 LUBBOCK REGIONAL MHMR DBA
STARCARE SPECIALTY HEALTH SYSTEM
904 AVENUE O
LUBBOCK, TX 79401-3924

37 REYES RAMIRO & DEBRA
15916 N COUNTY ROAD 2500
ABERNATHY, TX 79311-5333

38 CERDA JOSE L
GUADALUPE REYES & ZETA RODRIGUEZ
2902 2ND PL LUBBOCK, TX 79415

39 WALTON BONNIE
TESSIE ESTATE
ADDRESS UNKNOWN

40 RODRIGUEZ ROGER & MARIA ELENA
8710 GOLDEN PT
SAN ANTONIO, TX 78239

41 RODRIGUEZ, MANUEL
13538 BALLAST RD
HOUSTON, TX 77044

42 PITTS, ELAINE
140 CR 3051
DECATUR, TX 76234-4610

43 THOMPSON JAMES E ET AL
2609 E 19TH ST
LUBBOCK, TX 79403-5829

44 GIL, LUIS JESUS
PO BOX 348
SMYER, TX 79367-0348

45 STROUP, MICHAEL ERVIN
2605 E 19TH ST
LUBBOCK, TX 79403-5829

46 PUCKETT, WILEY ESTATE
ADDRESS UNKNOWN

47 ODDIE FREDDRICK II
DARAVION J BONNER JR
904 W LAUREL ST
COMPTON, CA 90220-2907

48 BUTLER, REGINA
4013 47TH ST
LUBBOCK, TX 79413

49 GARCIA ANGEL & EMERY
2506 58TH ST
LUBBOCK, TX 79413-5632

50 CARTER, BRYCE CYRLOYD
4013 47TH ST
LUBBOCK, TX 79413

51 HERRERA, RAMONA (TOD)
2211 E 19TH ST
LUBBOCK, TX 79403

52 RAMIREZ, MARIA LETICIA
5419 48TH ST
LUBBOCK, TX 79414-1523

53 MATA, CHRISTINA V
3702 ENGLEWOOD
LUBBOCK, TX 79407

54 JOINER MELVIN & WELBURN TRAVIS
ADDRESS UNKNOWN

55 3D LAND DEVELOPMENT LLC
2621 21ST ST
LUBBOCK, TX 79410

56 SUBIA MARGARITA ELVIRA & EST OF VIRGINIA R
1720 VANDA AVE
LUBBOCK, TX 79403

57 MARTINEZ LUPE & EST OF VIRIGINIA SUBIA
1720 VANDA AVE
LUBBOCK, TX 79403

58 GUTIERREZ, JOE
JANIE GUTIERREZ
4828 8TH ST LUBBOCK, TX 79416

59 SALAS, AMY
1716 UTE AVE
LUBBOCK, TX 79404

60 MC CULLOUGH, MARY
2205 E 29TH ST
LUBBOCK, TX 79404-2016

61 MCCUTCHEON, VIRGINIA E
1714 TEAK AVE
LUBBOCK, TX 79404

62 CLEAVER, DORIS R
1811 SPRUCE AVE
LUBBOCK, TX 79408-5322

63 CANALES SANTOS JR & REFUGIA M
1721 E 19TH ST
LUBBOCK, TX 79403

64 OCHOA, JOHN
5223 16TH ST
LUBBOCK, TX 79416

65 ALDERETE, SANDY
1105 A MCCLELLAN AVE
MONTEREY, CA 93940

66 GUZMAN, NATALIA M
1715 E 19TH ST
LUBBOCK, TX 79403

67 ACOSTA JORGE & RUTH
2815 O'BANNON
DALLAS, TX 75224

68 RAGSDALE H L ESTATE OF
c/o DOROTHY WILKERSON
2708 TEAK AVENUE LUBBOCK, TX 79404

69 HERNANDEZ, LEE, SR
1709 E 19TH ST
LUBBOCK, TX 79403

70 SANCHEZ, ELSA
1707 E 19TH ST
LUBBOCK, TX 79403-5725

71 CURRY FUNERAL HOME INC
1805 MLK BLVD
LUBBOCK, TX 79403

72 MOUSAVIJAM, MIRASAAD
11212 GENOA AVE
LUBBOCK, TX 79424-3963

73 ROCC SOLID FITNESS LLC
5014 18TH ST
LUBBOCK, TX 79416

74 MANN, VERA LEGALE
2238 LOCUST ST
AMARILLO, TX 79109-1921

75 J & J PARTNERSHIP
8001 QUAKER AVE #STE L
LUBBOCK, TX 79424

76 JAY BIRD INVESTMENTS INC
5025 50th ST #STE A
LUBBOCK, TX 79414

77 LUBBOCK ISD
1628 19TH ST
LUBBOCK, TX 79401-4832

78 FOSTER, RAYMON
3417 40TH ST
LUBBOCK, TX 79413

79 ANZLEY, LAFRANCES RICHARDSON
1827 MANHATTAN DR
LUBBOCK, TX 79404-1317

80 KNIGHTEN, RHONALD
1110 41ST ST #UNIT B
LUBBOCK, TX 79412-2040

81 HOWARD, JOHN HENRY
7307 BRYERS CIR
PLANO, TX 75025-2205

82 ROSS, WENDY TOLSON
8605 NW 74TH TER
KANSAS CITY, MO 64152

83 NIELAND, VICTOR MANUEL
1322 E 24TH ST
LUBBOCK, TX 79404

84 MC KNIGHT, SAMANTHA MASON ESTATE ETAL
1324 E 24TH ST
LUBBOCK, TX 79404

85 THOMAS, MAJORIE
1122 MEADOWLARK LN
DESOTO, TX 75115-8042

86 PHEA DOROTHY B ESTATE OF
3308 S MACGREGOR WAY
HOUSTON, TX 77021

87 MC CORMICK, MAXINE
1330 E 24TH ST
LUBBOCK, TX 79404-1202

88 WALKER BYRON JR & BRIDGETT C
1332 E 24TH ST
LUBBOCK, TX 79404-1202

89
AUGUST & MELESSA HOWARD FAMILY TRUST
HOWARD AUGUST J & MELESSA W TRUSTEES
7307 BRYERS CIRCLE
PLANO, TX 75025

90
CHILDERS, CURTIS W
PO BOX 883
BASTROP, TX 78602-0883

91
DORSEY BETTIE MAE ESTATE OF &
IRION ROSS ET AL
2112 E 29TH ST
LUBBOCK, TX 79404

92
RAY, ROBERT L
JACQUELYN PORCH
1516 E 1ST PL
LUBBOCK, TX 79403

93
BUTLER, JAMES A
TODD SANDERS
2720 E 9TH ST
LUBBOCK, TX 79403

94
MVIII PROPERTIES LLC
605 N WINSTON AVE
LUBBOCK, TX 79416

95
WILLIAMS, REGINALD
1710 E 24TH ST
LUBBOCK, TX 79404

96
MANN-STEWART TIFFANY & TRIELLIS STEWART
2418 E 8TH ST
LUBBOCK, TX 79403

97
ROSSMAN, WOODSON
1518 E 24TH ST
LUBBOCK, TX 79404

98
BAPTIST CHURCH LYONS CHAPEL
1704 E 24TH ST
LUBBOCK, TX 79404-1302

99
LUBBOCK BOYS CLUB INC
WESLEY STRENGTH
3221 59TH ST
LUBBOCK, TX 79413-5515

100
PHEA JOE W JR
1819 E 24TH ST
LUBBOCK, TX 79404-1303

101
FAIR SONYA & DAVID
1821 MANHATTAN DR
LUBBOCK, TX 79404

102
VASQUEZ, ROSABELLE
1823 MANHATTAN DR
LUBBOCK, TX 79404

103
BAPTIST CHURCH GREATER ST LUKE
306 E 26TH ST
LUBBOCK, TX 79404-1606

104
HILL, MARY KATHERINE
2815 BARBEE ST
HOUSTON, TX 77004

105
HILL DAMON H JR
STEPHANIE JO
1831 MANHATTAN DR
LUBBOCK, TX 79404-1317

106
PRIESTLY, WILLIE RUTH
607 MAPLEWOOD CIR
PFLUGERVILLE, TX 78660

107
BEN & JERRYS PROPERTIES LLC
8282 MOBERLY LN
DALLAS, TX 75227

108
THUNDER SUN INC
6303 INDIANA AVE
LUBBOCK, TX 79413

109 JOHNSON, HEENAN
8302 TRENTON AVE
LUBBOCK, TX 79424-4726

110 CAVIEL, BILLIE JEAN
2401 E 28TH ST
LUBBOCK, TX 79404

111 BROWN CHARLES E III & MARCUS D
2403 E 28TH ST
LUBBOCK, TX 79404

112 WILLIAMS, RACHEL
2405 E 28TH ST
LUBBOCK, TX 79404

113 COX, COLTER
3014 125TH ST
LUBBOCK, TX 79423

114 VINCENT, SHAYNE
4707 81ST PL
LUBBOCK, TX 79424

115 WILEY, TINA
2411 E 28TH ST
LUBBOCK, TX 79404

116 JEFFERSON, LILLIAN N (TOD)
5506 76TH ST
LUBBOCK, TX 79424

117 LLANAS JULIO & ROSA
4007 110th ST
LUBBOCK, TX 79423

118 RM INVESTMENT GROUP LLC
10601 CLARENCE DR #STE 250
FRISCO, TX 75033

119 JOHNSON, LASHONDA B
2419 E 28TH ST
LUBBOCK, TX 79404

120 DIXON, BETTY LENNOX
2421 E 28TH ST
LUBBOCK, TX 79404

121 JOHNSON, JANICE
2423 E 28TH ST
LUBBOCK, TX 79404

122 KAVIANI MEHRNOOSH
4210 88TH PL
LUBBOCK, TX 79423-2940

123 KAVIANI MEHRNOOSH
4210 88TH PL
LUBBOCK, TX 79423-2940

124 HODGE, MILTON L
2429 E 28TH ST
LUBBOCK, TX 79404

125 WELLS, CLARENCE
4260 DECATUR DR
WOODBRIDGE, VA 22193-1889

126 BROWN, MARCUS D
2101 SE 36TH AVE
AMARILLO, TX 79118-7744

127 HAWTHRONE, LATORSHA
1705 E 1ST PL
LUBBOCK, TX 79403

128 LEWIS, WILLIAM T
2437 E 28TH ST
LUBBOCK, TX 79404

129 TINGLUND GABRIELA MARIA & LILLIAN
2439 E 28TH ST
LUBBOCK, TX 79404

130 MOORE RAMONA & CHAD
2901 BEECH AVE
LUBBOCK, TX 79404

131 WATLEY, MICHAEL J
2903 BEECH AVE
LUBBOCK, TX 79404

132 SPENCER EDDIE L & DIANA M
2905 BEECH AVE
LUBBOCK, TX 79404

133 ROWE, CONNI C
2907 BEECH AVE
LUBBOCK, TX 79404

134 MOORE, ARWILLA
2628 IVORY AVE
LUBBOCK, TX 79404

135 CARTER CHAPEL C M ECHURCH
PO BOX 413
LUBBOCK, TX 79408-0413

136 ROSS KATHERINE J
KARL JACKSON
2915 BEECH AVE
LUBBOCK, TX 79404

137 VAZQUEZ, ROBERT TALAVERA
2917 BEECH AVE
LUBBOCK, TX 79404

138 ELIZALDE JOSE A R & SILVIA C B MORALES
2919 BEECH AVE
LUBBOCK, TX 79404

139 LUELLEN, RITA K
2921 BEECH AVE
LUBBOCK, TX 79404

140 SIX SHOOTER ENTERPRISES LLC
1821 S MCELROY ST
CRANE, TX 79631

141 ARREOLA MARIBEL G &
ERASMO MARTINEZ BONILLA
5520 E COUNTY ROAD 6540
LUBBOCK, TX 79403

142 WHITFIELD STANLEY & CHARLOTTE
2802 E 30TH ST
LUBBOCK, TX 79404-2046

143 LEE, MATTHEWS
10601 DIXON AVE
LUBBOCK, TX 79423

144 BMC HOLDINGS LLC
5109 82ND ST SUITE 7 #330
LUBBOCK, TX 79424

145 JBRB HOLDINGS LLC
3502 AVENUE N #UNIT A
LUBBOCK, TX 79412

146 GATEWOOD, MICHAEL
3146 BLUESTEM DR
GARLAND, TX 75044-6546

147 STEWART, KENNETH W
1831 KIRKWOOD DR
MACON, GA 31211

148 MONTGOMERY, KATHERINE M EST OF
815 S CENTER ST #UNIT F
GRAND PRAIRIE, TX 75051

149 PAA FLATLAND VENTURES LLC
5007 AVE U
LUBBOCK, TX 79412

150 COLEMAN, JANIE EARL
2436 E 30TH ST
LUBBOCK, TX 79404

151 MANHATTAN HTS CHURCH OF CHR
2434 E 30TH ST
LUBBOCK, TX 79404

152 JOHNSON LUEJENNER & ALIZEAN HUNT
2432 E 30TH ST
LUBBOCK, TX 79404

153 PEPPERS, RAYMOND, JR
2428 E 30TH ST
LUBBOCK, TX 79404-2023

154 ROSS, GLENN
2426 E 30TH ST
LUBBOCK, TX 79404-2023

152 JOHNSON LUEJENNER & ALIZEAN HUNT
2432 E 30TH ST
LUBBOCK, TX 79404

153 PEPPERS, RAYMOND, JR
2428 E 30TH ST
LUBBOCK, TX 79404-2023

154 ROSS, GLENN
2426 E 30TH ST
LUBBOCK, TX 79404-2023

155 GUY, PATRICIA A
2424 E 30TH ST
LUBBOCK, TX 79404

156 HARRIS, BULAH
2422 E 30TH ST
LUBBOCK, TX 79404-2023

157 JACKSON ARLEE ESTATE OF
2420 E 30TH ST
LUBBOCK, TX 79404

158 PENDGRAFT, CLOVIS S
2418 E 30TH ST
LUBBOCK, TX 79404-2023

159 BROOKS, ELNORA JONES
2416 E 30TH ST
LUBBOCK, TX 79404-2023

160 AUSTIN DERRICK D & DARNISE A
2439 E 30TH ST
LUBBOCK, TX 79404-2022

161 BOLDEN ERIE LEE ESTATE & IDA AUSTIN & IRENE BURKS & JOHN L & WAYNE & RICKY & KENNETH BOLDEN
2412 E 30TH ST
LUBBOCK, TX 79404-2023

162 DARTHARD, MINNIE LUE
2410 E 30TH ST
LUBBOCK, TX 79404-2023

163 ORNELAS EDUARDO & MARISOL SALCIDO
2408 E 30TH ST
LUBBOCK, TX 79404

164 STEPTOE, ELIJAH, JR
2406 E 30TH ST
LUBBOCK, TX 79404

165 FLORES MICHELLE LEE & ISRAEL
2404 E 30TH ST
LUBBOCK, TX 79404

166 WILSON, CORI M
2402 E 30TH ST
LUBBOCK, TX 79404-2023

167 SMITH, DORIS HOOD
807 WESTOVER DR
LANCASTER, TX 75134-3732

168 MOUNTS, AARON
4105 84TH ST
LUBBOCK, TX 79423

169 RAGLAND, CAROLYN
2128 E 30TH ST
LUBBOCK, TX 79404-2021

170 BROWN LINDA D ESTATE OF
2126 E 30TH ST
LUBBOCK, TX 79404

171 WILLIAMS SAMMY L & ROSE MARY & JACQULIN
2122 E 30TH ST
LUBBOCK, TX 79404

172 RAGSDALE, CHARLES L
2118 E 30TH ST
LUBBOCK, TX 79404-2021

173 SIPP HOMES LLC
605 CROSBY DR
ALTAMONTE SPRINGS, FL 32714-7217

174 TAYLOR JOHNNIE V ESTATE OF
6704 TULLOCH WAY
AUSTIN, TX 78754-5822

175 BROWN CHALK JOHNSTON LP
PO BOX 550
PLAINVIEW, TX 79073

176 NORRIS, GRENLYN A
2110 E 30TH ST
LUBBOCK, TX 79404

177 COTTON, WILLIE
2106 E 30TH ST
LUBBOCK, TX 79404-2021

178 WARREN ALICE J & MARY MALONE
LYNDA LEON BOOKER
6614 BILLIKIN DR
HOUSTON, TX 77086

179 PROFFER, ANDREW JACOB
2102 E 30TH ST
LUBBOCK, TX 79404

180 ANDERSON, KATHYL R
2914 UTE AVE
LUBBOCK, TX 79404-2038

181 HAMBRICK, BILLY
2913 TEAK AVE
LUBBOCK, TX 79404

182 BELL, MARY EDNA
3125 DIAMOND BLVD 235
SAN ANGELO, TX 76905

183 RADER, DAVID
3109 TEAK AVE
LUBBOCK, TX 79404

184 CARROLL, DESIREE K
1313 49TH ST
LUBBOCK, TX 79412-2331

185 HUDSON CHARLIE F & WILLIE H THOMAS &
RUTH GREEN
2135 W 108TH ST
LOS ANGELES, CA 90047

186 URBAN RENEWAL
COMMUNITY DEV DEPT
PO BOX 2000
LUBBOCK, TX 79457-0001

187 SOUTHWEST PROPERTY DEVELOPMENT AND
CONST LLC
10408 WAVERLY AVE
LUBBOCK, TX 79424-4678

188 QUIGLEY, CORY
2318 BIRCH AVE
LUBBOCK, TX 79404

189 DAVIS SHAFT DESHONE ESTATE OF
c/o YOLANDA WALKER DEPENDENT ADMINR
2806 GREEN OAKS DR
GARLAND, TX 75046

190 NELSON, BOBBIE DAVIS
1713 E AMHERST ST
LUBBOCK, TX 79403-4039

191 WALKER, RUBY
3211 TEAK AVE
LUBBOCK, TX 79404-2035

192 GRIMES W L EST
3213 TEAK AVE
LUBBOCK, TX 79404-2035

193 CYPHERS, EDWIN
3215 TEAK AVE
LUBBOCK, TX 79404-2035

194 COLLINS, MARGARET
1828 E 25TH ST
LUBBOCK, TX 79404

195 GARNER OZE C MS
% PAULA BIBBS-SAMUELS
805 S IVORY ST
SLATON, TX 79364-5740

196 SALDANA, DOLORES
1325 47TH ST
LUBBOCK, TX 79412-2321

197 CONTRERAS, PHILLIP
1929 N TURMERIC
LUBBOCK, TX 79403

198 LUBBOCK HOUSING AUTHORITY
1708 CRICKETS AVE
LUBBOCK, TX 79401-5105

199 TSAI PETER & LI-HUNG C
% UNITED COMMERCE CENTER
1720 E HWY 356
IRVING, TX 75060

200 UNITED COMMERCE CENTERS INC
10679 HARRY HINES BLVD
DALLAS, TX 75220-2611

201 EDWARDS, NETTIE J
3004 80TH ST
LUBBOCK, TX 79423-2021

202 FLETCHER, DORIS LEE VEST
2605 75TH ST
LUBBOCK, TX 79423-2101

203 SNODGRASS MANER CO
PO BOX 579
LUBBOCK, TX 79408-0579

204 HEREFORD, SURLESTER
3102 E AUBURN ST
LUBBOCK, TX 79403-4133

205 FAIR SONYA & DAVID
1821 MANHATTAN DR
LUBBOCK, TX 79404

206 CHANDLER, WILLIE MAE
Attn: CAROLYN L HARPER
4290 CROWN BLVD #APT 44
DENVER, CO 80239-4814

207 PARKS, JAMES
ADDRESS UNKNOWN

208 WILLIAMS, JOSEPH EDDIE
ADDRESS UNKNOWN

209 WASHINGTON, T L EST OF
% LAVERNE BIBBS
2934 E BATES ST
LUBBOCK, TX 79403-4122

210 BUTLER, EARVIN
1510 E 1ST PL
LUBBOCK, TX 79403-3404

211 PRIESTLY, CARLTON
% WILLIE RUTH PRIESTLY
607 MAPLEWOOD CIR
PFLUGERVILLE, TX 78660-2880

212 HAMMONDS, CHARLES WALTER
1046 GREYWOOD DR
VAN ALSTYNE, TX 75495

213 HOWARD, JOHN HENRY
7307 BRYERS CIR
PLANO, TX 75025-2205

214 LEWIS, PATRICK
2611 GLOBE AVE
LUBBOCK, TX 79404-1731

215 BROWN, PEARL
ADDRESS UNKNOWN

216 MT GILEAD BAPTIST CHURCH
2512 FIR AVE
LUBBOCK, TX 79404-1724

217 COLEMAN, TOBY
ADDRESS UNKNOWN

218 BAPTIST CHURCH GREATER ST LUKE
306 E 26TH ST
LUBBOCK, TX 79404-1606

219 ADAMS, SHIRLEY R
4160 189TH PL
COUNTRY CLUB HILLS, IL 60478-5704

220 PARKER, BEULAH ETAL
1306 60TH ST
LUBBOCK, TX 79413-3618

221 WAGGONER, W LEROY
ADDRESS UNKNOWN

222 THOMAS, FRANCIS
ADDRESS UNKNOWN

223 SWENSON, JOHN
ADDRESS UNKNOWN

224 LINK MINISTRIES INC
1414 KENT ST
LUBBOCK, TX 79403-1405

225 COURTNEY DELTON & STELLA R
49 SOUTHBURY RD
CLIFTON PARK, NY 12065

226 ROFE, JAVARA
ADDRESS UNKNOWN

227 CHURCH OF THE LIVING GOD
ADDRESS UNKNOWN

228 BUNTON, MABLE
1711 E 28TH ST
LUBBOCK, TX 79404-2003

229 CHURCH OF GOD IN CHRIST
JAMES JUDIE
2925 E COLGATE ST
LUBBOCK, TX 79403-3605

230 SOLTANI JALAL
10301 NORFOLK AVE
LUBBOCK, TX 79423

231 STALLINGS LARRY C
PO BOX 32190
AMARILLO, TX 79120-2190

232 ATTEBURY GRAIN INC
PO BOX 2707
AMARILLO, TX 79105-2707

PYCO INDUSTRIES INC
2901 AVE A
LUBBOCK, TX 79404-2231

CRBBB PARTNERSHIP LP
5201 19TH ST
LUBBOCK, TX 79407

FARMERS CO-OP COMPRESS
PO BOX 2877
LUBBOCK, TX 79408-2877

ONCOR ELECTRIC DELIVERY
COMPANY LLC
PO BOX 139100
DALLAS, TX 75313-9100

PLAINS COTTON COOP
ASSOCIATION
PO BOX 2827
LUBBOCK, TX 79408-2827

SCHOPPA, RODNEY
2605 CR 2800
LUBBOCK, TX 79403

MICKAN RUSSELL
KAY MICKAN SPEER
1405 PONY EXPRESS LANE
COPPERAS COVE, TX 76522

GREEN J H TRUSTS
PO BOX 1204
DUNCAN, OK 73534-1204

FRITZ, KENNETH
2308 FM 1729
LUBBOCK, TX 79403-7049

FRITZ, CAROL A
5815 E FM 835
LUBBOCK, TX 79403-7034

TORRES, ALMA
4801 COUNTY ROAD 2800
LUBBOCK, TX 79404

BRASHEAR JUSTON THOMAS &
DANYELLE MARIE
1909 128TH ST
LUBBOCK, TX 79423-7456

KUNKEL CLARK & MARK LEMMONS &
CLINT WHITTLE
4905 E FM 835
LUBBOCK, TX 79403

ADAMS PROPERTY HOLDINGS LLC
PO BOX 45
IDALOU, TX 79329

FITHEN, LESLIE
5437 45TH ST
LUBBOCK, TX 79414

TORRES RUDY & ANNETTE
4935 E FM 835
LUBBOCK, TX 79403-9685

LUBBOCK RIVERWALK LLC
6301 INDIANA AVE
LUBBOCK, TX 79413

MICHAEL ROSS HOLDINGS LLC
6301 INDIANA AVE
LUBBOCK, TX 79413

RONNIE ZAHN PAVING INC
6608 MLK BLVD
LUBBOCK, TX 79404

ARNETT SAM C III
ABBY F QUINN & WILLIAM A
FLYGARE 806 AVE J
LUBBOCK, TX 79401-2717

BECK, FRANK W
6406 FM 835
LUBBOCK, TX 79403-7004

FOERSTER EARL TRUST & MILTON
GLORIA J KEETON
7412 HURON AVE LUBBOCK, TX
79424

BASF AGRICULTURAL SOLUTIONS
SEED US LLC
100 PARK AVE FLORHAM PARK, NJ
07932

JOSEPH ADAM CORPORATION
PO BOX 64791
LUBBOCK, TX 79464-4791

GWINN ALY TRUST
JARET W GREASER & BURT C
HEINRICH C0-TRS
PO BOX 1378 LUBBOCK, TX 79408

PLAYA LAKE FARM & RANCH LP
11107 MIAMI AVE
LUBBOCK, TX 79423

MCGEHEE DENNIS H & JULIE
PO BOX 1368
IDALOU, TX 79329

FOERSTER, MARC
5907 FM 835
LUBBOCK, TX 79403

FALLIN RODNEY & THERESA
5209 E COUNTY ROAD 6610
LUBBOCK, TX 79403

NUNEZ ANTONIO & REYNA
6210 E COUNTY ROAD 6450
LUBBOCK, TX 79403

LEPRINO FOODS COMPANY
1830 W 38TH AVE
DENVER, CO 80211-2225

BASF CORPORATION
100 PARK AVE
FLORHAM PARK, NJ 07932-1089

LOS CARNALES MC
4022 WOODROW RD
LUBBOCK, TX 79423

ADAMS C POWELL & CAROL
7317 E FM 40 LUBBOCK, TX 79403

SIEBER TRUST
PROSPERITY BANK TRUST
1401 AVE Q
LUBBOCK, TX 79401-3819

LUBBOCK REGIONAL MHMR DBA
STARCARE SPECIALTY HEALTH
SYSTEM
904 AVENUE O
LUBBOCK, TX 79401-3924

REYES RAMIRO & DEBRA
15916 N COUNTY ROAD 2500
ABERNATHY, TX 79311-5333

CERDA JOSE L
GUADALUPE REYES & ZETA
RODRIGUEZ
2902 2ND PL LUBBOCK, TX 79415

WALTON BONNIE
TESSIE ESTATE
ADDRESS UNKNOWN

RODRIGUEZ ROGER & MARIA ELENA
8710 GOLDEN PT
SAN ANTONIO, TX 78239

RODRIGUEZ, MANUEL
13538 BALLAST RD
HOUSTON, TX 77044

PITTS, ELAINE
140 CR 3051
DECATUR, TX 76234-4610

THOMPSON JAMES E ET AL
2609 E 19TH ST
LUBBOCK, TX 79403-5829

GIL, LUIS JESUS
PO BOX 348
SMYER, TX 79367-0348

STROUP, MICHAEL ERVIN
2605 E 19TH ST
LUBBOCK, TX 79403-5829

PUCKETT, WILEY ESTATE
ADDRESS UNKNOWN

ODDIE FREDDRICK II
DARAVION J BONNER JR
904 W LAUREL ST
COMPTON, CA 90220-2907

BUTLER, REGINA
4013 47TH ST
LUBBOCK, TX 79413

GARCIA ANGEL & EMERY
2506 58TH ST
LUBBOCK, TX 79413-5632

CARTER, BRYCE CYRLOYD
4013 47TH ST
LUBBOCK, TX 79413

HERRERA, RAMONA (TOD)
2211 E 19TH ST
LUBBOCK, TX 79403

RAMIREZ, MARIA LETICIA
5419 48TH ST
LUBBOCK, TX 79414-1523

MATA, CHRISTINA V
3702 ENGLEWOOD
LUBBOCK, TX 79407

JOINER MELVIN & WELBURN TRAVIS
ADDRESS UNKNOWN

3D LAND DEVELOPMENT LLC
2621 21ST ST
LUBBOCK, TX 79410

SUBIA MARGARITA ELVIRA & EST OF
VIRGINIA R
1720 VANDA AVE
LUBBOCK, TX 79403

MARTINEZ LUPE & EST OF VIRIGINIA
SUBIA
1720 VANDA AVE
LUBBOCK, TX 79403

GUTIERREZ, JOE
JANIE GUTIERREZ
4828 8TH ST LUBBOCK, TX 79416

SALAS, AMY
1716 UTE AVE
LUBBOCK, TX 79404

MC CULLOUGH, MARY
2205 E 29TH ST
LUBBOCK, TX 79404-2016

CLEAVER, DORIS R
1811 SPRUCE AVE
LUBBOCK, TX 79408-5322

CANALES SANTOS JR & REFUGIA M
1721 E 19TH ST
LUBBOCK, TX 79403

OCHOA, JOHN
5223 16TH ST
LUBBOCK, TX 79416

ALDERETE, SANDY
1105 A MCCLELLAN AVE
MONTEREY, CA 93940

GUZMAN, NATALIA M
1715 E 19TH ST
LUBBOCK, TX 79403

ACOSTA JORGE & RUTH
2815 O'BANNON
DALLAS, TX 75224

RAGSDALE H L ESTATE OF
c/o DOROTHY WILKERSON
2708 TEAK AVENUE LUBBOCK, TX
79404

HERNANDEZ, LEE, SR
1709 E 19TH ST
LUBBOCK, TX 79403

SANCHEZ, ELSA
1707 E 19TH ST
LUBBOCK, TX 79403-5725

CURRY FUNERAL HOME INC
1805 MLK BLVD
LUBBOCK, TX 79403

MOUSAVIJAM, MIRASAAD
11212 GENOA AVE
LUBBOCK, TX 79424-3963

ROCC SOLID FITNESS LLC
5014 18TH ST
LUBBOCK, TX 79416

MANN, VERA LEGALE
2238 LOCUST ST
AMARILLO, TX 79109-1921

J & J PARTNERSHIP
8001 QUAKER AVE #STE L
LUBBOCK, TX 79424

JAY BIRD INVESTMENTS INC
5025 50th ST #STE A
LUBBOCK, TX 79414

LUBBOCK ISD
1628 19TH ST
LUBBOCK, TX 79401-4832

FOSTER, RAYMON
3417 40TH ST
LUBBOCK, TX 79413

ANZLEY, LAFRANCES RICHARDSON
1827 MANHATTAN DR
LUBBOCK, TX 79404-1317

KNIGHTEN, RHONALD
1110 41ST ST #UNIT B
LUBBOCK, TX 79412-2040

HOWARD, JOHN HENRY
7307 BRYERS CIR
PLANO, TX 75025-2205

ROSS, WENDY TOLSON
8605 NW 74TH TER
KANSAS CITY, MO 64152

NIELAND, VICTOR MANUEL
1322 E 24TH ST
LUBBOCK, TX 79404

MC KNIGHT, SAMANTHA MASON
ESTATE ETAL
1324 E 24TH ST
LUBBOCK, TX 79404

THOMAS, MAJORIE
1122 MEADOWLARK LN
DESOTO, TX 75115-8042

PHEA DOROTHY B ESTATE OF
3308 S MACGREGOR WAY
HOUSTON, TX 77021

MC CORMICK, MAXINE
1330 E 24TH ST
LUBBOCK, TX 79404-1202

WALKER BYRON JR & BRIDGETT C
1332 E 24TH ST
LUBBOCK, TX 79404-1202

AUGUST & MELESSA HOWARD FAMILY
TRUST
HOWARD AUGUST J & MELESSA W
TRUSTEES
7307 BRYERS CIRCLE
PLANO, TX 75025

CHILDERS, CURTIS W
PO BOX 883
BASTROP, TX 78602-0883

DORSEY BETTIE MAE ESTATE OF &
IRION ROSS ET AL
2112 E 29TH ST
LUBBOCK, TX 79404

RAY, ROBERT L
JACQUELYN PORCH
1516 E 1ST PL
LUBBOCK, TX 79403

BUTLER, JAMES A
TODD SANDERS
2720 E 9TH ST
LUBBOCK, TX 79403

MVIII PROPERTIES LLC
605 N WINSTON AVE
LUBBOCK, TX 79416

WILLIAMS, REGINALD
1710 E 24TH ST
LUBBOCK, TX 79404

MANN-STEWART TIFFANY &
TRIELLIS STEWART
2418 E 8TH ST
LUBBOCK, TX 79403

ROSSMAN, WOODSON
1518 E 24TH ST
LUBBOCK, TX 79404

BAPTIST CHURCH LYONS CHAPEL
1704 E 24TH ST
LUBBOCK, TX 79404-1302

LUBBOCK BOYS CLUB INC
WESLEY STRENGTH
3221 59TH ST
LUBBOCK, TX 79413-5515

PHEA JOE W JR
1819 E 24TH ST
LUBBOCK, TX 79404-1303

FAIR SONYA & DAVID
1821 MANHATTAN DR
LUBBOCK, TX 79404

VASQUEZ, ROSABELLE
1823 MANHATTAN DR
LUBBOCK, TX 79404

BAPTIST CHURCH GREATER ST
LUKE
306 E 26TH ST
LUBBOCK, TX 79404-1606

HILL, MARY KATHERINE
2815 BARBEE ST
HOUSTON, TX 77004

HILL DAMON H JR
STEPHANIE JO
1831 MANHATTAN DR
LUBBOCK, TX 79404-1317

PRIESTLY, WILLIE RUTH
607 MAPLEWOOD CIR
PFLUGERVILLE, TX 78660

BEN & JERRYS PROPERTIES LLC
8282 MOBERLY LN
DALLAS, TX 75227

THUNDER SUN INC
6303 INDIANA AVE
LUBBOCK, TX 79413

JOHNSON, HEENAN
8302 TRENTON AVE
LUBBOCK, TX 79424-4726

CAVIEL, BILLIE JEAN
2401 E 28TH ST
LUBBOCK, TX 79404

BROWN CHARLES E III & MARCUS D
2403 E 28TH ST
LUBBOCK, TX 79404

WILLIAMS, RACHEL
2405 E 28TH ST
LUBBOCK, TX 79404

COX, COLTER
3014 125TH ST
LUBBOCK, TX 79423

VINCENT, SHAYNE
4707 81ST PL
LUBBOCK, TX 79424

WILEY, TINA
2411 E 28TH ST
LUBBOCK, TX 79404

JEFFERSON, LILLIAN N (TOD)
5506 76TH ST
LUBBOCK, TX 79424

LLANAS JULIO & ROSA
4007 110th ST
LUBBOCK, TX 79423

RM INVESTMENT GROUP LLC
10601 CLARENCE DR #STE 250
FRISCO, TX 75033

JOHNSON, LASHONDA B
2419 E 28TH ST
LUBBOCK, TX 79404

DIXON, BETTY LENNOX
2421 E 28TH ST
LUBBOCK, TX 79404

JOHNSON, JANICE
2423 E 28TH ST
LUBBOCK, TX 79404

KAVIANI MEHRNOOSH
4210 88TH PL
LUBBOCK, TX 79423-2940

HODGE, MILTON L
2429 E 28TH ST
LUBBOCK, TX 79404

WELLS, CLARENCE
4260 DECATUR DR
WOODBRIDGE, VA 22193-1889

BROWN, MARCUS D
2101 SE 36TH AVE
AMARILLO, TX 79118-7744

HAWTHRONE, LATORSHA
1705 E 1ST PL
LUBBOCK, TX 79403

LEWIS, WILLIAM T
2437 E 28TH ST
LUBBOCK, TX 79404

TINGLUND GABRIELA MARIA & LILLIAN
2439 E 28TH ST
LUBBOCK, TX 79404

MOORE RAMONA & CHAD
2901 BEECH AVE
LUBBOCK, TX 79404

WATLEY, MICHAEL J
2903 BEECH AVE
LUBBOCK, TX 79404

SPENCER EDDIE L & DIANA M
2905 BEECH AVE
LUBBOCK, TX 79404

ROWE, CONNI C
2907 BEECH AVE
LUBBOCK, TX 79404

MOORE, ARWILLA
2628 IVORY AVE
LUBBOCK, TX 79404

CARTER CHAPEL C M E CHURCH
PO BOX 413
LUBBOCK, TX 79408-0413

ROSS KATHERINE J
KARL JACKSON
2915 BEECH AVE
LUBBOCK, TX 79404

VAZQUEZ, ROBERT TALAVERA
2917 BEECH AVE
LUBBOCK, TX 79404

ELIZALDE JOSE A R & SILVIA C B MORALES
2919 BEECH AVE
LUBBOCK, TX 79404

LUELLEN, RITA K
2921 BEECH AVE
LUBBOCK, TX 79404

SIX SHOOTER ENTERPRISES LLC
1821 S MCELROY ST
CRANE, TX 79631

ARREOLA MARIBEL G & ERASMO MARTINEZ BONILLA
5520 E COUNTY ROAD 6540
LUBBOCK, TX 79403

WHITFIELD STANLEY & CHARLOTTE
2802 E 30TH ST
LUBBOCK, TX 79404-2046

LEE, MATTHEWS
10601 DIXON AVE
LUBBOCK, TX 79423

BMC HOLDINGS LLC
5109 82ND ST SUITE 7 #330
LUBBOCK, TX 79424

JBRB HOLDINGS LLC
3502 AVENUE N #UNIT A
LUBBOCK, TX 79412

GATEWOOD, MICHAEL
3146 BLUESTEM DR
GARLAND, TX 75044-6546

STEWART, KENNETH W
1831 KIRKWOOD DR
MACON, GA 31211

MONTGOMERY, KATHERINE M EST OF
815 S CENTER ST #UNIT F
GRAND PRAIRIE, TX 75051

PAA FLATLAND VENTURES LLC
5007 AVE U
LUBBOCK, TX 79412

COLEMAN, JANIE EARL
2436 E 30TH ST
LUBBOCK, TX 79404

MANHATTAN HTS CHURCH OF CHR
2434 E 30TH ST
LUBBOCK, TX 79404

JOHNSON LUEJENNER & ALIZEAN HUNT
2432 E 30TH ST
LUBBOCK, TX 79404

PEPPERS, RAYMOND, JR
2428 E 30TH ST
LUBBOCK, TX 79404-2023

ROSS, GLENN
2426 E 30TH ST
LUBBOCK, TX 79404-2023

GUY, PATRICIA A
2424 E 30TH ST
LUBBOCK, TX 79404

HARRIS, BULAH
2422 E 30TH ST
LUBBOCK, TX 79404-2023

JACKSON ARLEE ESTATE OF
2420 E 30TH ST
LUBBOCK, TX 79404

PENDGRAFT, CLOVIS S
2418 E 30TH ST
LUBBOCK, TX 79404-2023

BROOKS, ELNORA JONES
2416 E 30TH ST
LUBBOCK, TX 79404-2023

AUSTIN DERRICK D & DARNISE A
2439 E 30TH ST
LUBBOCK, TX 79404-2022

BOLDEN ERIE LEE ESTATE & IDA AUSTIN & IRENE BURKS & JOHN L & WAYNE & RICKY & KENNETH BOLDEN
2412 E 30TH ST
LUBBOCK, TX 79404-2023

DARTHARD, MINNIE LUE
2410 E 30TH ST
LUBBOCK, TX 79404-2023

ORNELAS EDUARDO & MARISOL SALCIDO
2408 E 30TH ST
LUBBOCK, TX 79404

STEPTOE, ELIJAH, JR
2406 E 30TH ST
LUBBOCK, TX 79404

FLORES MICHELLE LEE & ISRAEL
2404 E 30TH ST
LUBBOCK, TX 79404

WILSON, CORI M
2402 E 30TH ST
LUBBOCK, TX 79404-2023

SMITH, DORIS HOOD
807 WESTOVER DR
LANCASTER, TX 75134-3732

MOUNTS, AARON
4105 84TH ST
LUBBOCK, TX 79423

RAGLAND, CAROLYN
2128 E 30TH ST
LUBBOCK, TX 79404-2021

BROWN LINDA D ESTATE OF
2126 E 30TH ST
LUBBOCK, TX 79404

WILLIAMS SAMMY L & ROSE MARY & JACQULIN
2122 E 30TH ST
LUBBOCK, TX 79404

RAGSDALE, CHARLES L
2118 E 30TH ST
LUBBOCK, TX 79404-2021

SIPP HOMES LLC
605 CROSBY DR
ALTAMONTE SPRINGS, FL 32714-7217

TAYLOR JOHNNIE V ESTATE OF
6704 TULLOCH WAY
AUSTIN, TX 78754-5822

BROWN CHALK JOHNSTON LP
PO BOX 550
PLAINVIEW, TX 79073

NORRIS, GRENLYN A
2110 E 30TH ST
LUBBOCK, TX 79404

COTTON, WILLIE
2106 E 30TH ST
LUBBOCK, TX 79404-2021

WARREN ALICE J & MARY MALONE LYNDA LEON BOOKER
6614 BILLIKIN DR
HOUSTON, TX 77086

PROFFER, ANDREW JACOB
2102 E 30TH ST
LUBBOCK, TX 79404

ANDERSON, KATHYL R
2914 UTE AVE
LUBBOCK, TX 79404-2038

HAMBRICK, BILLY
2913 TEAK AVE
LUBBOCK, TX 79404

BELL, MARY EDNA
3125 DIAMOND BLVD 235
SAN ANGELO, TX 76905

RADER, DAVID
3109 TEAK AVE
LUBBOCK, TX 79404

CARROLL, DESIREE K
1313 49TH ST
LUBBOCK, TX 79412-2331

HUDSON CHARLIE F & WILLIE H
THOMAS &
RUTH GREEN
2135 W 108TH ST
LOS ANGELES, CA 90047

URBAN RENEWAL
COMMUNITY DEV DEPT
PO BOX 2000
LUBBOCK, TX 79457-0001

SOUTHWEST PROPERTY
DEVELOPMENT AND CONST LLC
10408 WAVERLY AVE
LUBBOCK, TX 79424-4678

QUIGLEY, CORY
2318 BIRCH AVE
LUBBOCK, TX 79404

DAVIS SHAFT DESHONE ESTATE OF
c/o YOLANDA WALKER DEPENDENT
ADMINR
2806 GREEN OAKS DR
GARLAND, TX 75046

NELSON, BOBBIE DAVIS
1713 E AMHERST ST
LUBBOCK, TX 79403-4039

WALKER, RUBY
3211 TEAK AVE
LUBBOCK, TX 79404-2035

GRIMES W L EST
3213 TEAK AVE
LUBBOCK, TX 79404-2035

CYPHERS, EDWIN
3215 TEAK AVE
LUBBOCK, TX 79404-2035

COLLINS, MARGARET
1828 E 25TH ST
LUBBOCK, TX 79404

GARNER OZE C MS
% PAULA BIBBS-SAMUELS
805 S IVORY ST
SLATON, TX 79364-5740

SALDANA, DOLORES
1325 47TH ST
LUBBOCK, TX 79412-2321

CONTRERAS, PHILLIP
1929 N TURMERIC
LUBBOCK, TX 79403

LUBBOCK HOUSING AUTHORITY
1708 CRICKETS AVE
LUBBOCK, TX 79401-5105

TSAI PETER & LI-HUNG C
% UNITED COMMERCE CENTER
1720 E HWY 356
IRVING, TX 75060

UNITED COMMERCE CENTERS INC
10679 HARRY HINES BLVD
DALLAS, TX 75220-2611

EDWARDS, NETTIE J
3004 80TH ST
LUBBOCK, TX 79423-2021

FLETCHER, DORIS LEE VEST
2605 75TH ST
LUBBOCK, TX 79423-2101

SNODGRASS MANER CO
PO BOX 579
LUBBOCK, TX 79408-0579

HEREFORD, SURLESTER
3102 E AUBURN ST
LUBBOCK, TX 79403-4133

FAIR SONYA & DAVID
1821 MANHATTAN DR
LUBBOCK, TX 79404

CHANDLER, WILLIE MAE
Attn: CAROLYN L HARPER
4290 CROWN BLVD #APT 44
DENVER, CO 80239-4814

PARKS, JAMES
ADDRESS UNKNOWN

WILLIAMS, JOSEPH EDDIE
ADDRESS UNKNOWN

WASHINGTON, T L EST OF
% LAVERNE BIBBS
2934 E BATES ST
LUBBOCK, TX 79403-4122

BUTLER, EARVIN
1510 E 1ST PL
LUBBOCK, TX 79403-3404

PRIESTLY, CARLTON
% WILLIE RUTH PRIESTLY
607 MAPLEWOOD CIR
PFLUGERVILLE, TX 78660-2880

HAMMONDS, CHARLES WALTER
1046 GREYWOOD DR
VAN ALSTYNE, TX 75495

HOWARD, JOHN HENRY
7307 BRYERS CIR
PLANO, TX 75025-2205

LEWIS, PATRICK
2611 GLOBE AVE
LUBBOCK, TX 79404-1731

BROWN, PEARL
ADDRESS UNKNOWN

MT GILEAD BAPTIST CHURCH
2512 FIR AVE
LUBBOCK, TX 79404-1724

COLEMAN, TOBY
ADDRESS UNKNOWN

BAPTIST CHURCH GREATER ST LUKE
306 E 26TH ST
LUBBOCK, TX 79404-1606

ADAMS, SHIRLEY R
4160 189TH PL
COUNTRY CLUB HILLS, IL 60478-5704

PARKER, BEULAH ETAL
1306 60TH ST
LUBBOCK, TX 79413-3618

WAGGONER, W LEROY
ADDRESS UNKNOWN

THOMAS, FRANCIS
ADDRESS UNKNOWN

SWENSON, JOHN
ADDRESS UNKNOWN

LINK MINISTRIES INC
1414 KENT ST
LUBBOCK, TX 79403-1405

COURTNEY DELTON & STELLA R
49 SOUTHBURY RD
CLIFTON PARK, NY 12065

ROFE, JAVARA
ADDRESS UNKNOWN

CHURCH OF THE LIVING GOD
ADDRESS UNKNOWN

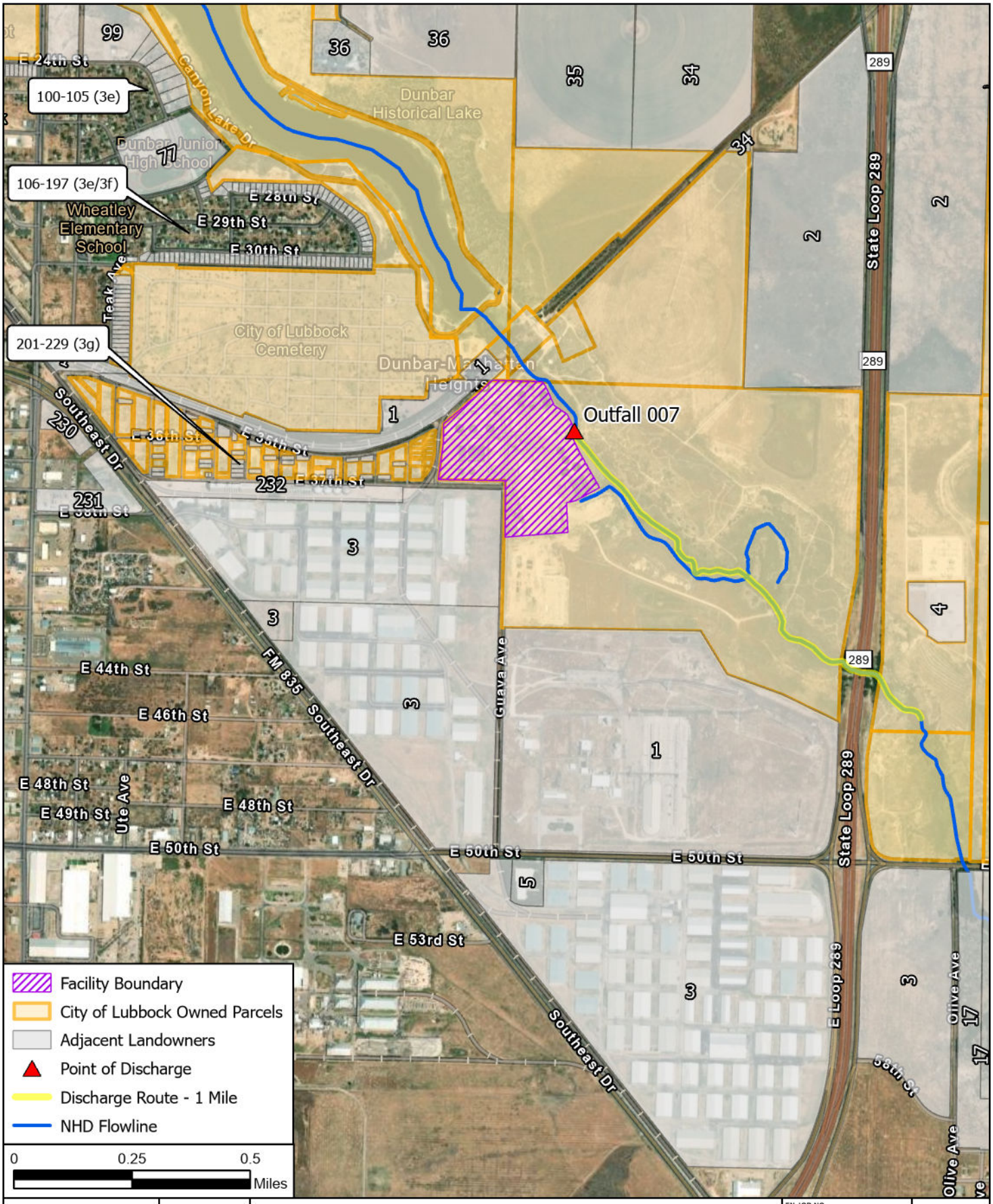
BUNTON, MABLE
1711 E 28TH ST
LUBBOCK, TX 79404-2003

CHURCH OF GOD IN CHRIST
JAMES JUDIE
2925 E COLGATE ST
LUBBOCK, TX 79403-3605

SOLTANI JALAL
10301 NORFOLK AVE
LUBBOCK, TX 79423

STALLINGS LARRY C
PO BOX 32190
AMARILLO, TX 79120-2190

ATTEBURY GRAIN INC
PO BOX 2707
AMARILLO, TX 79105-2707



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Phone - (817) 735 - 7300

City of Lubbock

TPDES Permit Amendment

Affected Landowner Map

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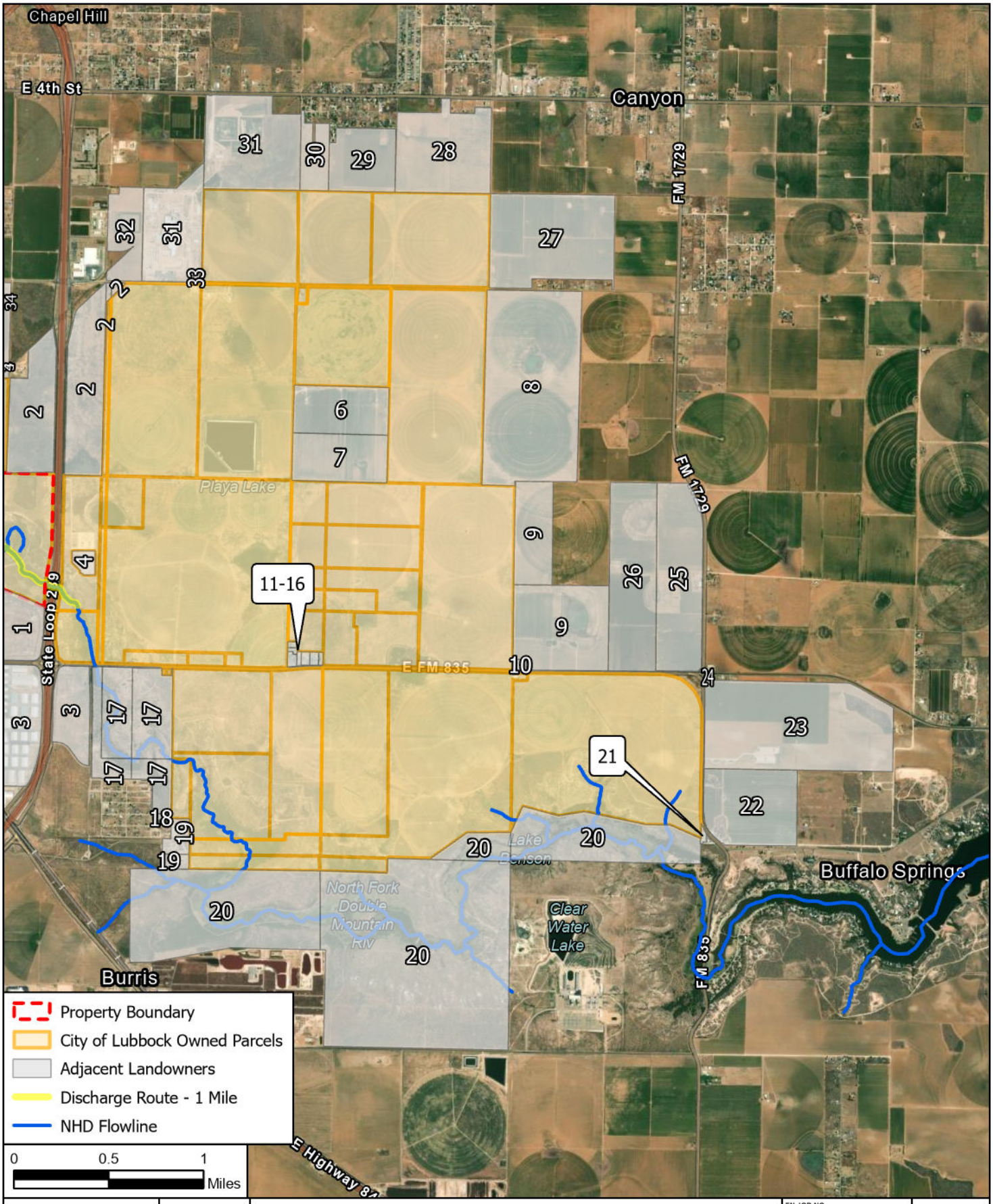

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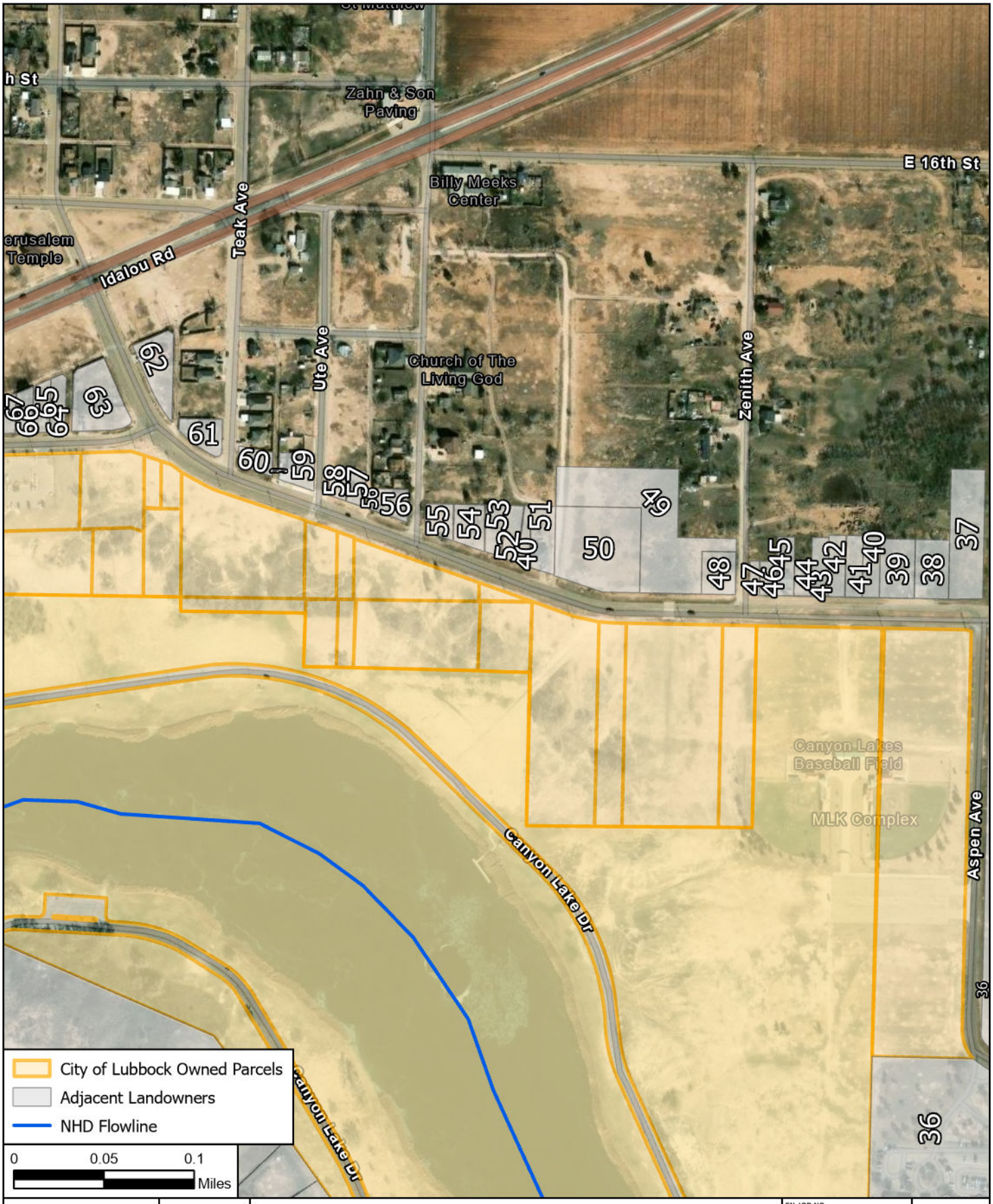

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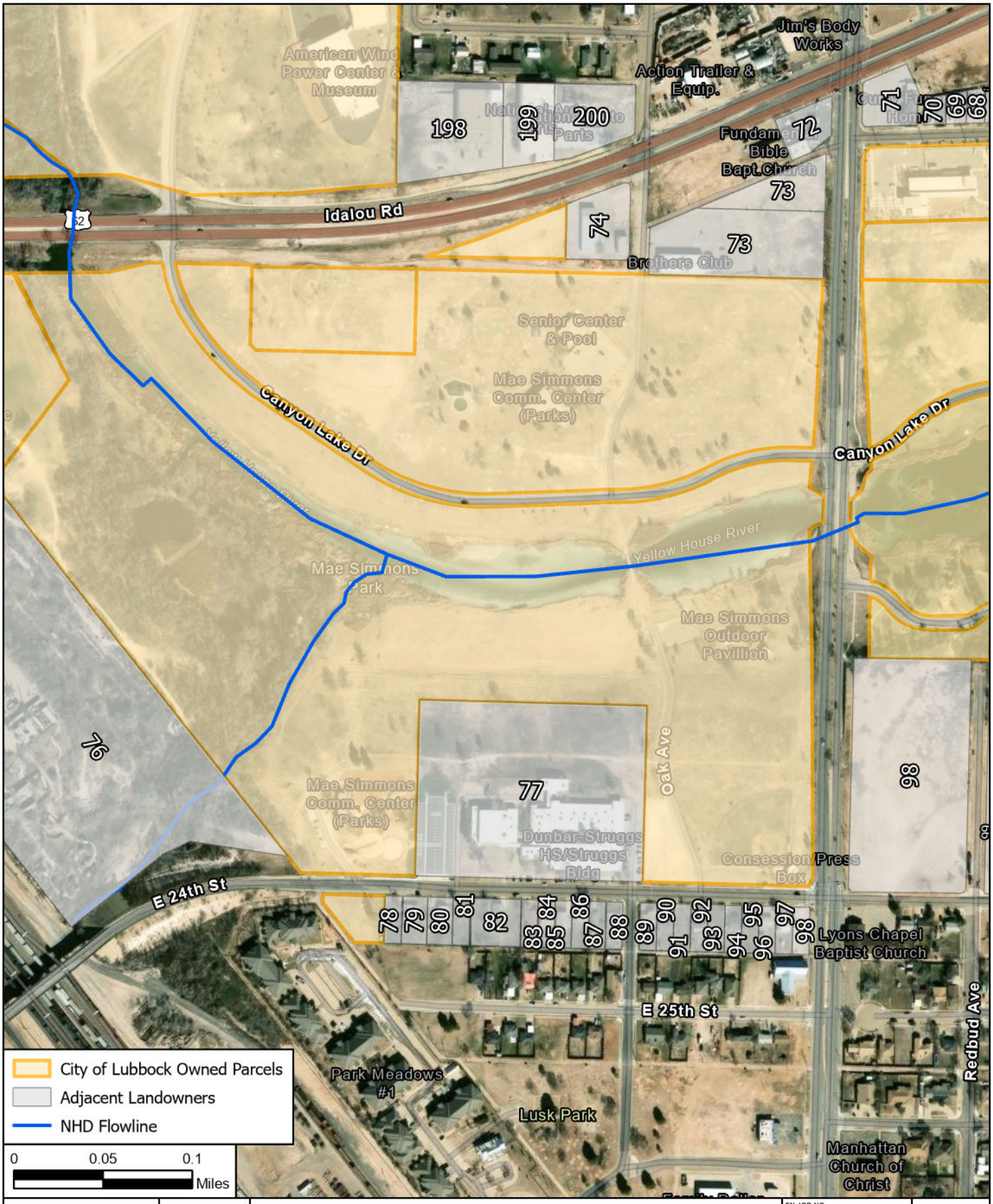

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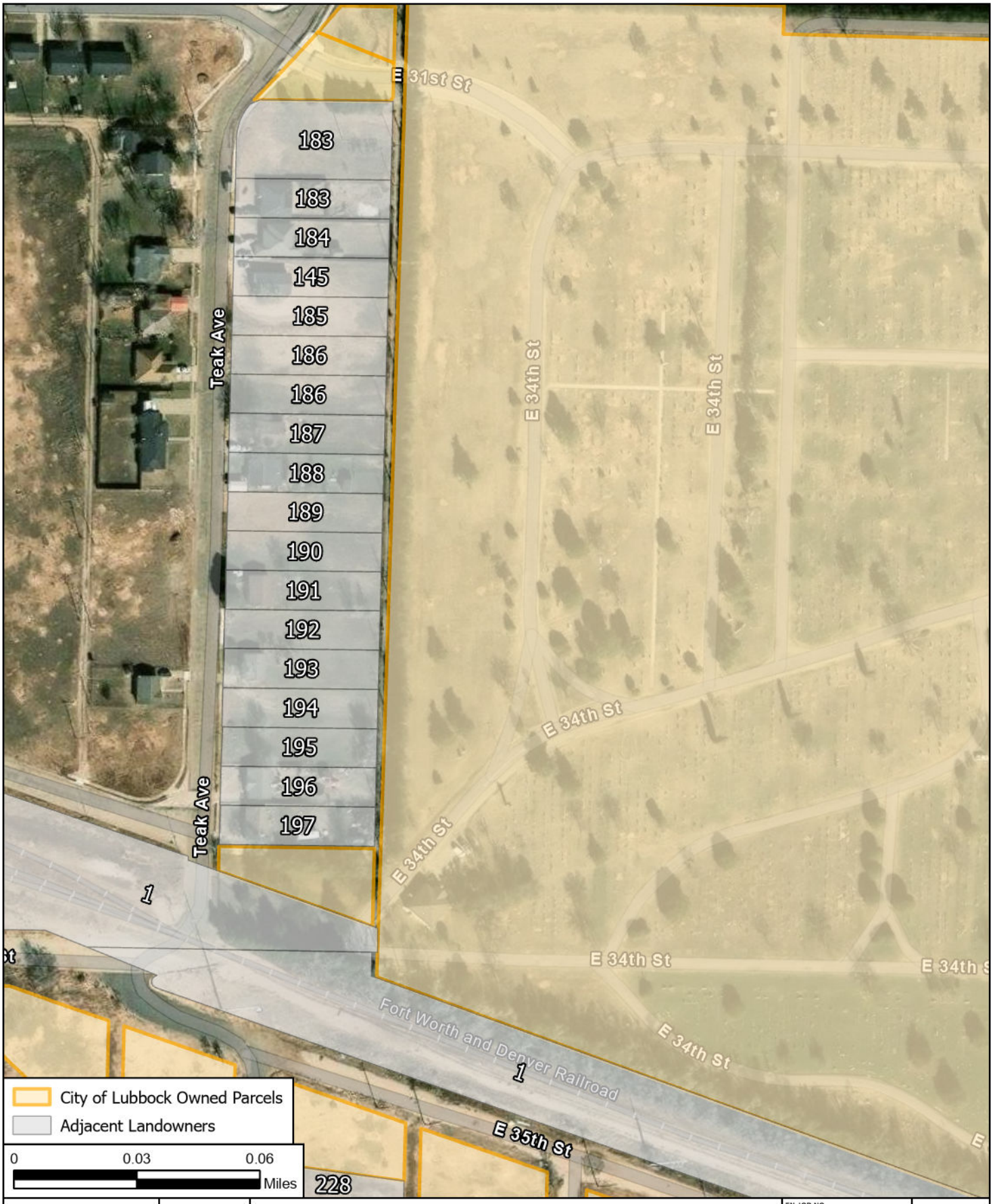

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NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

ATTACHMENT AR-8

Original Photographs and

Photo Plot Map

Photo 1: Primary Clarifier No. 1

Photo 2: Primary Sludge Pump Station

Photo 3: Blower Building

Photo 4: Filter Complex

Photo 5: UV Disinfection

Photo 6: Aeriation Basin No. 1

Photo 7: Aeration Basin No. 2

Photo 8: Aeration Basin No. 3

Photo 9: Outfall 007

Photo 10: Outfall 001 – Downstream of Outfall 001 facing upstream.

Photo 11: Outfall 001 – Upstream of Outfall 001 facing downstream.

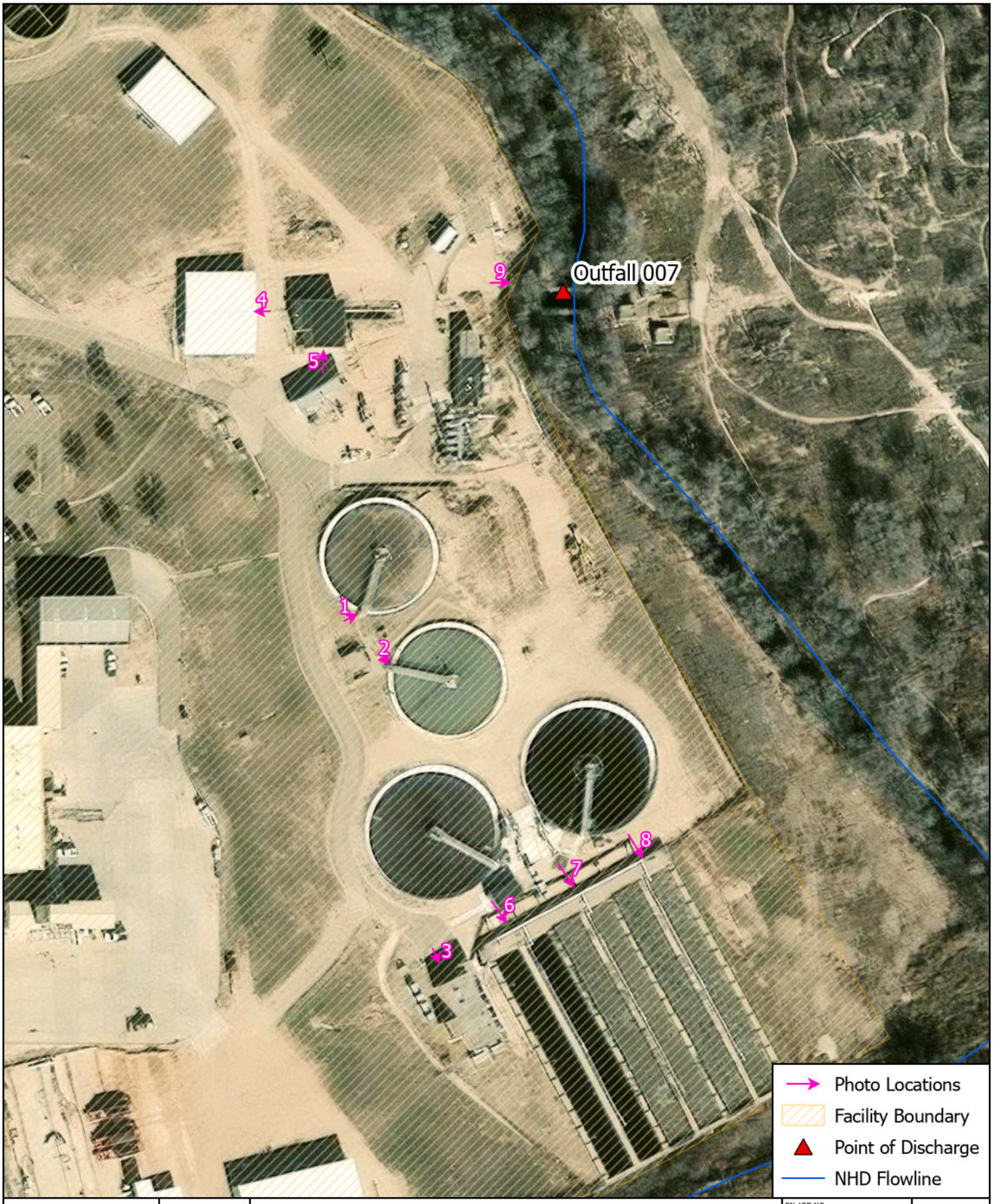

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Photo Plot Map

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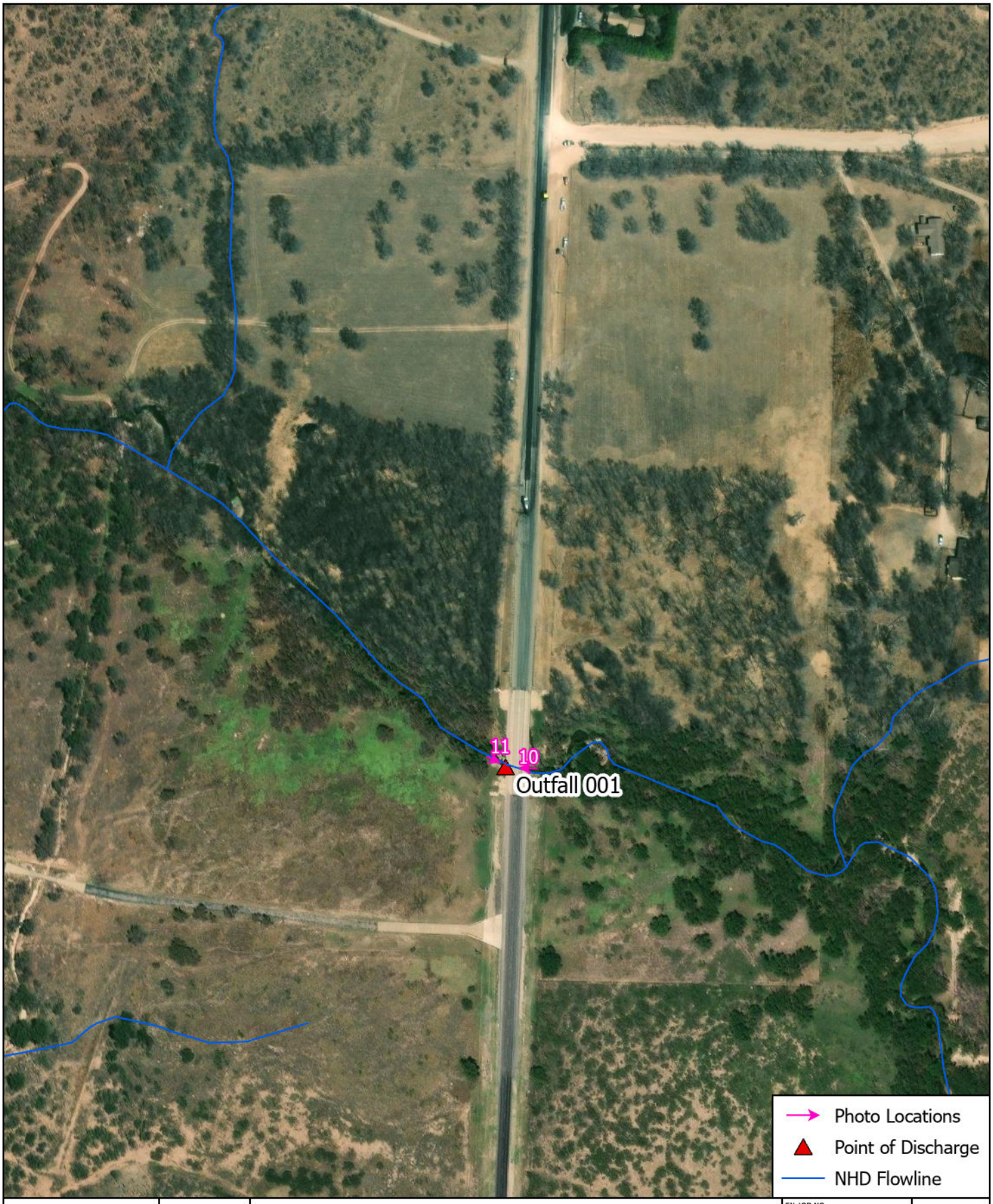

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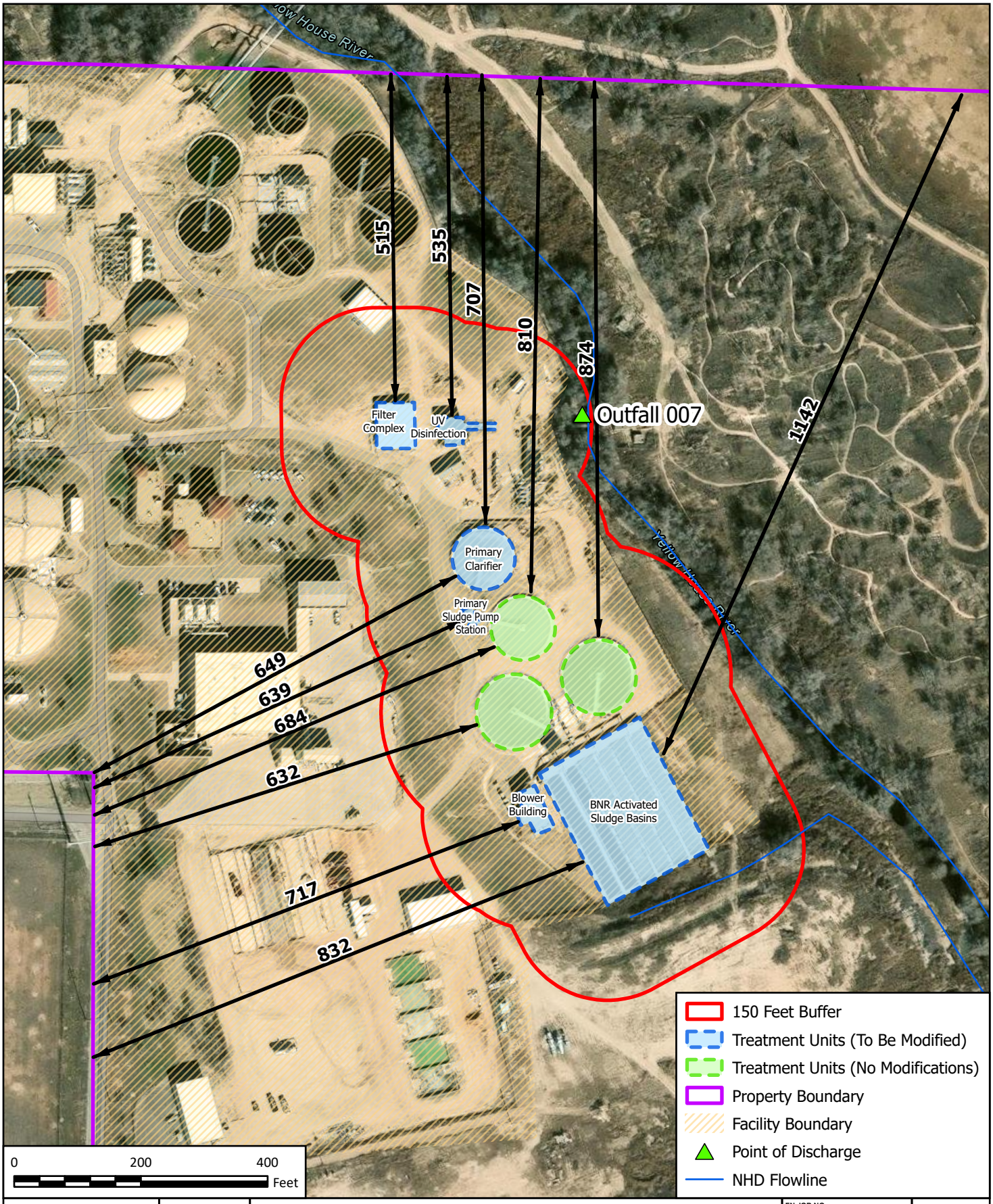
NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

ATTACHMENT AR-9

Buffer Zone Map



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TPDES Permit Amendment

Buffer Zone Map

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FIGURE

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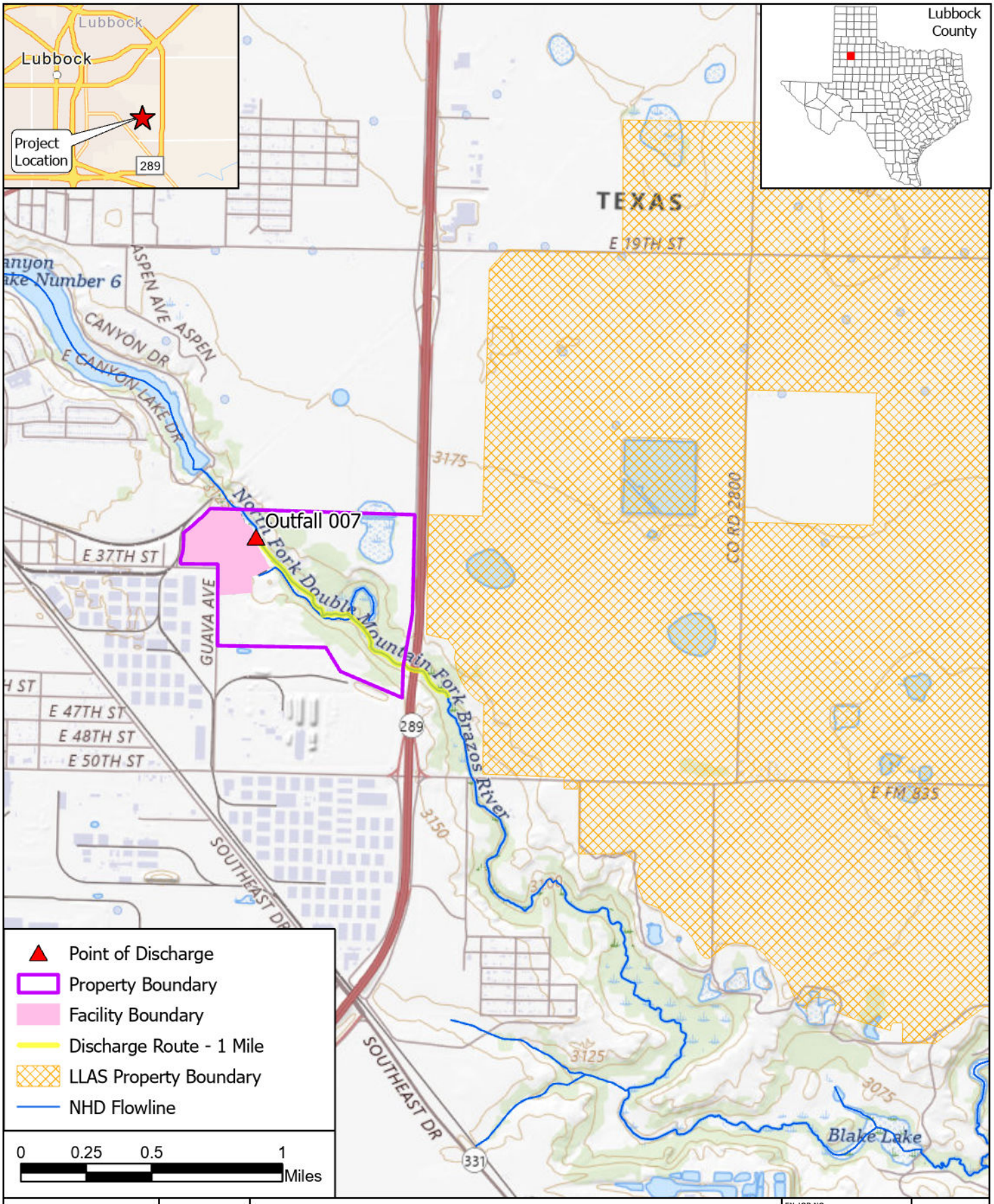
NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

ATTACHMENT SPIF-1

SPIF USGS Topographic Map



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TPDES Permit Amendment

SPIF USGS Topographic Map

FN JOB NO	LUB23850
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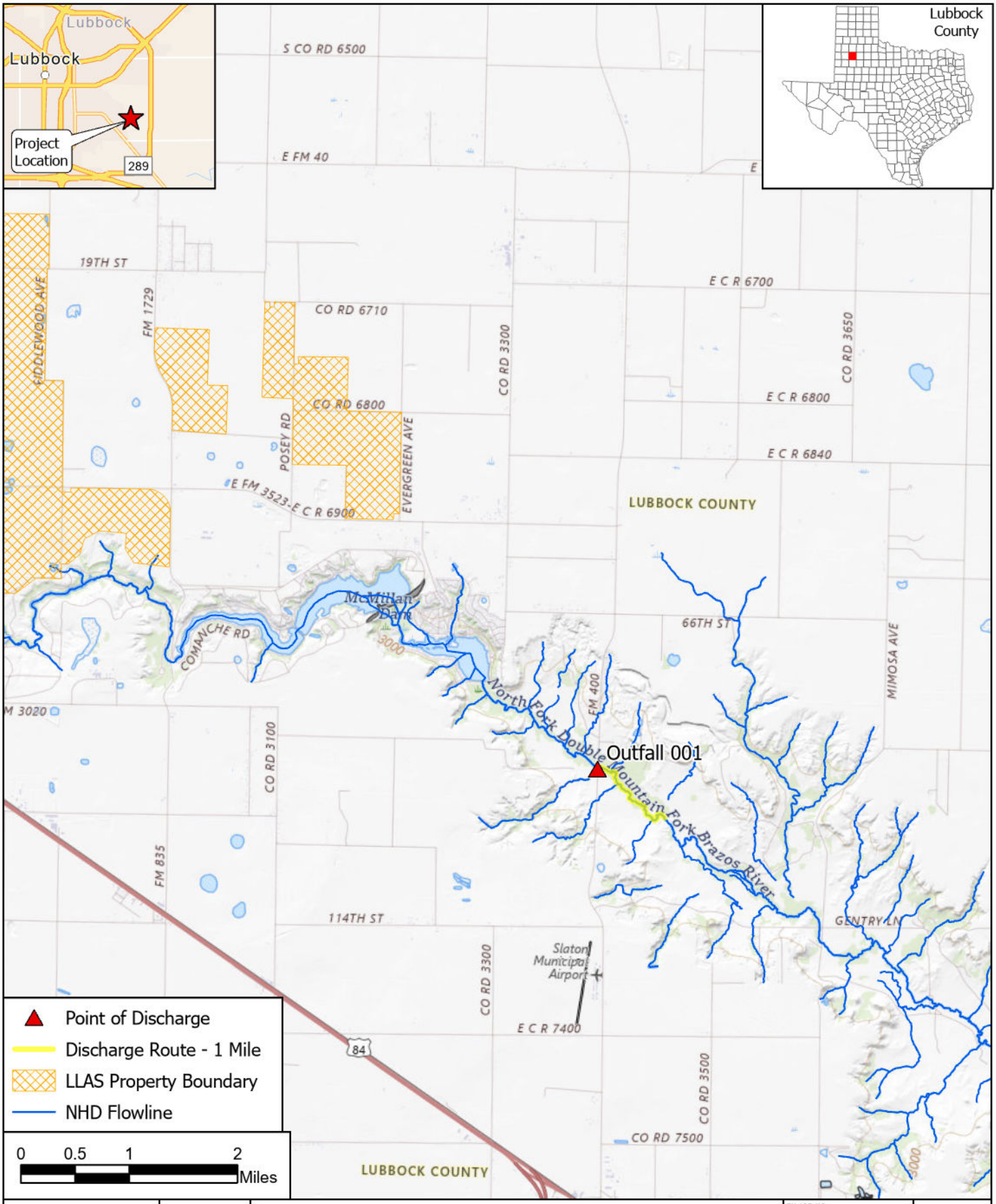

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TPDES Permit Amendment

SPIF USGS Topographic Map

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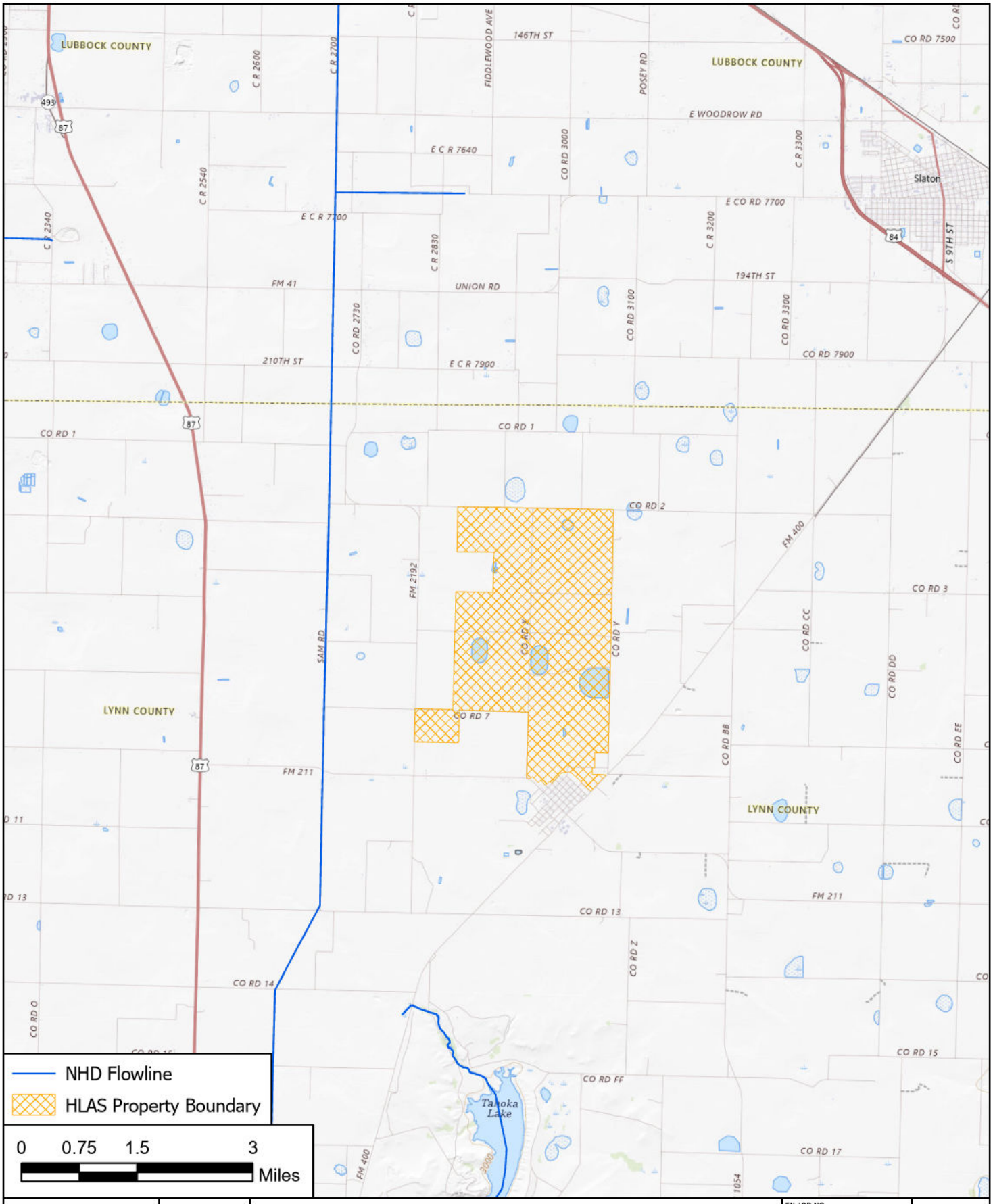

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NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

ATTACHMENT TR-1

Treatment Process Description

CITY OF LUBBOCK
SOUTHEAST WATER RECLAMATION PLANT

TPDES PERMIT APPLICATION

DESCRIPTION OF TREATMENT PROCESS

The Southeast Water Reclamation Plant (SEWRP) is designed for maximum flexibility of operation. The facilities include a preliminary treatment system, two separate Treatment Trains, interconnected effluent pumping stations, and a solids treatment system.

Preliminary Treatment System

Preliminary treatment processes consist of screening and grit removal. All raw wastewater flows are received at a combined headworks structure to two fine screens of the perforated plated type, and rake screen as backup. A screening conveyor and wash compactor is supplied for both fine screens. The screened effluent is degritted with two parallel vortex grit removal units. The screened and degritted flow is split between two liquid Treatment Trains (Train #3 and #4) and metered with Parshall flumes.

Treatment Trains

Treatment Train #3 is an activated sludge plant that is being upgraded to a biological nutrient removal (BNR) facility. The treatment units include two primary clarifiers, three activated sludge BNR basins, two secondary clarifiers, five cloth media filter units, and a low-pressure, high-output ultraviolet (UV) disinfection system. The BNR basins consist of pre-anoxic, anaerobic, anoxic, and oxic/ aerobic zones. The effluent from Treatment Train #3 is routed to effluent pump station 2 (EP2).

Treatment Train #4 is a BNR integrated fixed film activated sludge (IFAS) plant. The treatment units include three primary clarifiers, three activated sludge BNR basins, three secondary clarifiers, six cloth media filter units, and a low-pressure, high-output ultraviolet (UV) disinfection system. The BNR basins consist of pre-anoxic, anaerobic, anoxic, and oxic/ aerobic zones with IFAS. The effluent from Treatment Train #4 is routed to effluent pump station 1 (EP1) and EP2.

Solids Treatment System

Solids from the primary and secondary clarifiers of all Treatment Trains are digested in anaerobic digesters prior to dewatering. Primary clarifier solids are routed directly to the anaerobic digesters. The secondary clarifier solids are thickened by rotary drum thickeners prior to being routed to anaerobic digesters. Digested sludge is dewatered with centrifuges. The sludge treatment system includes anaerobic digesters, three rotary drum thickeners, and three centrifuges.

Dewatered sludge is hauled by the registered transporter and disposed of at city's permitted landfills, the City of Lubbock Landfill, Permit No. 69 or the West Texas Disposal Region Disposal Facility, Permit No. 2252, both in Lubbock County.

ATTACHMENT TR-2

Treatment Units

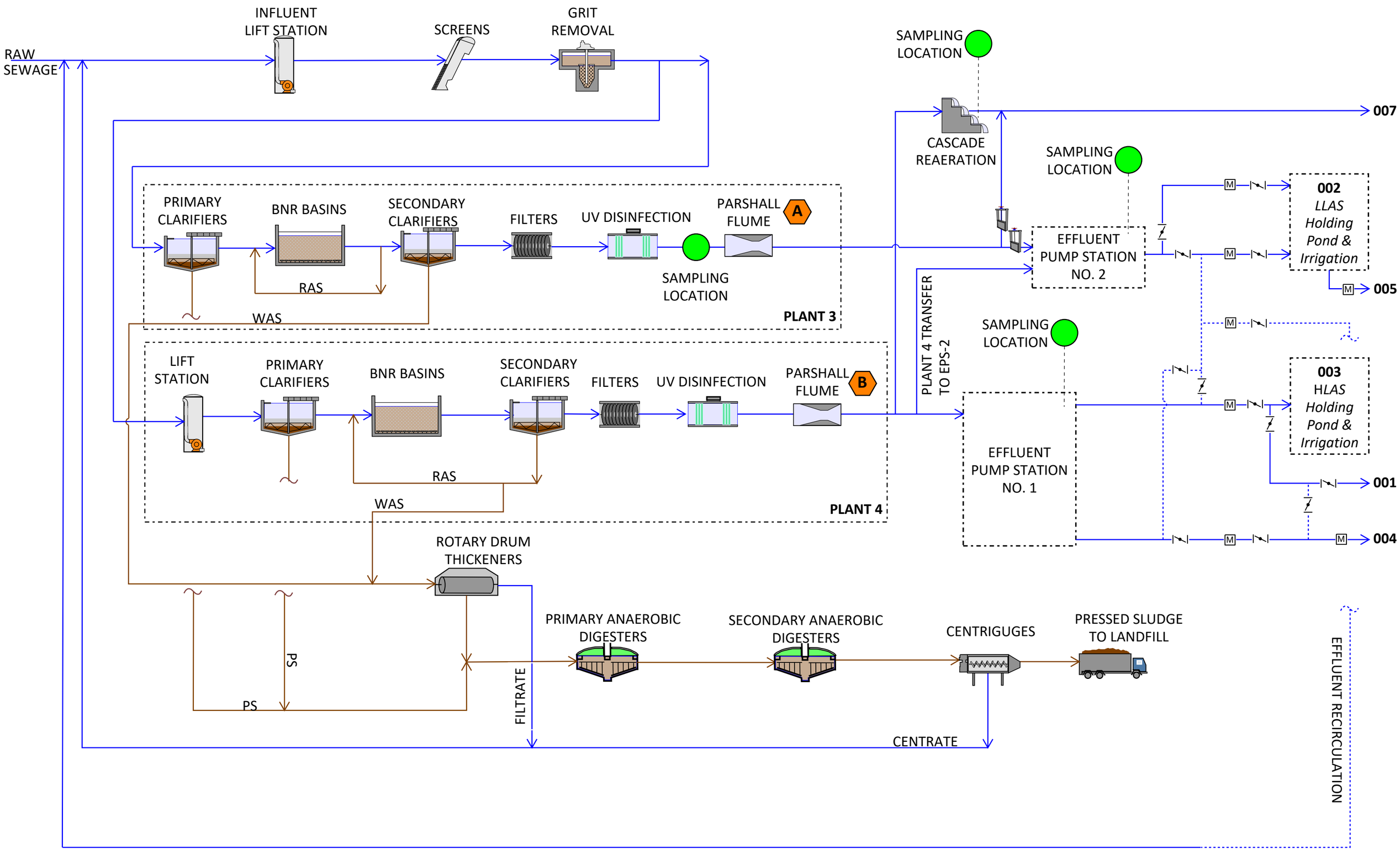
Table 1.0(1) – Treatment Units

Treatment Train	Unit	Quantity	Size
All	Rake Screen Fine Screen	1 2	¾” screen, 8’ channel. 7’-3” SWD ¼” screen, 8’ channel, 7’-3” SWD
All	Grit Chambers	2 (Circular)	20’ dia. x 8’
3	Primary Clarifiers	2 (Circular)	95’ dia., 8’ SWD
3	Biological Nutrient Removal Basins	3 (Rectangular)	Pre-Anoxic- 35’ x 27’-6” x 15’ SWD Anaerobic basin- 96’ x 27’-6” x 15’ SWD Anoxic basin- 44’ x 27’-6” x 15’ SWD Oxic basin- 265’ x 27’-6” x 15’ SWD
3	Secondary Clarifiers	2 (Circular)	115’ dia., 9’ SWD
3	Cloth Media Filter	5	15.5’ x 10.5’ x 12.14’
3	UV Disinfection Channels	2	10’ x 4’-1” x 5.37’ SWD
4	Primary Clarifiers	3 (Circular)	85’ dia., 11.96’ SWD
4	Biological Nutrient Removal Basins	3	Pre-Anoxic- 24’ x 18’-2” x 17.82’ SWD Anaerobic basin- 69’ x 29’ x 17.86’ SWD Anoxic basin- 87’ x 24’ x 17.31 SWD Oxic basin- 122’ x 89’ x 16.88’ SWD
S4	Secondary Clarifiers	3 (Circular)	110’ dia. x 13.96’
4	Cloth Media Filter	6	15.5’ x 10.5’ x 11.67’
4	UV Disinfection Channels	2	23.5’ x 4’-1” x 5.67’ SWD
All	Anaerobic Digesters	2 (Circular)	90’ dia. x 19.5’ SWD
All	Anaerobic Digester	1 (Circular)	120’ dia. x 32’ SWD

All	Anaerobic Digester	1 (Circular)	120’ dia. x 21.5’ SWD
All	Rotary Drum Thickeners	3	18.59’ x 5.90’ x 5.96’
All	Centrifuges	3	10’-8.25” x 7’- 6” x 7’-7.25”

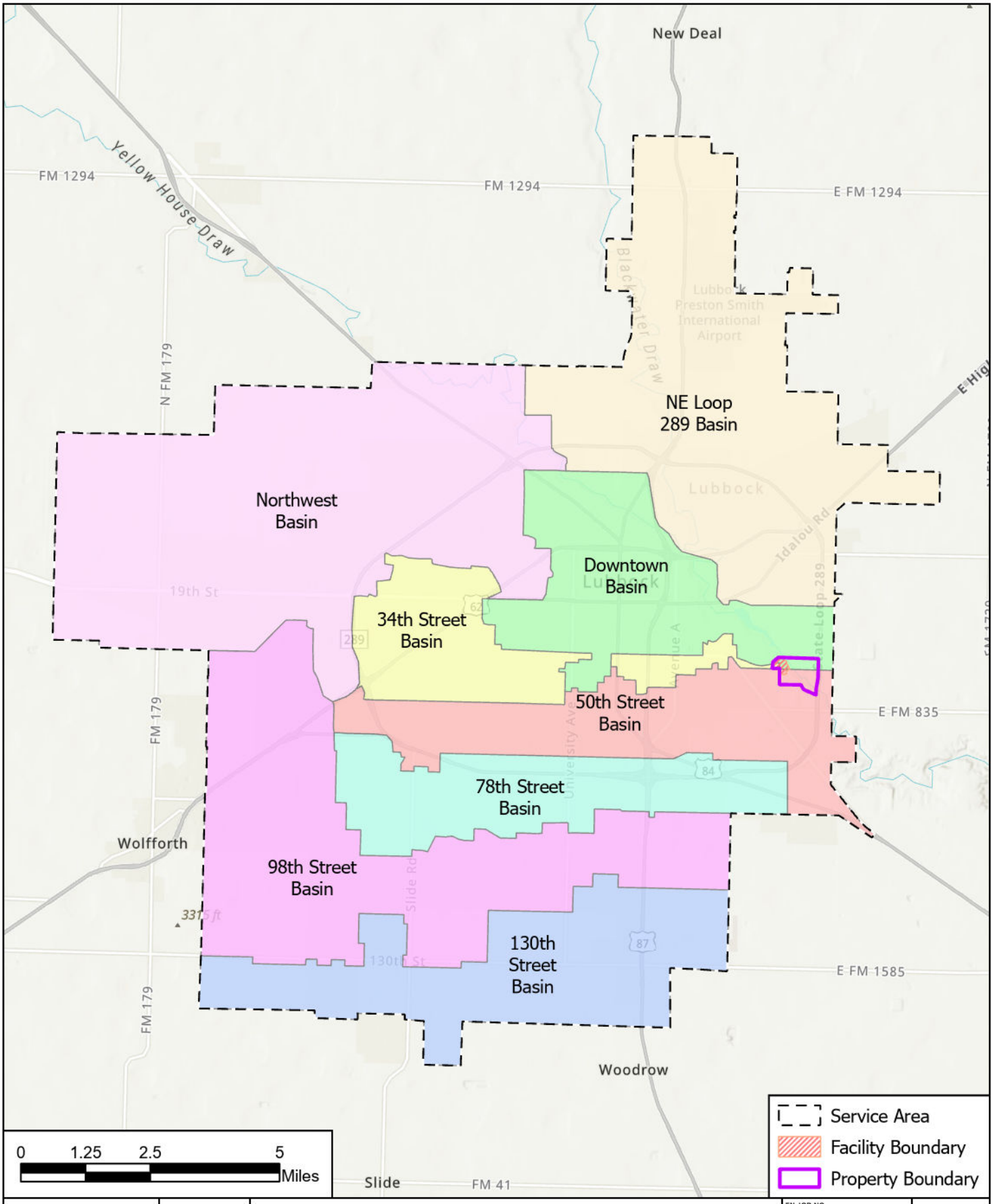
ATTACHMENT TR-3

Process Flow Diagrams


RAW SEWAGE
INFLUENT LIFT STATION
SCREENS
GRIT REMOVAL
SAMPLING LOCATION
CASCADE REAERATION
007
SAMPLING LOCATION
PRIMARY CLARIFIERS
BNR BASINS
SECONDARY CLARIFIERS
FILTERS
UV DISINFECTION
PARSHALL FLUME
A
RAS
WAS
SAMPLING LOCATION
PLANT 3
EFFLUENT PUMP STATION NO. 2
002
LLAS Holding Pond & Irrigation
005
PLANT 4 TRANSFER TO EPS-2
SAMPLING LOCATION
LIFT STATION
PRIMARY CLARIFIERS
BNR BASINS
SECONDARY CLARIFIERS
FILTERS
UV DISINFECTION
PARSHALL FLUME
B
RAS
WAS
PLANT 4
EFFLUENT PUMP STATION NO. 1
003
HLAS Holding Pond & Irrigation
001
004
ROTARY DRUM THICKENERS
PS
PS
FILTRATE
PRIMARY ANAEROBIC DIGESTERS
SECONDARY ANAEROBIC DIGESTERS
CENTRIFUGES
PRESSED SLUDGE TO LANDFILL
CENTRATE
EFFLUENT RECIRCULATION

ATTACHMENT TR-4

Site Drawing



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City of Lubbock

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Site Drawing

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NAD 1983 StatePlane Texas South Central FIPS 4204 Feet

ATTACHMENT TR-5

Closure Report

Mary H Gonzales

From: Brian Sierant <brian.sierant@tceq.texas.gov>
Sent: Tuesday, October 20, 2020 1:16 PM
To: Kimberly Buckley
Cc: Mary H Gonzales; Zoltan Fekete; Dan McCrummen
Subject: Approval of Final Closure Report for City of Lubbock Southeast Water Reclamation Plant No. 2

Follow Up Flag: Follow up
Flag Status: Completed

Hi all,

Please use this email as the approval for the final closure report and include for your records:

Approval of Closure Report for City of Lubbock Southeast Water Reclamation Plant No. 2 – TPDES Permit No. WQ0010353002, EPA I.D. No. TX0106071 (CN600130736; RN101609949)

We have completed our review of the closure report dated August 10, 2018. The report detailed the activities conducted for the Southeast Water Reclamation Plant No. 2. Our review of the final report indicated that the closure of the site was generally in compliance with the closure requirements.

Please Note: This approval letter is not an approval to cancel the Water Quality Permit. If you wish to cancel your permit, please submit via mail the form entitled ***Request to Cancel a TCEQ Water Quality Permit or Registration*** (TCEQ Form No. 20029) to the Water Quality Applications Review and Processing Team (MC 148).

If you have any comments or questions, please contact me at (512) 239-1375 or if by correspondence, include MC 150 in the letterhead address following my name.

Sincerely,

Brian Sierant, Biosolids Work Leader
brian.sierant@tceq.texas.gov
Texas Commission on Environmental Quality
Water Quality Division
Land Application Team (MC 150)
P.O. Box 13087
Austin, Texas 78711-3087
Ph: 512-239-1375

WARNING: This message was sent from outside the City of Lubbock's email system.
It could contain harmful attachments or links to harmful web pages.

ATTACHMENT TR-6

Justification of Permit Need

Permit Justification

The City of Lubbock (City) owns and operates two functioning liquid treatment plants at the facility, SEWRP No. 3 and SEWRP No. 4. SEWRP No. 1 was decommissioned and demolished in 1993, and the SEWRP No. 2 has been out-of-service since about 2008 and was formally decommissioned in 2018. Currently, SEWRP No. 4 is the only facility able to produce an effluent quality that can be discharged into the North Fork of the Double Mountain Fork. SEWRP No. 3 has a design capacity of 8.1 million gallons per day (MGD) annual average daily flow (AADF) and 18 MGD peak two-hour flow (P2HF) while SEWRP No. 4 has a design capacity of 16.4 MGD AADF and 29.9 MGD P2HF.

SEWRP No. 3 was designed for carbonaceous removal with conventional activated sludge, and it was not sized for nitrification (ammonia removal) or nutrient removal (total nitrogen and total phosphorus removal). Due to these limitations, SEWRP No. 3's effluent is currently limited to being pumped to multiple land application sites (Outfalls 002, 003, and 005). This amendment is to make improvements to SEWRP No. 3 to produce high quality effluent that can be discharged directly into the North Fork of the Double Mountain Fork of the Brazos River (Segment 1241A) via Outfall 007.

The SEWRP No. 3 BNR Improvements project aims to cost-effectively incorporate nitrification and BNR at the SEWRP No. 3 to produce a reclaimed effluent equivalent to SEWRP No. 4. In the near term, this provides the City flexibility to either send SEWRP No. 3 effluent to the land application sites as per current practice or discharge directly into the North Fork of the Double Mountain Fork of the Brazos River. In the long term, it allows all of the SEWRP effluent to augment Jim Bertram System Lake 7's firm yield as an indirect potable reuse water supply or be developed into a direct potable reuse water supply, thus supporting the objectives of the City's Strategic Water Supply Plan.

ATTACHMENT TR-7

Design Calculations

Design Calculations

Influent Flows and Loads

Influent Quality Characteristics - The average daily concentrations used for design purposes based on historical sampling results are provided in **Table 1**.

Table 1 – Influent Quality Characteristics

Parameter	**Average Daily Concentrations, mg/L**
Carbonaceous Biochemical Oxygen Demand ($CBOD_5$)	275
Total Suspended Solids (TSS)	340
Total Kjeldahl Nitrogen (TKN)	35

Influent Flow and Load Characteristics - The hydraulic and mass loading design of the facility mustensure that the facility will operate under the most extreme conditionsanticipated. The facility currently has two activated sludge treatment plants, Plant No. 3 and No. 4. The current improvements only involve Plant No. 3.

The peak two-hour flow conditions, which represent the most extreme hydraulic conditions, and the maximum month loadings, which represent the limiting criteria for meeting effluent permit criteria, were used for design (**Table 2**).

Table 2 – Design Flows and Loads

Parameter	**Units**	**Plant 3** *Proposed Improvements*	**Plant 4** *Existing*	**Total**
Design Flow	MGD	13.1	18.4	31.5
Peak 2-Hour Flow	MGD	18	36.9	54.9
Design $CBOD_5$ Load	lbs/d	23,855	48,900	72,755
Design TSS Load	lbs/d	32,895	67,435	100,330
Design TKN Load	lbs/d	3,045	6,220	9,265

Process Design – The treatment facility will be capable of treating a design flow of 31.5 MGD. The proposed improvements to Plant 3 will allow discharges from Plant 3 and 4 to be discharged to all of the existing outfalls.

Treatment Units

The units processes for are shown below in **Table 3.** Process design parameters showing compliance with 30 TAC 217 are provided in **Table 4** through **Table 12**. O

Table 3 – Unit Process Size

Treatment Train	Unit	Quantity	Size
All	Rake Screen	1	¾” screen, 8’ channel. 7’-3” SWD
All	Fine Screens	2	¼” screen, 8’ channel, 7’-3” SWD
All	Grit Chambers	2	20’ dia. x 8’
3	Primary Clarifiers	2	95’ dia., 8’ SWD
3	Biological Nutrient Removal Basins	3	Pre-Anoxic- 35’ x 27.5’ x 14.5’ SWD Anaerobic basin- 96’ x 27.5’ x 14.5’ SWD Anoxic basin- 44’ x 27.5’ x 14.5’ SWD Oxic basin- 265’ x 27.5’ x 14.5’ SWD
3	Secondary Clarifiers	2	115’ dia., 9’ SWD
3	Cloth Media Filter	5	15.5’ x 10.5’ x 12.14’
3	UV Disinfection Channels	2	10’ x 4’-1” x 5.37’ SWD
4	Primary Clarifiers	3	85’ dia., 11.96’ SWD
4	Biological Nutrient Removal Basins	3	Pre-Anoxic- 24’ x 18’-2” x 17.82’ SWD Anaerobic basin- 69’ x 29’ x 17.86’ SWD Anoxic basin- 87’ x 24’ x 17.31 SWD Oxic basin- 122’ x 89’ x 16.88’ SWD
S4	Secondary Clarifiers	3	110’ dia. x 13.96’ SWD
4	Cloth Media Filter	6	15.5’ x 10.5’ x 11.7’
4	UV Disinfection Channels	2	23.5’ x 4’-1” x 5.67’ SWD
All	Anaerobic Digesters	2	90’ dia. x 19.5’ SWD
All	Anaerobic Digester	1	120’ dia. x 32’ SWD
All	Anaerobic Digester	1	120’ dia. x 21.5’ SWD
All	Rotary Drum Thickeners	3	18.6’ x 5.9’ x 6’
All	Centrifuges	3	10.7’ x 7.5’ x 7.6’

Table 4 – Influent Pump Station

Parameter	Value	Units	Notes
Type	Submersible Pumps	[-]	Flygt Model NP3301.180
Number	8	[-]	
Motor power per unit	60	HP	
Drive Type	Variable Frequency Drive		
Capacity per pump	8.6	MGD	
Firm P2HF capacity	60.5	MGD	Firm capacity required
Total P2HF capacity	68.8	MGD	All pumps online

Table 5 – Fine Screens

Parameter	Value	Units	Notes
Screen No. 1 (backup)			**Constructed in 2007**
Type	Rake Screen	[-]	Vulcan Mensch
Number	1	[-]	Used as a backup screen
Effective opening	3/4	inch	18 mm
Capacity per unit	36	MGD	Per manufacturer
Screen Nos. 2 & 3			**Constructed in 2007**
Type	Perforated Plate Fine Screen	[-]	JWC Monster Finescreen Rehabbed in 2021
Number	2	[-]	
Effective opening	1/4	inch	6 mm
Capacity per unit	36	MGD	Per manufacturer
Overall Screen Capacity			
Firm P2HF capacity	72	MGD	Firm capacity required
Total P2HF capacity	108	MGD	

Table 6 – Grit Removal

Parameter	Value	Units	Notes
Grit Removal			**Constructed in 1991**
Type	270-degree Forced Vortex	[-]	Smith & Loveless, Inc.
Number	2	[-]	At least 2 units required
Diameter	20	ft	
Motor horsepower per unit	2	HP	
P2HF capacity per unit	36	MGD	Per manufacturer
Overall Grit Removal Capacity			
Firm P2HF capacity	36	MGD	
Total P2HF capacity	72	MGD	Total capacity acceptable

Table 7 – Primary Clarifiers

Parameter	Value	Units	Notes
Plant 3 Primary Clarifiers			**Constructed in 1969**
Type	Circular	[-]	Rehab in 1993
Number	2	[-]	
Diameter	95	ft	
Volume per unit	472,937	gal	
AADF surface loading limit per unit	7.1	MGD	at 1,000 gpd/sf
AADF minimum hydraulic residence time	6.3	MGD	at 108 min HRT
P2HF surface loading limit per unit	12.8	MGD	at 1,800 gpd/sf
P2HF minimum hydraulic residence time	12.6	MGD	at 54 min HRT
Total AADF capacity	12.6	MGD	Controlled by HRT
Total P2HF capacity	25.2 (1)	MGD	Controlled by HRT (1)
Plant 4 Primary Clarifiers			**Constructed in 1969**
Type	Circular	[-]	Rehab in 1993
Number	3	[-]	
Diameter	85	ft	
Volume per unit	509,343	gal	
AADF surface loading limit per unit	5.7	MGD	at 1,000 gpd/sf
AADF minimum hydraulic residence time	6.8	MGD	at 108 min HRT
P2HF surface loading limit per unit	10.2	MGD	at 1,800 gpd/sf
P2HF minimum hydraulic residence time	13.6	MGD	at 54 min HRT
Total AADF capacity	17.0	MGD	Controlled by HRT
Total P2HF capacity	30.6	MGD	Controlled by HRT (1)
(1) 30 TAC §217.129 also requires weir loadings to be less than 30,000 gpd/lf at P2HF; however, industry standards do not consider weir loading to be a good indicator of process performance (WEF MOP8).			

Table 8 – Activated Sludge Basins

Parameter	Value	Units	Notes
Plant 3 BNR Process			***Proposed Improvements***
Type	Johannesburg	[-]	
Number	3	[-]	
Design Temperature	16	°C	Min. week temperature
Design Aerobic SRT	10	d	
Total Volume per Basin	1.31	MG	
Pre-Anoxic	*0.10*	MG	
Anaerobic	*0.29*	MG	
Anoxic	*0.13*	MG	
Oxic Zone	*0.79*	MG	
Organic Loading Rate	24	ppd/kcf	< 35 ppd/kcf per §217.164(a)(5) Assumes PC removes 30% BOD5
Plant 4 BNR Process			***Improvements in 2007***
Type	Johannesburg	[-]	
Number	3	[-]	2 passes per basin
Design Temperature	16	°C	Min. week temperature
Design Aerobic SRT	10	d	
Total Volume per Basin	1.91	MG	
Pre-Anoxic	*0.06*	MG	
Anaerobic	*0.26*	MG	
Anoxic	*0.27*	MG	
Oxic Zone	*1.32*	MG	
Organic Loading Rate	34	ppd/kcf	< 35 ppd/kcf per §217.164(a)(5) Assumes PC removes 30% BOD5
P2HF Capacity	19.4 – 21.8	MGD	

Table 9 – Secondary Clarifiers

Parameter	Value	Units	Notes
Plant 3 Secondary Clarifiers			***Improvements in 2021***
Type	Circular with Hydraulic Suction Header	[-]	
Number	2	[-]	
Diameter	115	ft	
Side water depth	9.8	ft	> 10 ft req. per 30 TAC §217.152
Surface area per clarifier	10,387	ft^2	
Volume per clarifier	761,401	gal	
P2HF surface loading per clarifier	12.5	MGD	at 1,200 gpd/sf
P2HF minimum HRT	10.2	MGD	at 108 min HRT
Total P2HF capacity	20.3	MGD	
Plant 4 Secondary Clarifiers			***Improvements in 2007***
Type	Circular with Hydraulic Suction Header	[-]	Replaced in 2021
Number	3	[-]	
Diameter	110	ft	
Side water depth	14	ft	> 10 ft req. per 30 TAC §217.152
Surface area per clarifier	9,503	ft^2	
Volume per clarifier	995,187	gal	
P2HF surface loading per clarifier	11.4	MGD	at 1,200 gpd/sf
P2HF minimum HRT	13.3	MGD	at 108 min HRT
Total P2HF capacity	34.2	MGD	

Table 10 – Tertiary Filters

Parameter	Value	Units	Notes
Plant 3 Filters			**Installed in 2007**
Type	Cloth Media	[-]	Aqua Aerobics
Number of filters	5	[-]	At least 2 units required
Media type	Cloth	[-]	
Surface area per filter	645	ft^2	
P2HF design loading per filter	4.97	gpm/ft^2	< 6.5 gpm/ft^2 req. per 30 TAC §217.193
Firm P2HF capacity	18.5	MGD	
Plant 4 Filters			**Installed in 2007**
Type	Cloth Media	[-]	Aqua Aerobics
Number of filters	6	[-]	At least 2 units required
Media type	Cloth	[-]	
Surface area per filter	645	ft^2	
P2HF design loading per filter	6.5	gpm/ft^2	< 6.5 gpm/ft^2 req. per 30 TAC §217.193
Firm P2HF capacity	30.2	MGD	

Table 11 – Chemical Storage and Feed

Parameter	Value	Units	Notes
Plant 3			**Proposed**
Chemical Name	Alum (Aluminum Sulfate)	[-]	
Concentration (% by wt.)	45-50	%	
Type of storage tanks	Cross-linked polyethylene	[-]	
Number of storage tanks	2	[-]	
Capacity per storage tank	> 4,900	Gal	
Type of feed pumps	2	[-]	
Number of feed pumps	Peristaltic	[-]	
Capacity per feed pump	35	gph	
Plant 4			**Installed in 2007**
Chemical Name	Alum (Aluminum Sulfate)	[-]	
Concentration (% by wt.)	45-50	%	
Type of storage tanks	Cross-linked polyethylene	[-]	
Number of storage tanks	2	[-]	
Capacity per storage tank	7,500	Gal	
Type of feed pumps	4	[-]	
Number of feed pumps	Rotary Gear	[-]	
Capacity per feed pump	55	gph	

Table 12 – UV Disinfection

Parameter	Value	Units	Notes
Plant 3 UV Equipment			**Installed in 2007**
Type	Low-Pressure High-Output	[-]	Ozonia North America
Lamp configuration	Vertical	[-]	
No. channels	2	[-]	
No. of UV modules per channel	4	[-]	
Lamps per UV module	40	[-]	
Minimum UV calculated dosage	30	J/m^2	
P2HF Capacity	23.1	MGD	Per bioassay procedure
Plant 4 UV Equipment			**Installed in 2007**
Type	Low-Pressure High-Output	[-]	Ozonia North America
Lamp configuration	Vertical	[-]	
No. channels	2	[-]	
No. of UV modules per channel	6	[-]	
Lamps per UV module	40	[-]	
Minimum UV calculated dosage	30	mJ/cm^2	
P2HF Capacity	29.9	MGD	Per bioassay procedure

Air Requirements

The proposed Plant 3 BNR improvements activated sludge air supply requirements were determined under maximum day loading conditions and minimum week temperatures. Fine bubble diffusers with a submergence of 14.5 ft and clean water oxygen transfer efficiencies (CWOTE) of 2% per ft of submergence were used for the basis of design. The kinetic model included an unaerated selector zone capable of denitrification that accounted for 40% of the total activated sludge basin volume. Four blowers (3 duty, 1 standby), each with a maximum air supply capacity of 4,775 scfm, were included in the design. The firm capacity of the blowers was designed to fulfill the maximum day oxygen requirements as opposed to the maximum month oxygen requirements that are implied within 30 TAC §217.155(b)(2)(C).

Table 13 – Plant 3 Air Supply

Parameter	**TCEQ Requires**	**Plant 3** *Proposed*
Minimum aeration for mixing (SCFM / sq. ft.)	> 0.12	0.12
Oxygen demand supply (lb/day)	33,120	37,100
Air requirement (SCFM)	13,090	14,325 (firm)

Facility design features

A. *Emergency Power Requirements*

In accordance with 30 TAC § 217.36 and due to the number and duration of power outages that have occurred in the past, the treatment facility must incorporate an on-site automatically starting generator capable of continuously operating all critical wastewater treatment system units. The fuel tank must be sized for a run time greater than the longest power outage in the power records. This generator will provide sufficient power for the following units:

1. Four Influent Lift Station Pumps
2. Two Fine Screens (one for Trains 1/2 and one for Train 3)
3. Two Activated Sludge Blowers (one for Trains 1/2 and one for Train 3)
4. Four Final Clarifier Sludge Scrapers (two for Trains 1/2 and two for Train 3)
5. Four Return Activated Sludge Pumps (two for Trains 1/2 and two for Train 3)
6. Two Waste Activated Sludge Pumps (one for Trains 1/2 and one for Train 3)
7. Chlorination and Dechlorination Injection facilities (Trains 1/2)
8. Two Filters (Train 3)
9. Two UV trains (Train 3)
10. Effluent Metering Station (one for Trains 1/2 and one for Train 3)
11. Plant Service Water System
12. One Sludge Holding Tank Blower
13. One Dewatering Belt Presses
14. SCADA for alarm notification
15. Lighting Panels and Control Equipment

An automatic transfer switch will be included to transfer electrical loads to the generator during an outage. In accordance with 30 TAC § 217.37, the disinfection system will automatically restart during a power outage and upon transfer back to the main power source.

B. *Alarm Features*

The facility will be equipped with a Supervisory Control and Data Acquisition (SCADA) system to monitor the operation of all critical treatment units. The alarm feature will include paging system that will send out pages and texts to all of the operators during an event of emergency. The alarm generated in the alarm and events server will send the alarm to another server that is hosting WIN911. WIN911 will then send the alarm to pagers that are carried by all the operators and designated on-call cell phones. These alarms will also show up on the HMI screens in the utility dispatched screen that will be manned 24/7. The on-call operators will also have on-call laptops that securely connects to the HMI screens to control and monitor the systems along with acknowledging alarms. In events of complete loss of communications due to power outage multiple alarms would be sent for loss of communication to all the equipment at the plant and to all of the operator's pagers and the on-call cell phones. Depending on the alarm severity and classification

the system will page or text as many wastewater operators. The alarm will keep ringing until someone logs into the system and acknowledges it.

C. *Design Features for Reliability and Operating Flexibility*

1. Influent lift station: The influent lift station includes two separate wet wells with four submersible pumps in each sized to meet peak flow pumping capacity with largest pumps out of service. The pumps are equipped with VFD's to pace pumped flow rate with the influent flow rate. Level sensors automatically start, stop and control the pumps based on influent flows and rising and falling wet well levels. High wet well level will result in an alarm condition.
2. Fine Screens: The existing headworks structure includes two fine screens with 0.25" openings, each sized to handle 36 MGD. The facility also includes a stanby mechanical rake screen with 72 MGD capacity.
3. Grit chamber: The existing headworks structure includes two grit chambers, each sized to handle 36 MGD. Both the grit chambers have individual grit pumps and grit processing units.
4. Activated sludge basins: The Plant 3 activated sludge process is proposed to be upgraded to a BNR configuration to allow stable biological phosphorus removal. The Plant BNR process will be similar in configuration to Plant 4's existing BNR process. The Plant 3 improvements will include new fine bubble diffusers for the aeration zone while Plant 4's existing IFAS aeration zones utilize coarse bubble diffusers. Floating type mixers will be used in the selector zones (unaerated zones) for both Plant 3 and 4.
5. Blowers: The proposed Plant 3 improvements will include four multi-stage centrifugal blowers with 3 duty and 1 standby. The existing Plant 4 blowers include two single-stage geared turbo blowers and one multistage centrifugal blower.
6. Clarifiers: The existing Plant 3 and 4 clarifiers utilize suction-type sludge removal mechanisms.
7. Filters: The existing Plant 3 and 4 filters use the cloth media, outside-in filter type. Each plant has a standby unit.
8. UV Disinfection: The existing Plant 3 and 4 UV disinfection systems utilize vertical orientation, low pressure, high intensity lamps that are flow paced.

D. *Overflow prevention*

The following design features will be used to prevent the overflow of wastewater from treatment units.

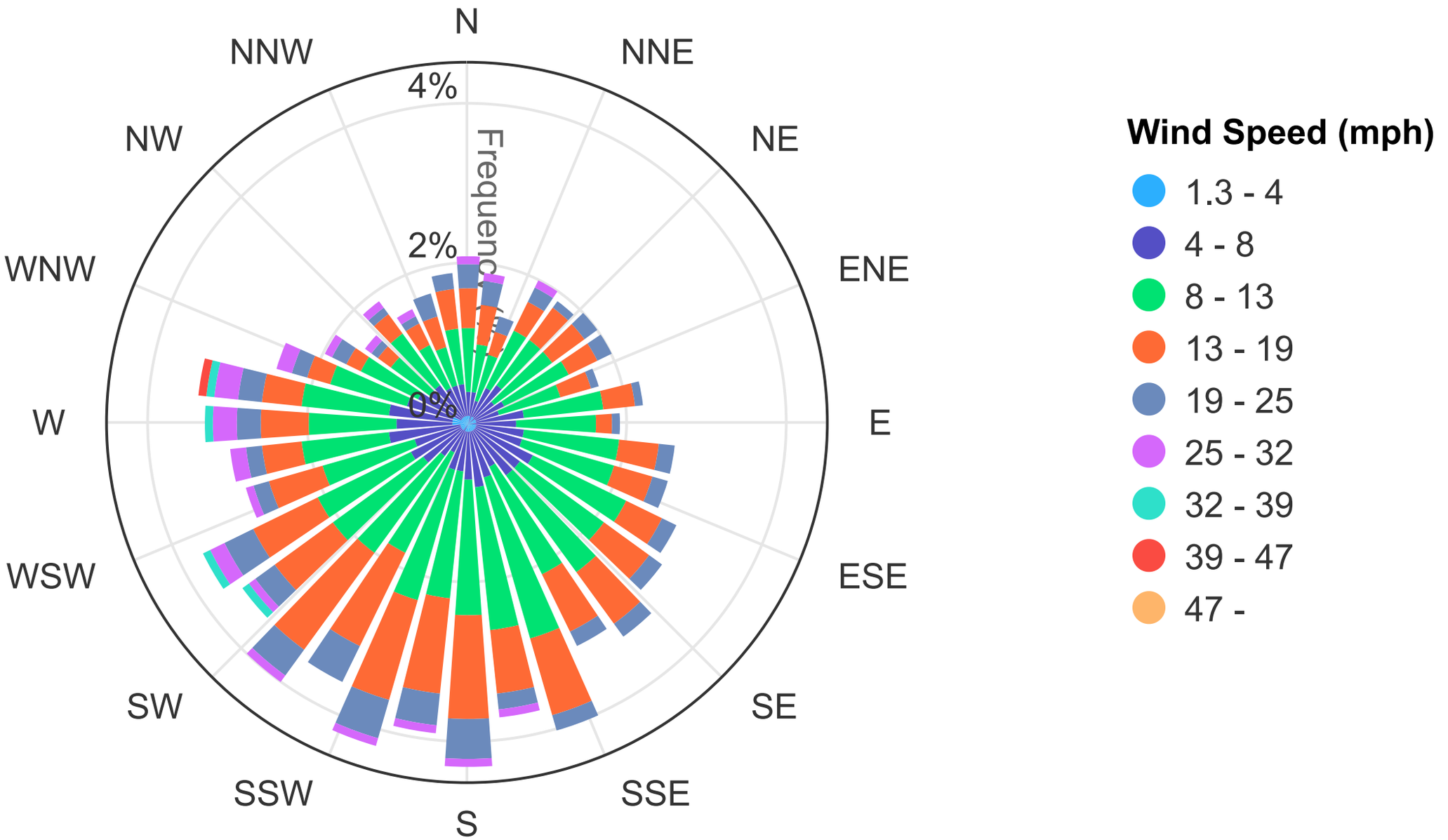
1. The influent lift station has a firm capacity to pump peak flow with the largest single pump out of service.
2. The facility hydraulic design, including piping, channels, weirs, troughs and other features, will allow the 2-hour peak flow to pass through the facility without exceeding minimum freeboard requirements with any single treatment unit out of service.
3. The facility includes two independent liquid treatment plants, each with internal redundancies.

ATTACHMENT TR-8

Wind Rose

LUBBOCK INTL AP (TX) Wind Rose

Jan. 1, 2023 - Feb. 26, 2024
Sub-Interval: Jan. 1 - Dec. 31, 0 - 23



Click and drag to zoom

ATTACHMENT TR-9

Sewage Sludge Solids

Management Plan

Sludge Management Plan

Influent Design Flow = 9.5 MGD AADF

Influent BOD Concentration = 185 mg/L

Aeration Basin MLSS: 3,000 – 4,000 mg/L

Table 1 - Maximum Month Sludge Production

Parameter	**100% flow**	**75% flow**	**50% flow**	**25% flow**
Pounds Influent BOD_5/day	72,755	54,566	36,378	18,189
Pounds of dry sludge to anaerobic digester/day	50,956	38,217	25,478	12,739
Pounds of dewatered dry sludge produced/day	31,847	23,885	15,924	7,962
Pounds of wet sludge produced/day at 0.8%	3,980,900	2,985,675	1,990,450	995,225
Gallons of wet sludge produced/day at 0.8%	477,326	357,995	238,663	119,332

Waste activated sludge from Plant 3 and 4 is thickened with three rotary drum thickeners and combined with unthickened primary sludge at the anaerobic digesters. Digested sludge overflows to two sludge storage tanks, where it is pumped to three centrifuges for dewatering.

Table 2 – Centrifuge Loading

Loading criteria	**100% flow**	**75% flow**	**50% flow**	**25% flow**
Solids loading, lbs/hr	6,369	4,777	3,185	1,592
Hydraulic loading, gpm	509	382	255	127

[a] based on 5 days/week, 7 hours/day operation

Solids from the digested sludge holding tanks will be dewatered to a percent solids concentration ranging from 15% to 25% by centrifuges. The dewatered solids will be transported and disposed at City of Lubbock Landfill (MSW 69).

ATTACHMENT TR-10

Land Application Site Crops

Engineers and Soil Scientists

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Crop Management Plan for the City of Lubbock's Land Application Site (LLAS)

Date Submitted: **August 24, 2021**

Prepared For: City of Lubbock
Lubbock, Texas

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1. Introduction

This document is an update to the documents of the same titles dated 6/9/06, 9/21/09, 8/24/11, 7/29/13, and 7/27/17 and details the planned crop management strategy at the Lubbock Land Application Site (LLAS). The reduction in effluent application at the LLAS over time allows for the consideration of these crop management strategy changes since plots can now be temporarily removed from the effluent application program and cultural practices (tillage, stand renovation, crop species changes, etc.) implemented. The continued primary objective of the land application system is to minimize movement of nitrogen out of the crop root zone (and, thus, possibly into the groundwater) by meeting weekly crop water and nitrogen needs and optimizing crop water and nitrogen uptake. This is needed to complement the groundwater remediation program at the LLAS that the City of Lubbock manages. The Water Balance Model will continue to be used to manage weekly effluent applications to each plot at the LLAS (no application recommendation will exceed permit limits). The goals of the changes in the LLAS crop management strategy detailed in this document are to improve: 1) the harvesting of crop vegetation and 2) the crop stands at the LLAS. Meeting these goals will limit the potential of any migration of nitrogen to the groundwater.

2. Background

The changes being proposed are based on several years experience with assisting in management of the LLAS. Since the crop management program directly impacts the groundwater remediation program at the LLAS, it is imperative that crop management promote optimum water and nutrient uptake. The proposed crop strategy changes are designed to improve the harvest of crop vegetation and promote a cyclical pattern of crop growth, harvest, and re-growth. This pattern will optimize crop water and nutrient uptake, which will complement the groundwater remediation plan.

3. Crop Management Plan

The crop management strategy detailed herein consists of planting cool and/or warm season crops on each plot coupled with harvesting each crop. This crop management strategy will be implemented for a 5-year period and then re-evaluated.

Figure 3.1 defines four (4) crop management Areas (Areas 1 – 4) for the LLAS. Table 3.1 below lists the plots that will be managed for the 2021-22, 2022-23, 2023-24, and 2024-25 cropping years (these divisions will be re-evaluated and could possibly be modified after each successive cropping year). The acreages within the three crop management strategies will change slightly each year.

Table 3.1. Renovation and Haying Plots at LLAS for the 2021-2025 Cropping Years.[1]

Cropping Year	Crop Management	Plots (Area or Areas)	Acreage
			----total----
2021-2022	Renovation	1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 34A, 34B, 34C, & 35 (Areas 1, 2, 3, 4)	~2,438
2022-2023	Renovation	1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 34A, 34B, 34C, & 35 (Areas 1, 2, 3, 4)	~2,438
2023-2024	Renovation	1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 34A, 34B, 34C, & 35 (Areas 1, 2, 3, 4)	~2,438
2024-2025	Renovation	1, 2, 3, 5, 6, 7, 8, 9, 10, 13, 15, 16, 17, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 34A, 34B, 34C, & 35 (Areas 1, 2, 3, 4)	~2,438

(1) These groups will be re-evaluated and could possibly be changed after each consecutive cropping year.

Renovation plots will either have the current stands reseeded or will have new crop species (such as Alfalfa, Cotton, San Jose Wheatgrass, Italian Ryegrass, Bermudagrass, Haygrazer, Small Grain, etc.) planted during the renovation process. The renovation of crop stands will improve the uniformity and quality of the vegetation in the plots. The changes in crop species will enhance the diversity of crop species at LLAS and, thus, increase the crop water and nutrient needs during certain parts of the year.

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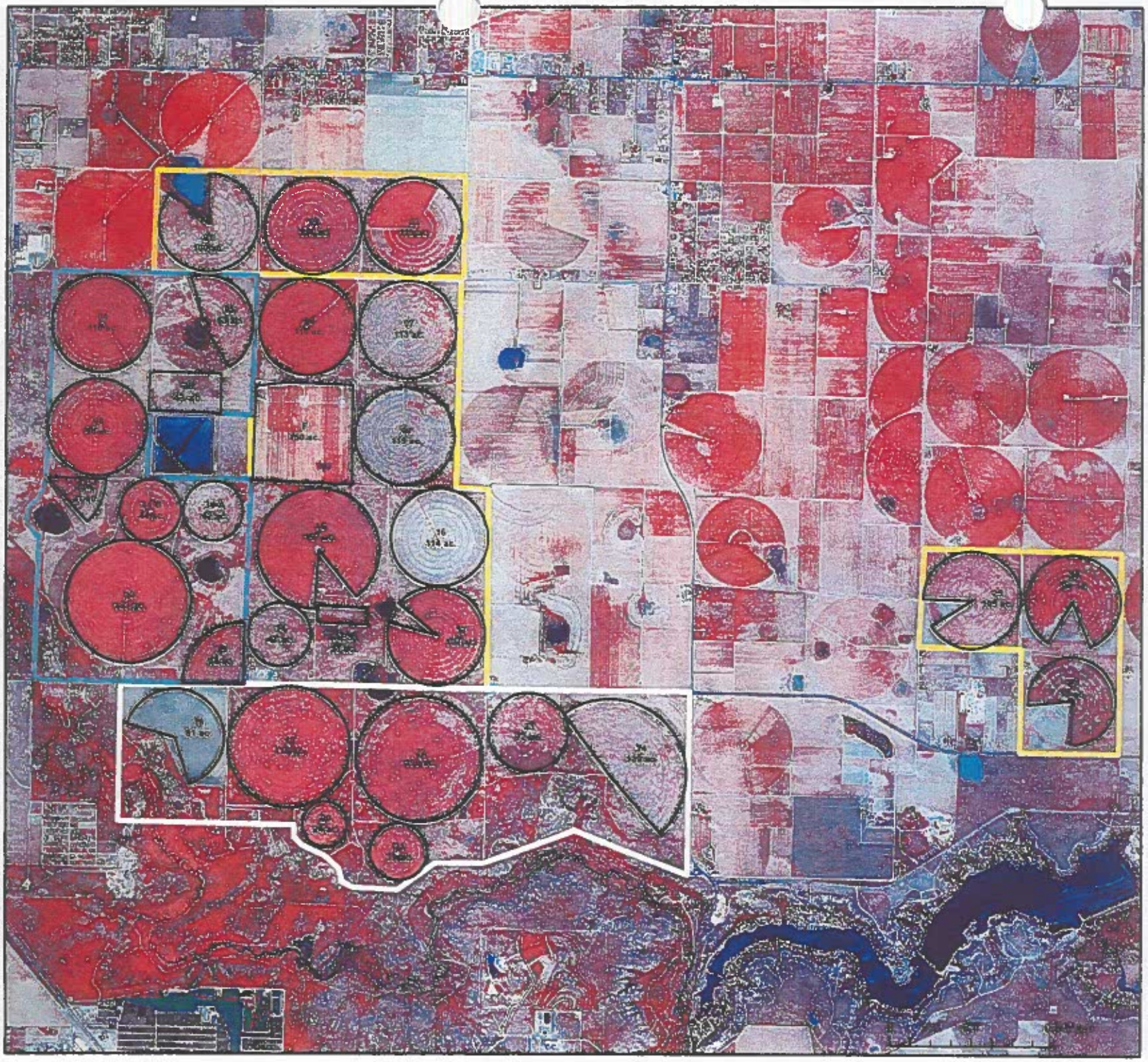
Figure 3.1

City of Lubbock- LLAS
Lubbock Co., TX



Legend
Areas
1
2
3
4

Drawn By: Julie Peele
Reviewed By: Chris Mosley
Date: 8/22/11

Specific additional details of these strategies are listed below.

1) During renovation activities, crops (such as Alfalfa, Cotton, Bermudagrass, Haygrazer, Small Grain, etc.) will be planted. Occasionally the plots will be fallowed for a season.

2) Crop nitrogen applications (via effluent) will be based on Texas Cooperative Extension (or other appropriate references) recommendations.

3) Yield records will continue to be kept and reported as part of the water and nutrient balance supporting data. Yield records include forage/lint/grain yields (dry tons or bushels) for each cropping event for each plot and forage tissue analyses to support nutrient balance computations.

4) Forage assessments will be made on a routine monthly basis for each plot. These data will be recorded and retained to support water and nutrient balance computations.

Crop Management Plan – 2021 - 2025 Plan

The following table details the 2021-25 current crops for each field in each management area (Table 3.2). The crops to be planted in the plots scheduled for renovation in each year will be based on the ease of establishment and performance of the crops planted the previous year. This re-evaluation each year will allow for the identification and potential selection of higher performing (yield and nutrient uptake) crop species at the LLAS for planting on plots scheduled for future renovation. The crops to be planted in the plots scheduled for renovation each year will continue to be provided to the TCEQ each year after this evaluation process by May 31 (include with the LLAS Groundwater Report).

Table 3.2. Current 2021-22 Crops for Each Field at LLAS.

Plot	Current/Planned Crop
1	Small Grain
2	Small Grain
3	Small Grain
5	Haygrazer
6	Small Grain
7	Small Grain
8	Haygrazer
9	Small Grain
10	Fallow
13	Haygrazer
15	Small Grain
16	Small Grain
17	Small Grain
19	Haygrazer
20	Haygrazer
21	Small Grain
22	Small Grain/Haygrazer
23	Haygrazer
24	Haygrazer
25	Small Grain
26	Small Grain
27	Small Grain
28	Cotton
34A	Haygrazer
34B	Haygrazer
34C	Fallow
35	Haygrazer

The range of hay yields and associated nitrogen (N) uptake values (based on crop tissue analyses) are detailed in Table 3.3 below. The typical annual N application rates (via effluent) for the crops in these plots range from approximately 70 – 100 lbs N/ac/yr based on the Water Balance Model (a base N application goal of 160 lbs N/ac/yr that is discounted for available soil N in annual soil tests). The crop yield and N uptake data collected demonstrates that a substantial portion of the annual crop N application rate can be removed with annual harvesting.

Table 3.3. The Range of Yields and Nitrogen Uptake for the 2005-2021 Hay Harvests at LLAS.

Crop	Yield	N Uptake
	---tons/ac---	--lbs N/ac--
Small grain/haygrazer	1.5 – 7.3	46 – 166

3.2 Crop Management Plan Renovation Strategy

The goal of the crop renovation is to improve crop stands at the LLAS. Most plots at the LLAS now contain a combination of warm and cool season crop species. Haygrazer and small grain have recently proven to perform at a high-level productivity and will continue to be used at the LLAS.

3.3 Crop Management Plan and Soil Sodium Adsorption Ratio (SAR)

The proposed crops in the Crop Plan are tolerant to the soil SAR levels found at LLAS. However, the crops will not likely reduce the soil SAR levels by themselves through sodium uptake.

As indicated in previous reports regarding soil SAR (*Assessment of Soil Sodium Adsorption Ratio (SAR) Limit for the City of Lubbock's Land Application Site (LLAS) dated 9/5/01; Soil Pit Evaluations and Soil Infiltration Tests at the Lubbock Land Application Site (LLAS) and Hancock Land Application Site (HLAS) dated 7/26/04; Soil Sodium Adsorption Ratio (SAR) Management Plan for the Lubbock Land Application Site (LLAS) and the Hancock Land Application Site (HLAS) dated 11/23/04*), the primary reason for the current soil SAR levels is the SAR of the source of water for the City of Lubbock. As long as the source water for the City of Lubbock remains the same, the soil SAR will likely change very little, if any. However, as indicated in previous soil SAR reports, the SAR of the source water has decreased slightly over the last several years due to the blending of Lake Meredith water with groundwater by the City of Lubbock.

4. Water Balance Model Simulation of the LLAS Crop Management Plan

The crop management strategy detailed above was simulated using the Water Balance Model to ensure that the implementation of this strategy could work within the

infrastructure and capabilities of the LLAS. In addition to the details listed above, the following assumptions were made for the simulation.

- Harvesting operations were simulated for 2 weeks per plot per harvest event (termination of effluent application, drying, cutting and removal), i.e., no effluent application occurs during a harvesting operation. Two harvesting operations were simulated on each plot.

- Harvesting was simulated each week (approximately 300 acres per week) beginning in mid-March and ending in mid-November.

- Average annual precipitation for LLAS was used in the simulation.

- Soil analysis data, effluent analysis data, inflow from the wastewater treatment plant, flow to Xcel, flow to the Hancock Land Application Site (HLAS), and effluent applications to contract land (Plots A – G at LLAS and 210 land) were assumed to be identical to the previous year.

- The initial LLAS reservoir level was assumed to be about 90% of capacity (worst case scenario).

5. Water Balance Model Simulation Results

The Water Balance Model simulation indicated that the crop management strategy detailed above could be accomplished within the infrastructure and capabilities of the LLAS. The model results substantiated that the crop nitrogen needs were met, the reservoir level was controlled throughout the year, and the ending reservoir level was less than the initial reservoir level (Figure 5.1). Table 5.1 indicates the estimated ranges of effluent to be applied to the different crop and crop management strategy combinations for the simulation. The total amount of effluent needed for crop production is approximately 5.0 MGD.

Figure 5.1 Comparison of Monthly Effluent Applications at the LLAS with Average Precipitation Year

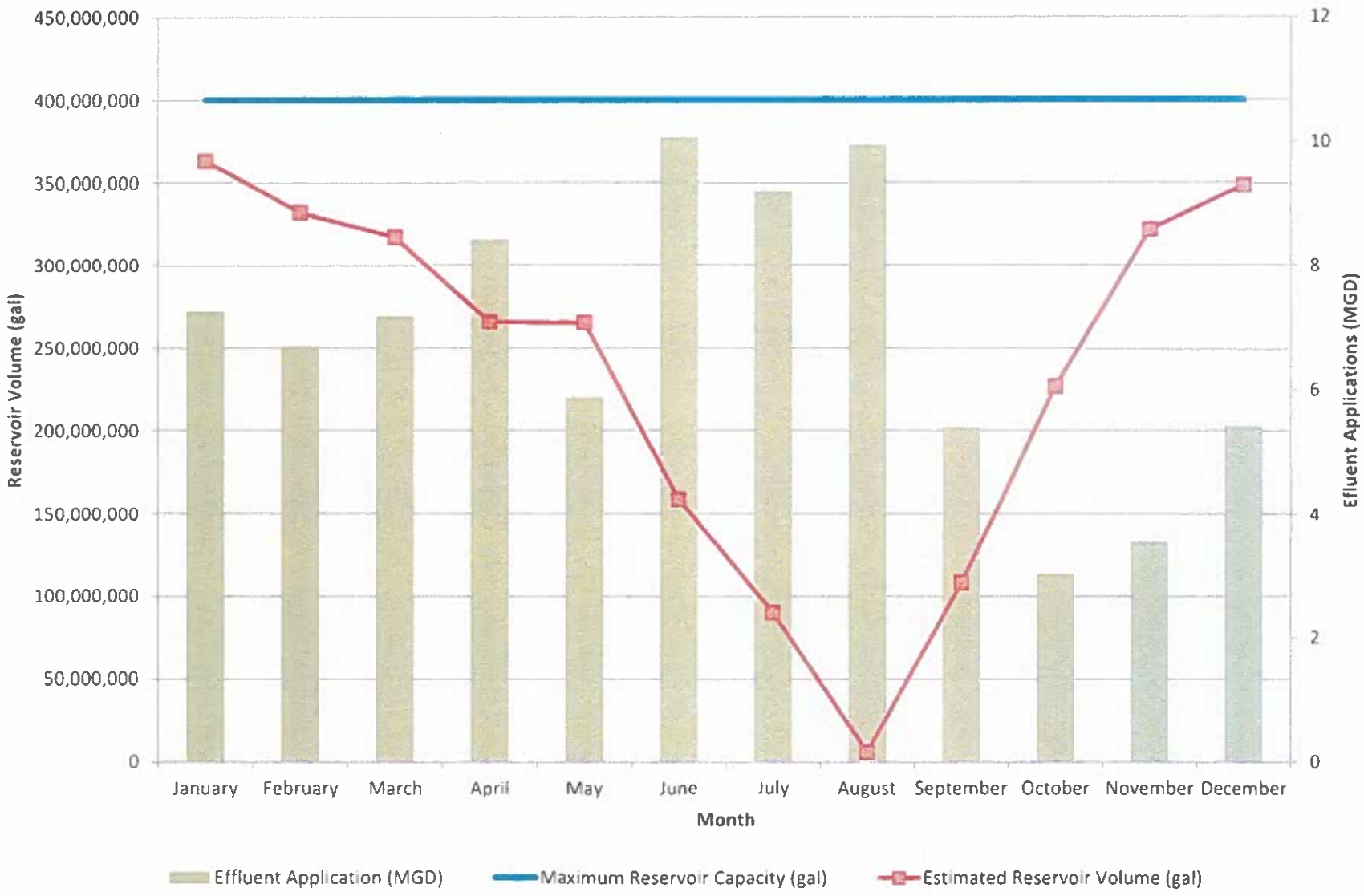


Table 5.1. Estimated Effluent to be Applied to Crop Management Combinations at LLAS.[1]

Crop Management	Effluent Applied	Nitrogen Applied
	---in/ac---	---lbs N/ac---
Haygrazer/Small Grain	11-45	70-100
Cotton	12-20	40-70
Alfalfa	33-50	150-200

(1) Estimated values only. Actual values will be based on the Water Balance Model.

5.1 Crop Management Plan and the Water Balance Model

The Water Balance Model will continue to be used to govern wastewater applications to all crops. The primary goal of the Water Balance Model is to minimize water and nitrogen movement below the root zone. The model takes into account the fact that crop growth cycles fluctuate throughout the year. Wastewater applications are reduced during cycles of low crop growth and are based on crop evapotranspiration, crop nutrient needs, wastewater nutrient concentrations, climate, and soil nutrient concentrations. Therefore, wastewater will be applied at lower rates during times of lower crop water and nutrient need. As detailed above, this is based on the crop growth cycle. An example of crop growth curves used in the Water Balance Model to predict crop water and N needs is displayed in Figure 5.2a-b. Additionally, an example of the weekly predicted crop N needs for Small Grain and Haygrazer (based on the crop growth curve) are in Figure 5.3a-b. These examples demonstrate that wastewater application recommendations cycle throughout the year in correspondence with crop growth cycles.

6. Conclusions

Careful management of the crop forage at the LLAS will be required to successfully implement the strategy detailed herein. This proposed crop management strategy should be followed to continue to complement the groundwater remediation program.

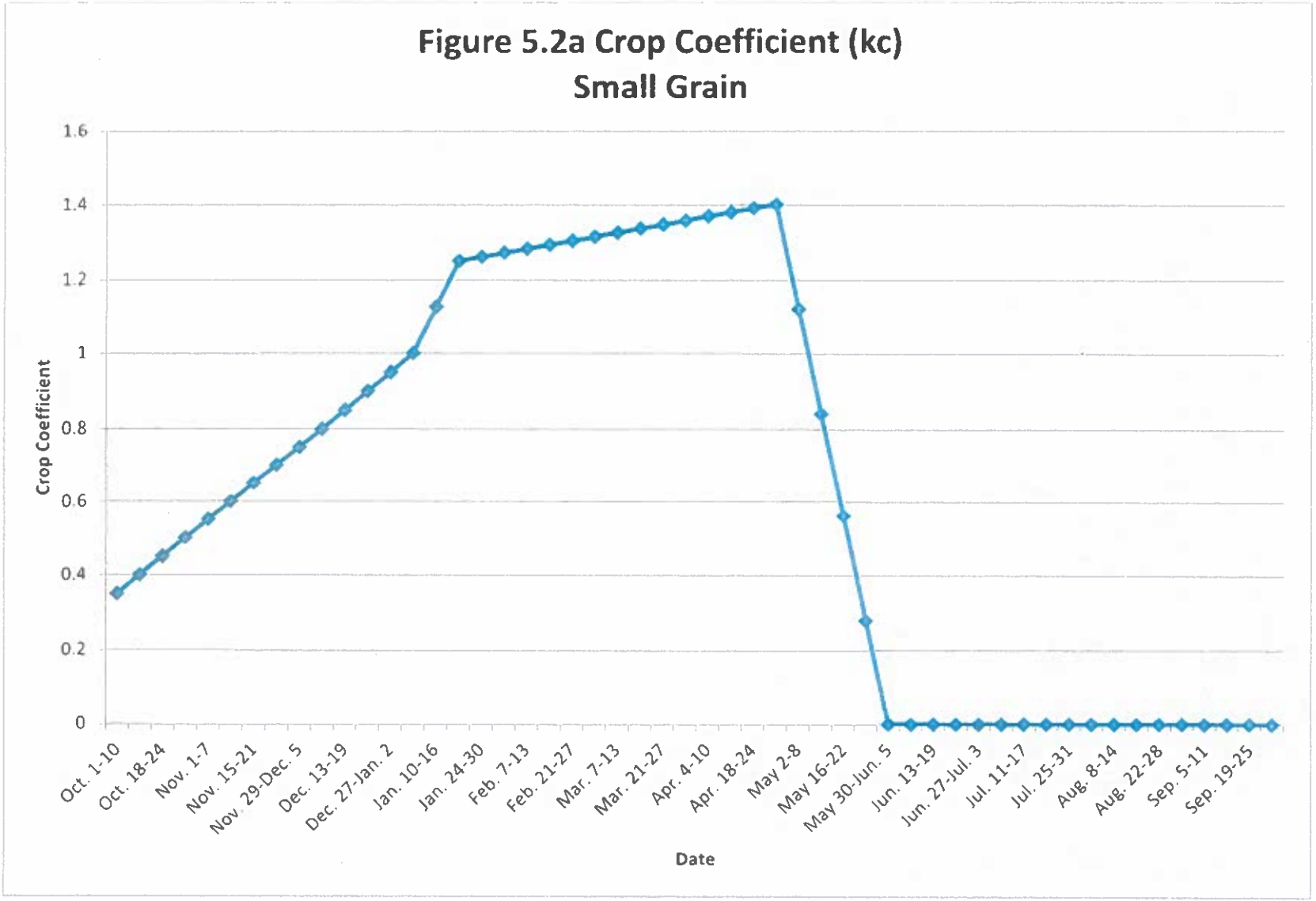


Figure 5.2a Crop Coefficient (kc)
Small Grain
Crop Coefficient
1.6
1.4
1.2
1
0.8
0.6
0.4
0.2
0
Oct. 1-10
Oct. 18-24
Nov. 1-7
Nov. 15-21
Nov. 29-Dec. 5
Dec. 13-19
Dec. 27-Jan. 2
Jan. 10-16
Jan. 24-30
Feb. 7-13
Feb. 21-27
Mar. 7-13
Mar. 21-27
Apr. 4-10
Apr. 18-24
May 2-8
May 16-22
May 30-Jun. 5
Jun. 13-19
Jun. 27-Jul. 3
Jul. 11-17
Jul. 25-31
Aug. 8-14
Aug. 22-28
Sep. 5-11
Sep. 19-25
Date

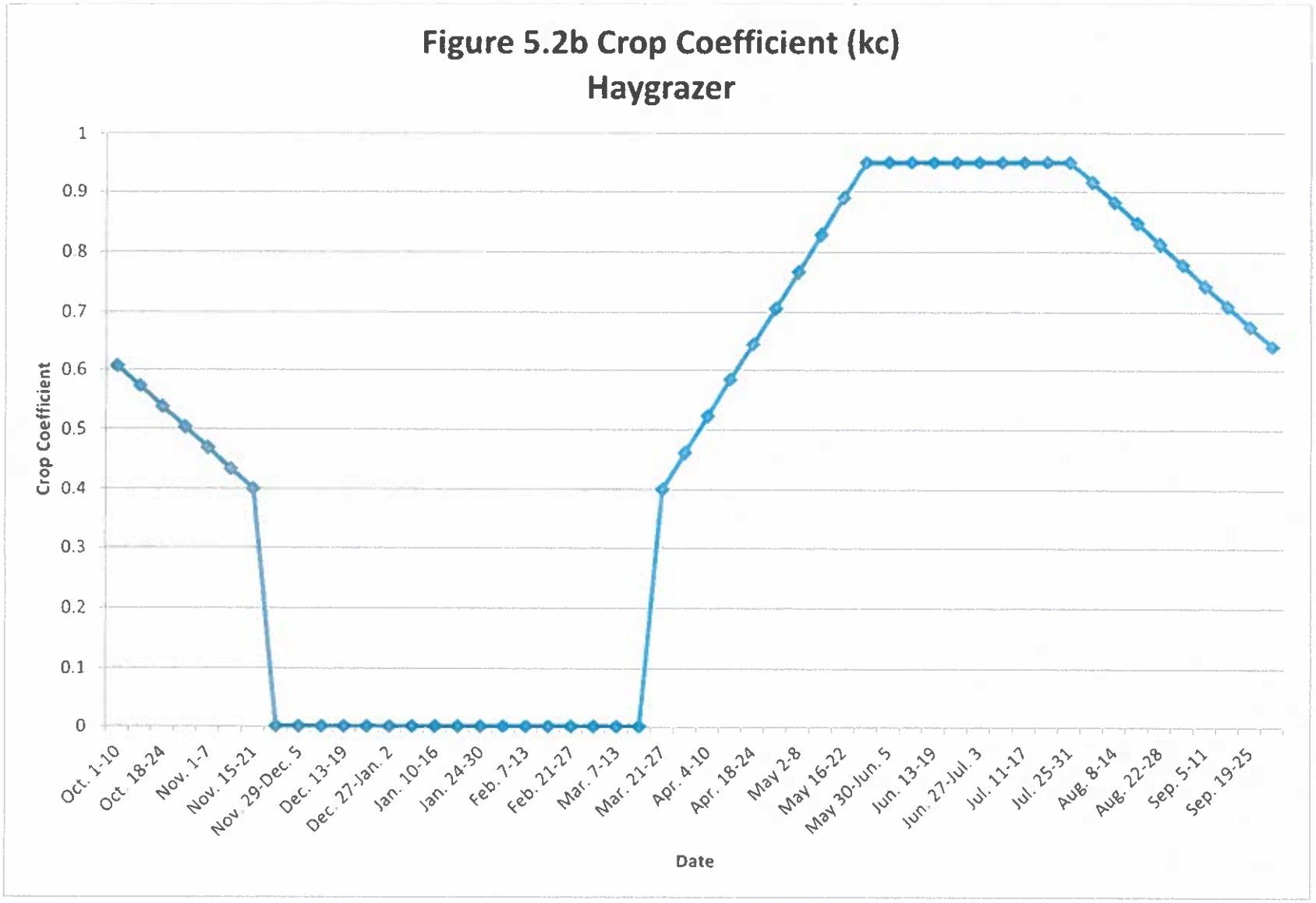


Figure 5.2b Crop Coefficient (kc)
Haygrazer
Crop Coefficient
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
Oct. 1-10
Oct. 18-24
Nov. 1-7
Nov. 15-21
Nov. 29-Dec. 5
Dec. 13-19
Dec. 27-Jan. 2
Jan. 10-16
Jan. 24-30
Feb. 7-13
Feb. 21-27
Mar. 7-13
Mar. 21-27
Apr. 4-10
Apr. 18-24
May 2-8
May 16-22
May 30-Jun. 5
Jun. 13-19
Jun. 27-Jul. 3
Jul. 11-17
Jul. 25-31
Aug. 8-14
Aug. 22-28
Sep. 5-11
Sep. 19-25
Date

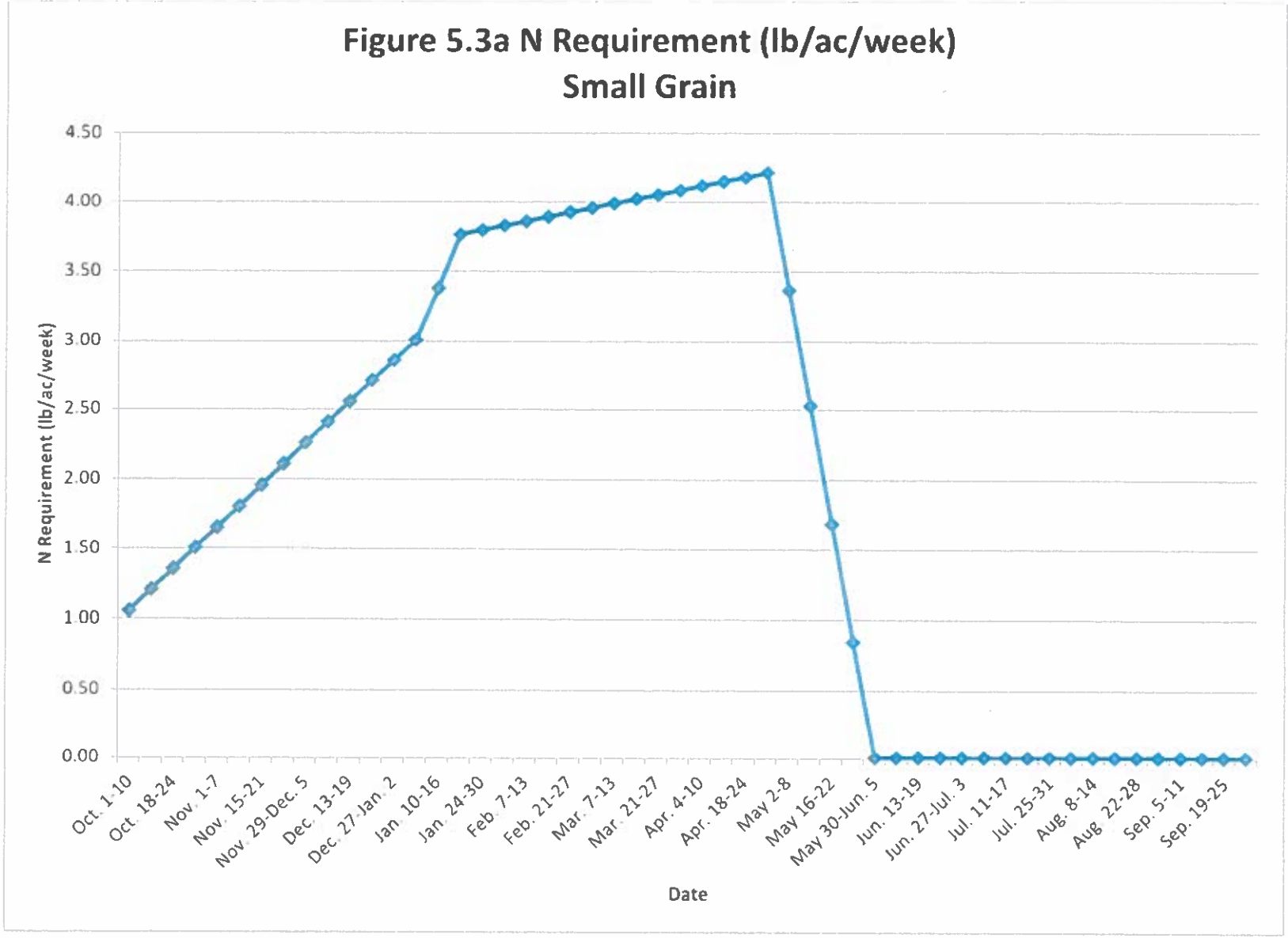


Figure 5.3a N Requirement (lb/ac/week)
Small Grain
N Requirement (lb/ac/week)
4.50
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Oct. 1-10
Oct. 18-24
Nov. 1-7
Nov. 15-21
Nov. 29-Dec. 5
Dec. 13-19
Dec. 27-Jan. 2
Jan. 10-16
Jan. 24-30
Feb. 7-13
Feb. 21-27
Mar. 7-13
Mar. 21-27
Apr. 4-10
Apr. 18-24
May 2-8
May 16-22
May 30-Jun. 5
Jun. 13-19
Jun. 27-Jul. 3
Jul. 11-17
Jul. 25-31
Aug. 8-14
Aug. 22-28
Sep. 5-11
Sep. 19-25
Date

Figure 5.3b N Requirement
Haygrazer
N Requirement (lb/ac/week)
4.00
3.50
3.00
2.50
2.00
1.50
1.00
0.50
0.00
Oct. 1-10
Oct. 18-24
Nov. 1-7
Nov. 15-21
Nov. 29-Dec. 5
Dec. 13-19
Dec. 27-Jan. 2
Jan. 10-16
Jan. 24-30
Feb. 7-13
Feb. 21-27
Mar. 7-13
Mar. 21-27
Apr. 4-10
Apr. 18-24
May 2-8
May 16-22
May 30-Jun. 5
Jun. 13-19
Jun. 27-Jul. 3
Jul. 11-17
Jul. 25-31
Aug. 8-14
Aug. 22-28
Sep. 5-11
Sep. 19-25
Date

However, with careful management and adherence to this plan, the continued effort at the LLAS towards minimizing nitrogen movement out of the crop root zone (and, thus, possibly into the groundwater) should be enhanced through improved crop water and nitrogen uptake.

Upgrades to the City's wastewater treatment plant were completed in 2015 to provide additional capacity to send effluent to the stream. A new solids handling facility was completed in the fall of 2017. The Northwest Plant came online in the spring of 2018. Treatment plant upgrades are currently under construction and are anticipated to be completed during the first quarter of 2022. It is anticipated that further upgrades will occur in the future, potentially resulting in lower effluent N concentrations. Therefore, the LLAS Crop Management Plan may need to be revised once the upgrades are completed and the resulting impact on effluent quality is fully known.

Impact of the Cattle Grazing System at the City of Lubbock's Land Application Site (LLAS) and Hancock Land Application Site (HLAS)

Date Submitted: September 10, 2003

Prepared For:

Pardue & Associates
Austin, Texas

City of Lubbock
Lubbock, Texas

Prepared By:

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Project Engineer

L. M. Safley, Jr., Ph.D., P.E.
President

This report has been prepared by J. D. Vaughan and L. M. Safley, Jr. of Agri-Waste Technology, Inc. (AWT), and supervised AWT staff. Agri-Waste Technology, Inc. has prepared this report at the request of Pardue & Associates and the City of Lubbock. J. D. Vaughan's and L. M. Safley's qualifications are detailed in Appendix A.

AWT has completed this report and certifies that it is true and complete to the best of our knowledge as of September 10, 2003.

L. M. Safley, Jr., Ph. D., P.E.
President

J.D. Vaughan, Ph.D., CPAg/SSc/CCA
Senior Agronomist/Soil Scientist

EXECUTIVE SUMMARY

- Due to the historical need to apply effluent at LLAS at rates within permit but greater than ideal particularly during winter months, it has not been possible to fully implement the optimal crop production strategy at LLAS.
- Grazing recently ended in late August 2003 at HLAS, but probably will continue to be an option at HLAS. Arcadis G&M is currently evaluating the groundwater at HLAS to determine any issues of concern. Should issues of concern be identified by Arcadis G&M, the practice of grazing at HLAS may need to be re-evaluated and specific management practices (similar to those currently recommended for LLAS) be implemented in the future.
- Effluent application rates at LLAS and HLAS must be discounted to account for nitrogen recycling in cattle manure when using grazing as a forage management method.
- For future grazing activities at LLAS, the groundwater below each plot should be evaluated to determine whether grazing is a viable option on a plot by plot basis.

1.0 Introduction

This report is intended to provide an assessment of the impact of cattle grazing at the Lubbock Land Application Site (LLAS) and the Hancock Land Application Site (HLAS) owned and utilized by the City of Lubbock for land application of effluent. In addition, the potential for future grazing activities is discussed. This information is partially in response to the Texas Commission on Environmental Quality's (TCEQ) comments on nitrogen (N) leaching following manure deposition by grazing cattle at the LLAS and HLAS facilities[1]. Manure N deposition by grazing cattle likely has not had a large direct impact on the quality of the groundwater (nitrate-N from grazing that leaches into groundwater) below the LLAS and HLAS. However, cattle grazing at LLAS must be done in a manner that compliments the current groundwater remediation program. Grazing probably will continue to be appropriate at HLAS as long as groundwater evaluations (currently being conducted by Arcadis G&M) do not find any issues of concern related to grazing. Specific recommendations regarding grazing at LLAS and HLAS can be found in Sections 5.2 and 5.3, respectively.

Due to the historical need to apply effluent at rates within permit but greater than ideal particularly during winter months, grazing may well have a limited role at LLAS for forage management.

[1] Email from Mr. Richard Eyster of TCEQ Groundwater Protection Team to Mr. Joe Reed of Arcadis G&M on October 1, 2002.

2.0 Avenues of N Loss From a Beef Cattle Grazing System

The following information details the avenues of N loss from manure deposited by grazing cattle at the LLAS and HLAS. This section is intended to only discuss the general principles of N loss from beef cattle grazing systems. Specific quantifications of N losses from the grazing systems at LLAS and HLAS will be addressed in Section 3 of this report.

The avenues of N loss from manure deposition in a beef cattle grazing system include denitrification, leaching, and volatilization (described in detail below). Grazing cattle are estimated to produce approximately 0.30 to 0.61 lbs N/day per 1,000 lb feeder. The loss of N from grazed cattle manure through particular pathways following deposition is estimated below.

2.1 Denitrification

Denitrification occurs when soil nitrate-nitrogen is reduced to nitrogen gas (N_2) through a series of reactions. The nitrogen gas is harmless and lost to the atmosphere. The main soil characteristic that impacts the rate of denitrification is development of anaerobic soil conditions caused by high soil water content. Higher soil water contents increase denitrification and vice versa. Higher denitrification rates typically occur in poorly drained soils that are wet due to slow soil permeability and infiltration rates. The soil must also have a readily available carbon source. The soil series Friona, within Plots 13, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, and 35 at LLAS, is classified as being within the C hydrologic group (i.e. slow rates of infiltration and permeability) (Attachment B). This represents approximately 41% of the center pivot irrigation acreage at the LLAS. Therefore, N loss through denitrification within these plots is probably higher than the other application areas at the LLAS. Denitrification reduces the soil nitrate-nitrogen pool that would be available for loss through leaching.

2.2 *Volatilization*

Volatilization occurs when soil or manure nitrogen is converted to ammonia gas through a series of reactions. The ammonia gas is then lost to the atmosphere. Approximately 25% - 35% of the total N excreted by grazing cattle is in the ammonium form, which is readily converted to ammonia gas and lost to the atmosphere as the excreted urine and feces dry. A portion of the remaining total N excreted by grazing cattle can be converted to ammonia and, thus, also be lost to the atmosphere. Ammonia volatilization is increased under alkaline soil (pH > 7) conditions and in warm climates. Alkaline soils are present at both the LLAS and HLAS (Attachment C) and the climate is warm much of the year. Therefore, a significant portion of N deposited by cattle at the LLAS and HLAS can be lost via volatilization (specific amounts of volatilization, as well as other loss pathways, are detailed in Section 3 and Tables 1 and 2). Volatilization also reduces the soil nitrogen pool that could be available for loss through leaching.

2.3 *Leaching*

Nitrogen can also be lost from a soil system through leaching. Leaching is the downward movement of nitrate-nitrogen ions in soil solution through the soil profile. Factors that influence nitrate leaching are irrigation and rainfall rates, infiltration rate, evapotranspiration rate, plant N uptake, and water holding capacity of the soil type in question. One of the major goals at the LLAS and HLAS is to prevent nitrate from leaching and, thus, reaching the groundwater.

3.0 Nitrogen Loss and Availability from a Beef Cattle Grazing System

The avenues of N loss from effluent application at the LLAS and HLAS have previously been addressed in the permit application submitted to the TCEQ in January 2003 and in the report

entitled *City of Lubbock Land Application Site Summary of Groundwater Remediation Results for 2001 and Revised Remediation Work Plan* developed by Arcadis G&M on November 26, 2002. The information detailed below reference only the avenues of loss for manure N deposited by grazing cattle at the LLAS and HLAS.

Nitrogen loss following manure deposition by beef cattle is dependent upon the processes described previously in Section 2 (volatilization, denitrification, and leaching). The amount of N lost through a given pathway is dependent upon environmental, soil, and N source characteristics. Table 1 gives an estimate of N loss and availability following manure deposition in the beef cattle grazing operation at the LLAS and HLAS. The loss of N is greatest via volatilization following deposition with an estimated loss of up to 30%. Some N loss occurs via denitrification at the HLAS and on some plots at the LLAS (~ 14%), but more denitrification (up to 28%) can occur on plots at the LLAS with higher soil moisture content. Minimal N is lost via leaching at either the LLAS or HLAS (5% or less).

Table 1. Summary of Cattle Nitrogen Production and Subsequent Nitrogen Losses.

Beef Cattle	TKN Deposition	Volatilization Loss		Denitrification Loss		Leaching Loss	
	(lb/yr/1000 lb LAW)	%	lb/yr/ 1000 lb LAW	%	lb/yr/ 1000 lb LAW	%	lb/yr/1000 lb LAW
ASAE, 2002							
800 lb	124	N/A	N/A	N/A	N/A	N/A	N/A
USDA-SCS, 1992							
750-1100 lb Feeder (High Forage)	113	30[1]	34	28[2]	32	5[3]	6
750-1100 lb Feeder (High Energy)	110	30[1]	33	28[2]	31	5[3]	5
450-750 lb	110	30[1]	33	28[2]	31	5[3]	5
MidWest Plan Service, 1993							
Calf (450 lb)	51	15-30 (Solid)[4] 10-25 (Liquid)	N/A	N/A	N/A	N/A	N/A
750 lb (High Forage)	150	15-30 (Solid)[4] 10-25 (Liquid)	N/A	N/A	N/A	N/A	N/A
1100 lb (High Forage)	223	15-30 (Solid)[4] 10-25 (Liquid)	N/A	N/A	N/A	N/A	N/A
750 lb (High Energy)	139	15-30 (Solid)[4] 10-25 (Liquid)	N/A	N/A	N/A	N/A	N/A
1100 lb (High Energy)	197	15-30 (Solid)[4] 10-25 (Liquid)	N/A	N/A	N/A	N/A	N/A

1 USDA-SCS, Table 11-6: Broadcast fresh solids, no incorporation, warm wet soils.
2 USDA-SCS, Table 11-8: <2% soil organic matter content, well drained, no-tillage, manure N
3 USDA-SCS, Table 11-7: Leaching index <2 (Calculated Leaching index = 0.2466 (Hydrologic Soil Group B), 0.0166 (Hydrologic Soil Group C)
4 MWPS, Table 10-2: Broadcast, no incorporation.

A range of cattle manure N deposited and lost via volatilization, denitrification, and leaching at the LLAS and HLAS for various size cattle are presented in Table 2 below (based on the values presented in Table 1).

Table 2. Annual Estimated Ranges of Cattle Manure Nitrogen (N) Deposition and Volatilization, Denitrification, and Leaching at the LLAS and HLAS.(1)

Cattle Size	Manure N Deposition	Manure N Volatilization Loss	Manure N Denitrification Loss	Manure N Leaching Loss	Remaining Manure N After Losses
--lbs--	---lbs/ac---	---lbs/ac---	---lbs/ac---	---lbs/ac---	---lbs/ac---
450 - 750	34 - 225	3 - 68	10 - 63	2 - 11	19 - 78
750 - 1100	85 - 368	9 - 110	24 - 103	4 - 18	48 - 137

(1) Assumes 1 – 2 cattle/acre (1.5 – 2.0 head/acre for 450 – 750 lb cattle and 1.0 – 1.5 head/acre for 750 – 1100 lb cattle).

The numbers in Table 2 assume a typical stocking rate of 1 – 2 cattle/acre depending on animal size (Redmon and Woods, Undated; Woods and Redmon, Undated; Zhang et al., Undated). Higher stocking rates will result in higher amounts of deposited nitrogen as well as increases in the other estimates reflected in Table 2. What is obvious is that some deposited manure nitrogen will enter into the pool of nitrogen that can leach beneath the crop root zone as nitrate nitrogen (2 – 18 lb N/ac). There is also the potential for additional nitrate-nitrogen to leach beneath the crop root zone if applied effluent and precipitation carry some of the 19 - 137 lb N/ac that is not readily accounted for in the nitrogen balance.

4.0 Haying Versus Grazing

There are several other reasons why a haying system is preferred over a grazing system at LLAS at this point in time. Nitrogen is not as effectively removed from the forage system by grazing livestock as is accomplished by forage harvesting via haying (Zhang et al., Undated; OSU, 1996). A comparison of nitrogen removal by grazing and by haying warm and cool season perennial grasses is presented in Table 3. Efficient nutrient removal is accomplished only by removing the forage as a hay crop and transporting the forage away from the pivots (Johnson and Woods, Undated). Grazing recycles most of the nutrients back into the forage system. Thus,

nitrogen demand (from an external source) for a hayed forage plot is higher than the nitrogen demand for a grazed plot because the nitrogen is removed from the plot in the hay crop (Table 3) (Stichler and McFarland, Undated). As a result, hayed plots likely can accept higher effluent applications than grazed plots without risking groundwater contamination. Continued effluent application under a grazed-only system leads to increased soil nitrogen accumulation and the potential for groundwater contamination (Zhang et al., Undated; OSU, 1996).

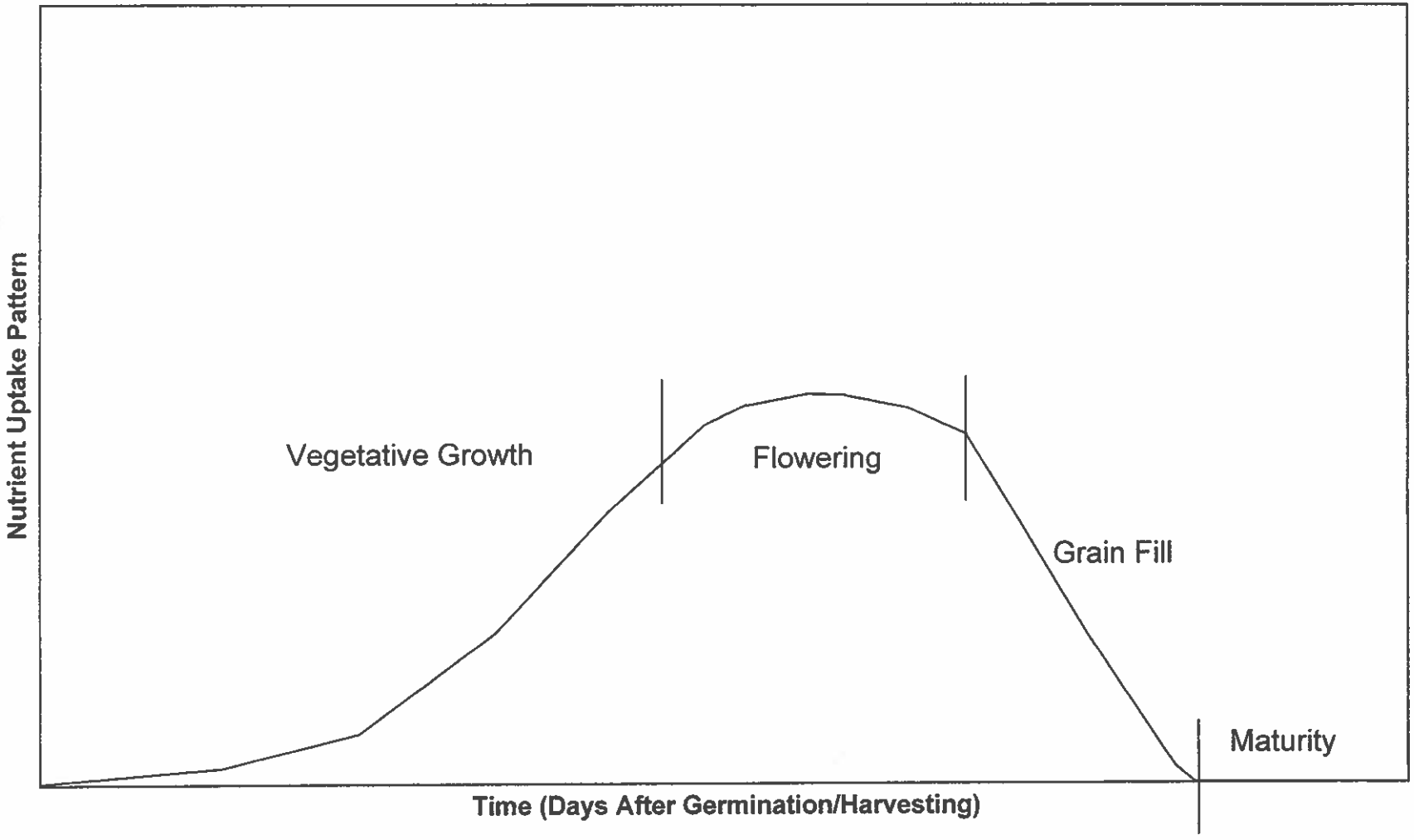
Table 3. Nitrogen Removal by Grazing and Haying[1]

System	Nitrogen Removal (lb/ac)
Grazing[2]	12.5
Bermudagrass Hay[3]	200
Wheatgrass Hay[4]	85
Ryegrass Hay[4]	100

[1] Source: Zhang et al., Undated; OSU, 1996; USDA-SCS, 1992.
[2] Assumes 1-500 lb calf weaned off of 1 acre on a year-round basis on a warm or cool season grass.
[3] Assumes 4 ton yield with all forage removed as hay crop.
[4] Assumes 3 ton yield with all forage removed as hay crop.

Nutrient uptake is generally substantial during vegetative growth and development. As the plant approaches maturity the rate of nutrient uptake declines. Virtually zero nutrient uptake occurs once the plant reaches full maturity (Figure 1) (Jones, 1998; Gardner et al., 1985; Mengel and Kirkby, 1987; Troeh and Thompson, 1993). Incomplete harvesting of the forage has possibly occurred on grazed plots in the past at the LLAS and HLAS due to the previous and current necessity of effluent application rates within permit but greater than ideal and possibly low grazing density (relative to forage growth) that prevented adequate forage removal. If mature grasses remain on the plots for extended periods of time then there are drastic reductions in nutrient uptake potential. During these time periods, effluent application events are

Figure 1. General Crop Nurient Uptake Pattern Over Course of Crop Growth Cycle



most susceptible to contributing nitrogen to the groundwater because the crop is not actively taking up the applied nutrients. It is of critical importance that crop water and nutrient uptake be optimized by maintaining the forage in a cyclic growth pattern (Redmon and Bidwell, Undated). This is especially true at the LLAS in order to compliment the goals of the groundwater remediation program. A properly implemented grazing system coupled with haying will promote this cyclic growth and, thus, optimize crop nutrient uptake.

In addition, a lack of vegetation (whether induced by grazing, haying, row crops, etc.) also has the potential to promote prairie dog populations (Hygnstrom and Virchow, 1994). Lack of vegetation and heavy sustained grazing, even if localized, results in favorable conditions for prairie dog town establishment and expansion. Although over-grazing has not been historically prevalent at the LLAS or HLAS, areas where livestock congregate are often very attractive to prairie dogs because the forage is sparse due to grazing and/or trampling.

Finally, compaction caused by grazing cattle can have an indirect impact on the groundwater quality. Moist soils (like those under pivot at the LLAS and HLAS) are susceptible to compaction (Hillel, 1982). Compaction impedes the movement of water and air through soil by decreasing the total porosity (especially the large interaggregate pores). Also, root growth decreases and soil bulk density increases. Grazing cattle caused an increase in soil bulk density from approximately 1.22 to 1.43 g/cm^3 (which corresponds to a decrease of air-filled porosity from 17.3 to 7.2%) and an increase in penetrometer resistance from 3.2 to 19.5 bar in one study (Tanner and Mamaril, 1959). Crop yields are typically reduced on compacted soils because root growth and penetration is restricted (Taylor, 1974). No concerns with compaction were

observed at LLAS during soil pit investigations conducted on May 15, 2001 by Agri-Waste Technology, Inc. and City of Lubbock personnel.

5.0 Future and Management of Grazing at LLAS and HLAS

The recommended future for grazing practices at LLAS and HLAS are detailed below. However, managing the forages at LLAS and HLAS via cattle grazing will likely need to be re-evaluated and adjusted at periodic intervals as issues arise. Management recommendations for grazing that will promote optimum crop water and N use are also provided below. All of these recommendations **assume** that the farm management team has the flexibility to implement a reasonable haying program.

5.1 General Grazing Management Recommendations

Grazing management must be done so that crop water and N use are optimized and, thus, potential nitrate-N leaching into groundwater is minimized. This will require routine (at least semi-weekly) crop assessment by City of Lubbock personnel as detailed below.

All grazed plots should be stocked at approximately 1 - 2 head/acre (depending on animal size) (Redmon and Woods, Undated; Woods and Redmon, Undated; Zhang et al., Undated). The N application goal for all grazed plots should be reduced in the water balance model by about 70 lbs N/ac to account for N remaining in soil from cattle manure (Table 2). All crops should only be grazed during periods of optimum forage availability. The months of optimum forage availability for the main forages at LLAS and HLAS are detailed in Table 4.

Table 4. Months of Optimum Forage Availability for Main Crops at LLAS and HLAS.[1]

Crop	Period of Forage Availability
Wheatgrass	February - May and September - November
Ryegrass	March - May and October - November
Alfalfa	March - June and September - October
Small Grain (Rye, Wheat, Triticale)	November - April
Sorghum-Sudangrass	June - September
Bermudagrass	April - October

(1) USDA-NRCS, 1997.
Ball et al., 2002.
Bidwell, Undated.
Woods and Redmon, Undated.

Grazing should occur when the forage crop is within the vegetative (leafy) to heading/bud stage (see figure in Attachment D). This range of crop growth stages provides the best balance of crop water and N use, yield, animal intake, and animal digestability. Grazing should be discontinued or the grazing population decreased when the forage is at a height of 4 – 6 inches to allow for crop regrowth (Ball et al., 2002; Blaser, 1986; Redmon and Bidwell, Undated; USDA-NRCS, 1997). Additionally, any forage crop reaching the bloom stage (Attachment D), regardless of whether it is being grazed or not, should be hayed as soon as possible to promote optimum crop water and N use. Finally, forage assessments should be made and recorded for each plot at LLAS and HLAS on at least a semi-weekly basis to determine the crop growth stage and if any changes in forage management practices are needed.

5.2 Specific Grazing Management for LLAS

Grazing may be a component of the nutrient management program at LLAS if the following criteria are realized:

i. Each application plot must be managed individually.

ii. Each plot must have a stand of forage that covers a minimum of 75% of the ground surface prior to initiating grazing. All site visits made to LLAS and HLAS to date indicate ground cover easily meets this requirement for most plots.

iii. The ground water nitrate-N in the monitoring wells in and around an application plot needs to be 15 mg/l or less plus the ground water nitrate-N concentration needs to be exhibiting a decreasing trend. This will need to be re-evaluated on a semi-annual basis as part of the groundwater monitoring reports to TCEQ to determine which plots, if any, can be grazed. Currently, it appears that Plot 26 may meet this criteria for grazing (Attachment E). Additionally, Plot 3 may meet this criteria in a year or so depending on future groundwater nitrate-N concentrations.

iv. Due to the presence of the Kimbrough soil type, grazing should not occur on Plots 25 and 27.

v. A 70 lb/ac/yr discount in the annual application of plant available nitrogen (PAN) will be made in the defined effluent application rate to account for the nitrogen recycled as a result of grazing (based on a stocking density of 1 – 2 head/ac). If the stocking density is higher than 2 head/ac, then the discount will be increased by 35 lbs N/ac/head/yr.

vi. The application of plant available nitrogen will continue to be further discounted by the amount of residual soil nitrogen found in the application plot immediately prior to the grazing activity.

vii. Grazing should be limited to time periods between the vegetative and heading/bud stage of the forage.

viii. The stocking density should be maintained between 1 to 2 head/acre (depending on animal size) during periods of grazing (as long as the condition in vii. above is met).

ix. Grazing should be discontinued or the grazing population decreased when the forage is at a height of 4 – 6 inches to allow for crop regrowth.

x. Once grazing has been terminated all remaining forage must be mechanically harvested and removed from the plot.

In addition to the above the following additional management measures must be implemented.

xi. If the ground water nitrate-N concentrations in one or more monitoring wells in and around a given application plot increase to 16 mg/l for two consecutive monitoring events then grazing will not be allowed on the tract until the ground water nitrate-N concentrations in the monitoring wells in and around the application plot have been lowered to 15 mg/l or below and exhibit a decreasing trend.

xii. The City of Lubbock's Wildlife Biologist and Environmental Compliance Specialist will be making periodic inspections of the prairie dog status at LLAS. The results of these periodic inspections will need to be evaluated on a plot by plot basis to determine whether grazing is promoting prairie dog populations at LLAS and if grazing should be discontinued.

5.3 Specific Grazing Management for HLAS

Grazing recently ended in late August 2003 at HLAS, but will probably continue to be an option at HLAS. Arcadis G&M is also currently evaluating the groundwater at HLAS to determine any issues of concern. Should the evaluation by Arcadis G&M find no groundwater problem related to grazing, then grazing probably will continue to be an option at HLAS as long as it occurs

according to the management recommendations presented below. In the meantime, the following conditions should be met in order for grazing to continue on plots at HLAS.

i. Each application plot must be managed individually.

ii. Each plot must have a stand of forage that covers a minimum of 75% of the ground surface prior to initiating grazing. All site visits made to LLAS and HLAS to date indicate ground cover easily meets this requirement for most plots.

iii. A 70 lb/ac/yr discount in the annual application of plant available nitrogen (PAN) will be made in the defined effluent application rate to account for the nitrogen recycled as a result of grazing (based on a stocking density of 1 – 2 head/ac). If the stocking density is higher than 2.0 head/ac, then the discount will be increased by 35 lbs N/ac/head/yr.

iv. The application of plant available nitrogen will continue to be further discounted by the amount of residual soil nitrogen found in the application plot immediately prior to the grazing activity.

v. Grazing should be limited to time periods between the vegetative and heading/bud stage of the forage.

vi. The stocking density should be maintained between 1 to 2 head/acre (depending on animal size) during periods of grazing (as long as the condition in v. above is met).

vii. Once grazing has been terminated all remaining forage must be mechanically harvested and removed from the plot.

viii. Grazing should be discontinued or the grazing population decreased when the forage is at a height of 4 – 6 inches to allow for crop regrowth.

6.0 Conclusion

Cattle grazing in conjunction with the effluent application program at the LLAS has been a likely contributor to groundwater nitrate at the LLAS given the past effluent management infrastructure and distribution system. The degree of contribution likely cannot be determined with significant accuracy. There are numerous issues related to cattle grazing such as incomplete crop harvest, low net crop nutrient removal and compaction that can contribute to the concerns regarding grazing. Given the fact that there are elevated ground water nitrate nitrogen levels at LLAS, it is prudent and conservative to prohibit grazing unless the conditions in Sections 5.2 and 5.3 are met at LLAS and HLAS, respectively.

Grazing at HLAS needs to be routinely evaluated as more is learned about the groundwater conditions. Grazing can continue as long as no issues of concern are identified and as long as appropriate management is utilized.

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Attachment A

L. M. Safley, Jr.'s and J.D. Vaughan's Qualifications

Attachment B

Hydrologic Soil Group Maps

Agri-Waste Technology, Inc.
5400 Etta Burke Court
Raleigh, North Carolina 27606
Phone: (919) 859-0669
Fax: (919) 233-1970
www.agriwaste.com

N

LLAS Hydrologic Groups.

Contour Interval = 5 feet

Hydrologic Group Descriptions

Group B soils have moderate infiltration rates when thoroughly wetted and consists chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.

Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water in soils with moderately fine to fine texture.

Group D soils have high runoff potential. They have very low infiltration rates when thoroughly wetted and consist chiefly of clay soils with a high swelling potential, soils with a permanent high water table, soils with a claypan or clay layer at or near the surface and shallow soils over nearly impervious material.

Contingency plots identification omitted.

Legend

Plots

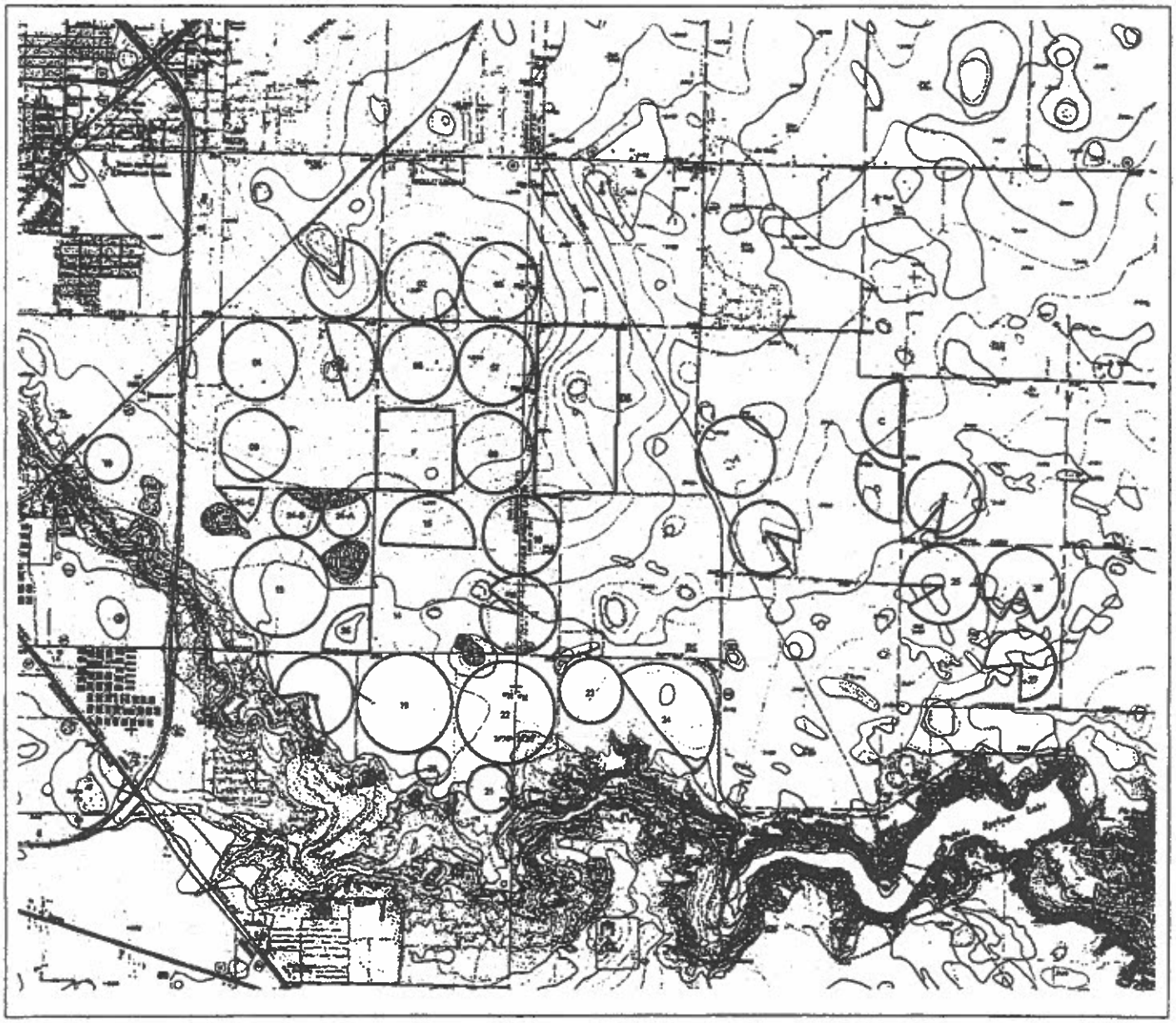
Hydrologic Groups

B

C

D

Drawn By:
Enrique Cachafeiro
Revised By:
Jeff Vaughan
Date:
04/03/2003



3 0 3 Miles

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www.agriwaste.com

HLAS Hydrologic Groups

N

Contour Interval of 5'

Hydrologic Group Descriptions

Group B soils have moderate infiltration rates when thoroughly wetted and consists chiefly of moderately deep to deep, moderately well to well drained soils with moderately fine to moderately coarse textures.

Group C soils have low infiltration rates when thoroughly wetted and consist chiefly of soils with a layer that impedes downward movement of water in soils with moderately fine to fine texture.

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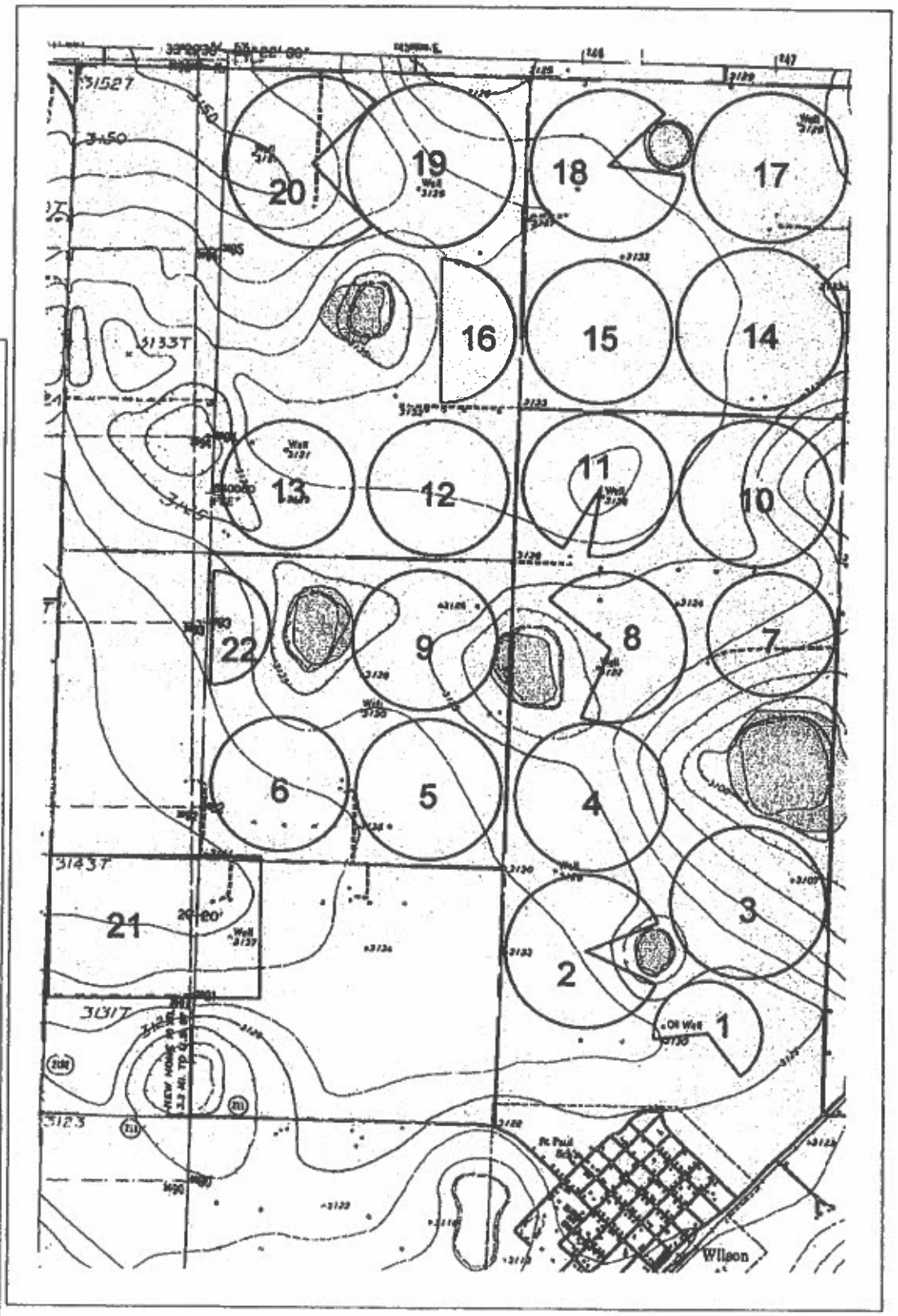
Contingency plots identification omitted.

Legend

Hydrologic Groups

- B
- D
- Plots

Drawn By:
Enrique Cachafeiro
Revised By:
Jeff Vaughan
Date:
04/03/2003



2000 0 2000 4000 Feet

Attachment C

Soil pH Maps

Agri-Waste Technology, Inc.
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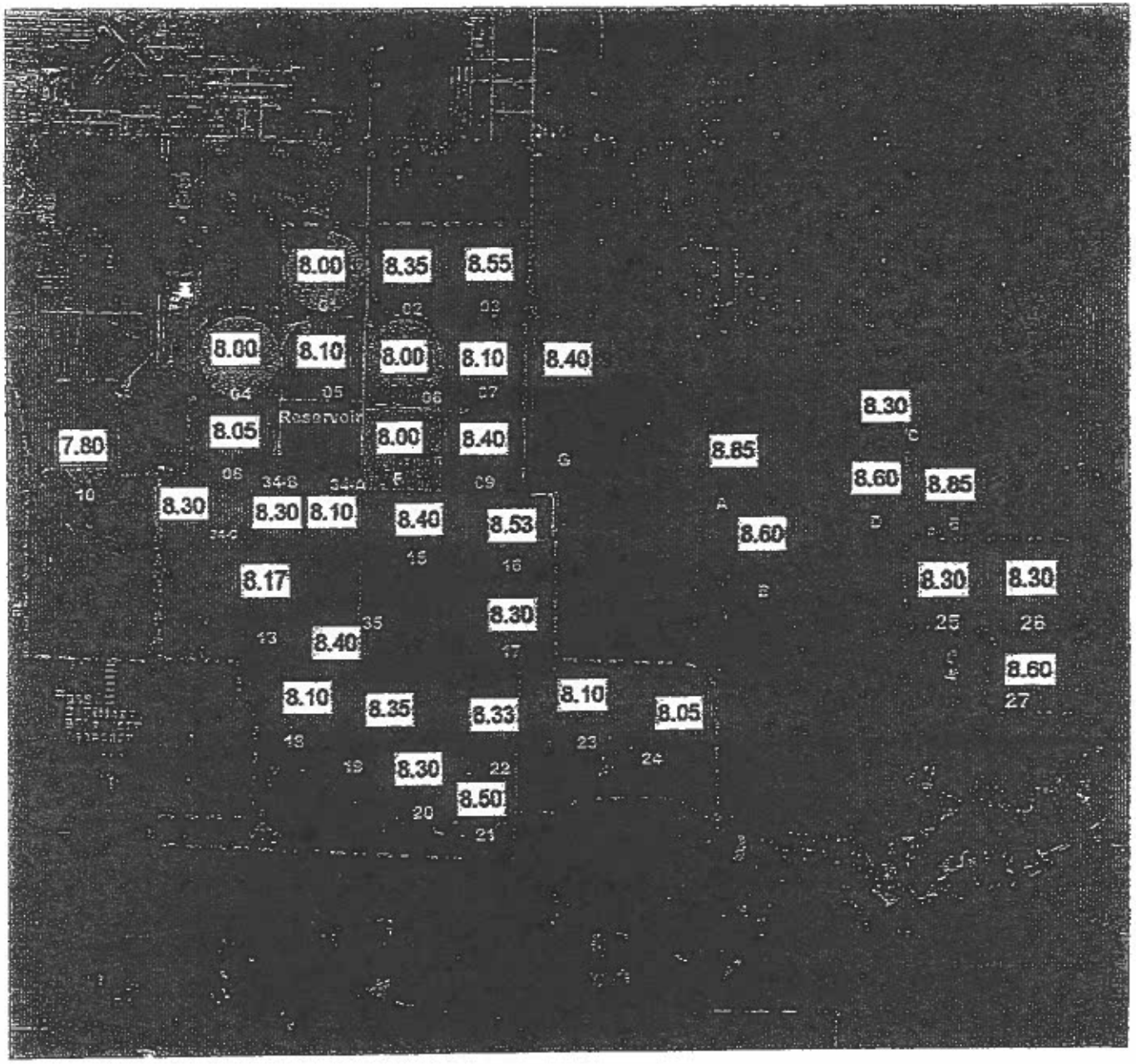
Phone: (919) 859-0669
Fax: (919) 233-1970
Email: awt@agriwaste.com

N

LLAS Soil pH 2002-2003



Legend

Soil pH (0-6" depth)

- 7.5 - 8
- 8 - 8.5
- 8.5 - 9

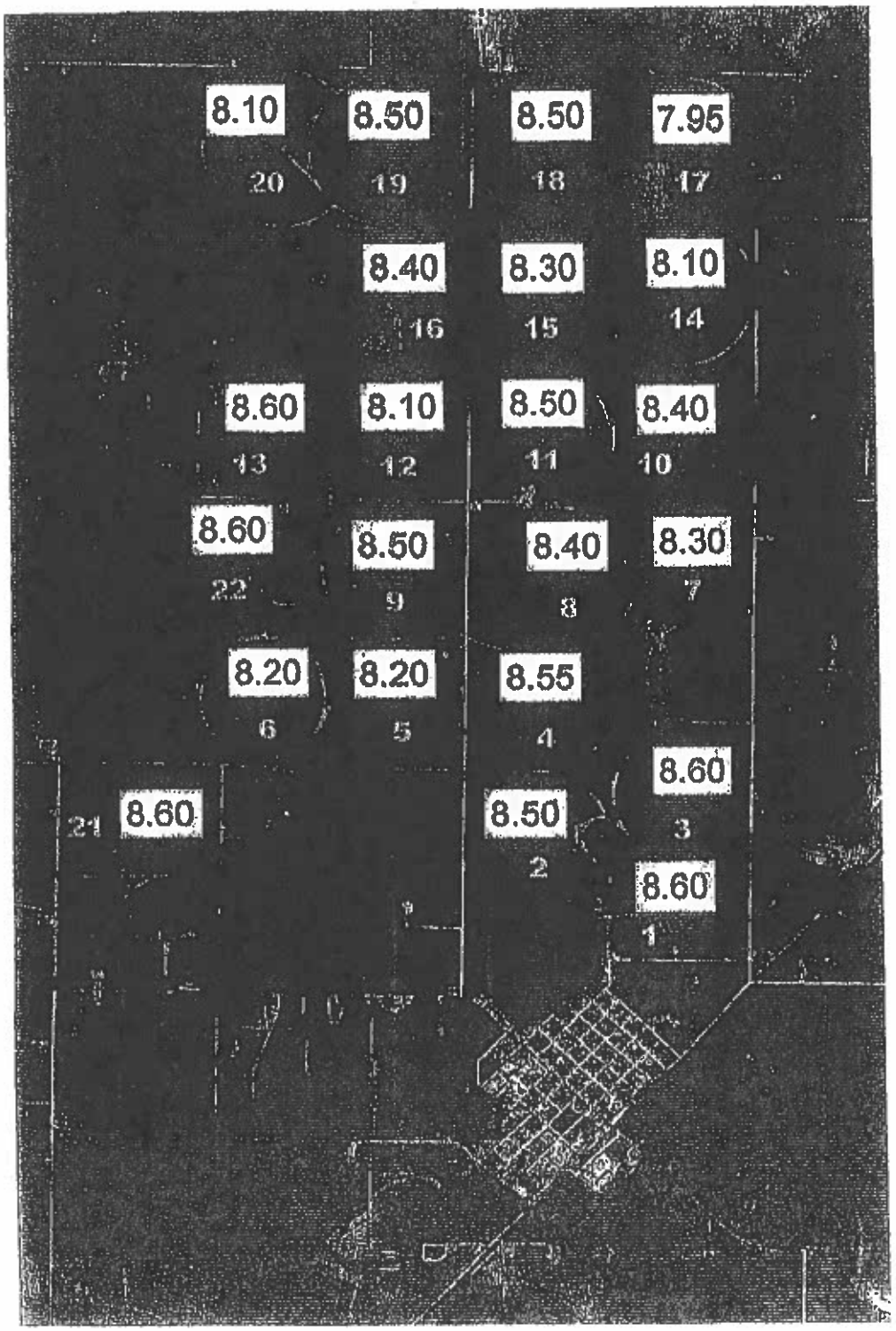
Drawn By:
Enrique Cachafeiro
Revised By:
Chris Mosely
Date:
06/19/2002

4000 0 4000 8000 Feet

Agri-Waste Technology, Inc.
5400 Etta Burke Court
Raleigh, North Carolina 27606
Phone: (919) 859-0669
Fax: (919) 233-1970
Email: awt@agriwaste.com

N

HLAS Soil pH 2001-2002



Legend

Soil pH (0-12" depth)

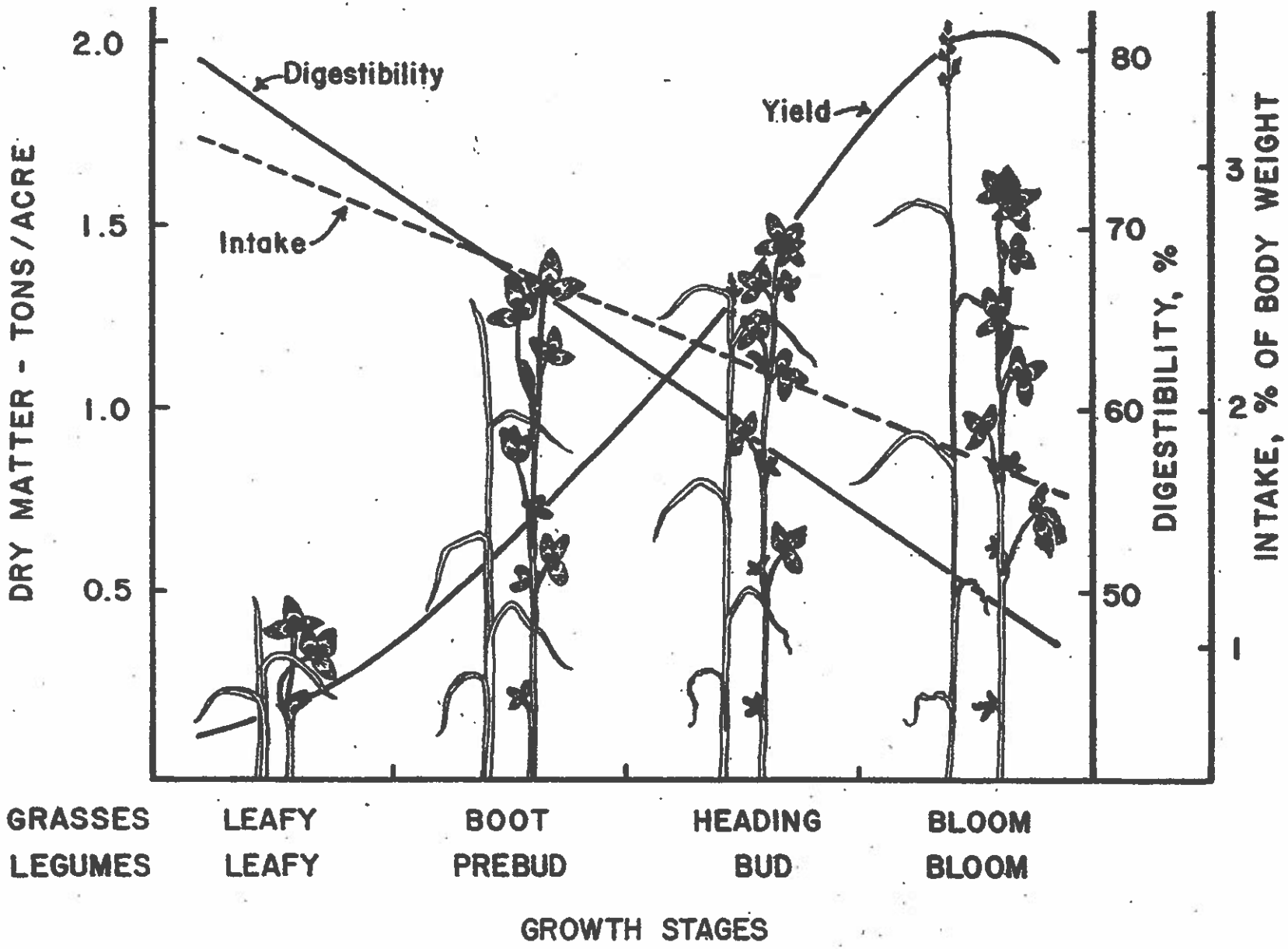
- 7.5 - 8
- 8 - 8.5
- 8.5 - 9

Drawn By:
Enrique Cachafeiro
Revised By:
Chris Mosley
Date:
04/04/2003

2000 0 2000 4000 Feet

Attachment D

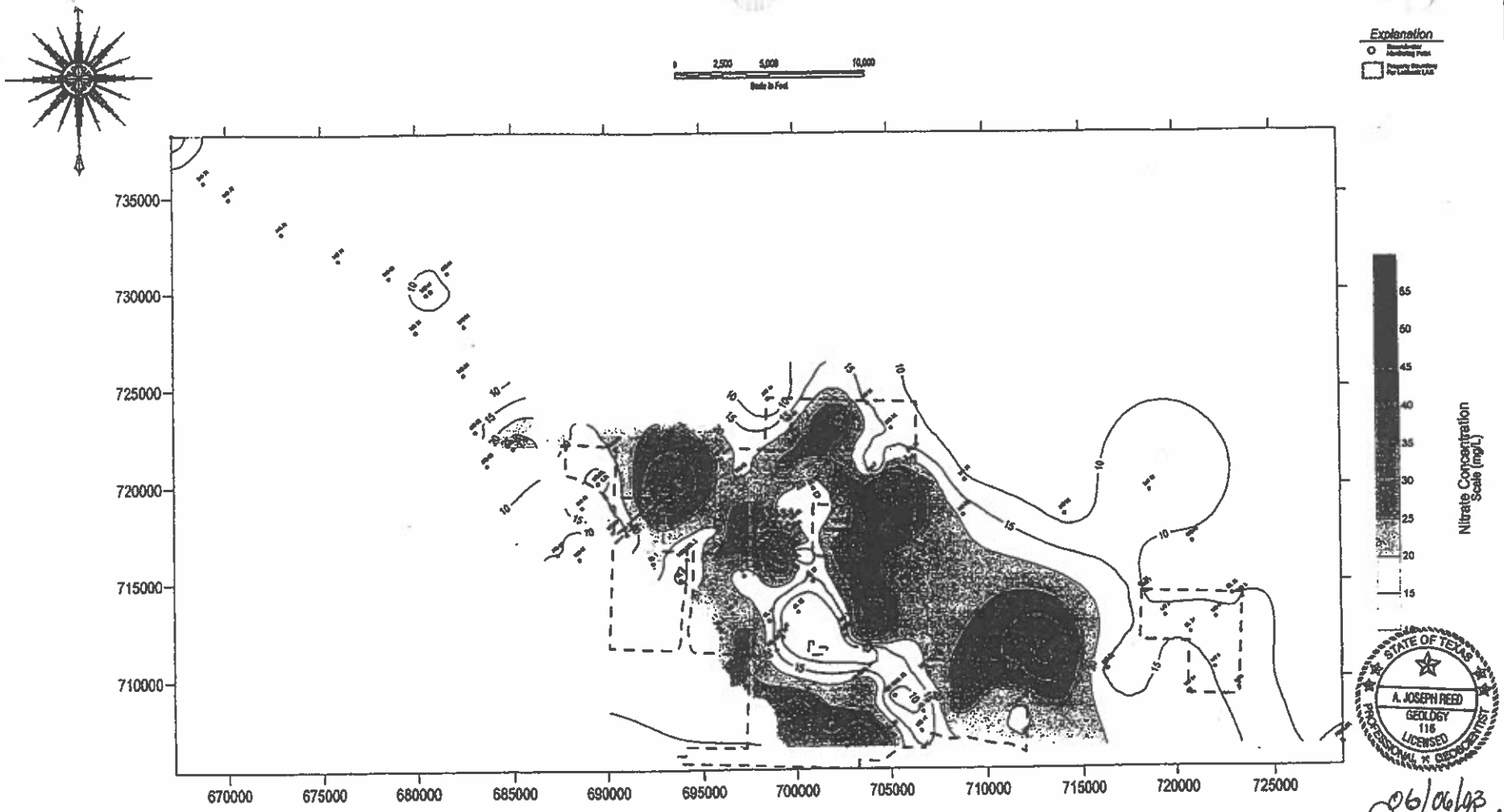
Crop Growth Stages for Forages


2.0
1.5
1.0
0.5
DRY MATTER - TONS/ACRE
Digestibility
Intake
Yield
80
70
60
50
DIGESTIBILITY, %
3
2
1
INTAKE, % OF BODY WEIGHT
GRASSES
LEGUMES
LEAFY
LEAFY
BOOT
PREBUD
HEADING
BUD
BLOOM
BLOOM
GROWTH STAGES

Blaser, 1986.

Attachment E

Map from City of Lubbock Land Application Site Summary of Groundwater Remediation Results for 2002 and Revised Remediation Work Plan developed by Arcadis G&M on June 11, 2003



STATE OF TEXAS
A. JOSEPH REED
GEOLOGY
116
LICENSED
PROFESSIONAL GEOSCIENTIST

06/06/03

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No.	Date	Revision Description	By	Chd

ARCADIS

1004 N. Big Spring Street, Suite 300
Midland, TX 79701-3383
Tel 432 687 5400 Fax 432 687 5401

Drawing Date	File Name	File Location	Unique Number
27 May 2003	MT7821179.dwg	G:\ArcCAD\DWG\Pardue & Associates\MT000782.001	43-152-00241

Pardue & Associates
Lubbock Land Application Site (LLAS) – City Of Lubbock

February, 2003 Nitrate Concentrations In
Ogallala Aquifer Beneath The LLAS

Lubbock County, Texas

Project Director	Area Manager
S. Hall	K. Schmidt
Task Manager	**Technical Review**
S. Hall	S. Tischer
Project Number	**Figure**
MT000746.0001	18

ATTACHMENT TR-11

Liner Certification Letter

STATE OF TEXAS
DAVID D DUNN
82630
REGISTERED PROFESSIONAL ENGINEER

2-1-2019

Memorandum

Date February 1, 2019

Project Lubbock LAS Pond Liner Certification

To Jay Keith, Section Manager, TCEQ Region 2

From David D Dunn, P.E

Subject **Water balance to certify pond liners at City of Lubbock land application sites**

Background

The City of Lubbock (City) temporarily impounds treated wastewater effluent from the Southeast Water Reclamation Plant (SEWRP) in three ponds located at the City's Hancock Land Application Site (HLAS) and one pond located at the Lubbock Land Application Site (LLAS) as permitted by Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0010353002. The ponds are shown in Appendix A (HLAS) and Appendix B (LLAS). The Texas Commission on Environmental Quality (TCEQ) is requiring the City to provide a liner certification signed and sealed by a Texas-licensed Professional Engineer as specified in TPDES Permit No. WQ0010353002 and based on the Recommended Corrective Action included in the TCEQ Investigation Report and pertaining to Investigations Nos. 1484879 and 1524275.

Permit No. WQ0010353002, Other Requirement No. 12 states "Facilities for the retention of treated or untreated wastewater shall be adequately lined to control seepage." The permit specifies three acceptable methods of pond lining:

a. Clay soils meeting specific physical requirements,
b. Membrane lining with a minimum thickness of 20 mils, or
c. Alternate method of pond lining approved by the Executive Director.

The permit also states "Permittee shall furnish certification by a Texas Licensed Professional Engineer that the completed pond lining meets the appropriate criteria above." and "Also, the certification shall be maintained at the facility and shall be readily available for inspection by TCEQ representative." Title 30 of the Texas Administrative Code Chapter 210.23 states that the "Certification shall be furnished by a Texas Registered Professional Engineer that the pond lining meets the appropriate criteria prior to utilization of the facilities." Given the fact that the facilities have been in operation for decades, it is assumed that the appropriate certifications have been provided to the TCEQ in the past, but simply cannot be located by either the City or the TCEQ. Furthermore, because the facilities are currently in operation, it is unreasonable to take the facilities out of operation to drain the ponds, and obtain a sufficient number of test samples to confirm compliance with the material properties required of the liners. In a meeting on October 18, 2018, with Mr. Malcolm Laing (City of Lubbock) and Messrs. Gary Shipp, Jay Keith and Brent Baker (TCEQ Region 2), the TCEQ suggested testing the overall performance of the ponds using a water balance approach.

The TCEQ Region 2 Office in Lubbock confirmed in electronic correspondence dated October 18, 2018, that a water balance for both sites would be acceptable for certifying the pond liners and resolving the alleged violation.

This memorandum presents results from a water balance analysis to determine the current performance of the pond liners. The water balance determined the apparent seepage rate from the ponds. This memorandum compares this rate to a proposed maximum allowable seepage rate based on standards established in other states, since no numerical standards for a maximum allowable seepage rate currently exist in Texas.

Proposed Maximum Allowable Seepage Rate

Texas has not adopted rules for a maximum allowable seepage rate for ponds containing wastewater effluent. However, several states have promulgated maximum allowable seepage rates for wastewater treatment lagoons[1], which can be useful in determining whether or not a pond liner is functioning adequately. These range from 0.0032 to 0.25 inches/day (0.08 to 6.35 millimeters per day, mm/day), per Table 1[2]. Obviously, the water quality of a wastewater lagoon would be substantially lower than the treated effluent contained in the Lubbock LAS ponds. Therefore, the rates allowed by other states for wastewater lagoons are necessarily more stringent than what should be considered acceptable for the City's ponds, which impound treated wastewater effluent that is land applied to the area surrounding the ponds

Table 1. Allowable Seepage Rates from Constructed Wastewater Lagoons

State	Stated Standard	Standard (decimal in/day)	Standard (mm/day)
Colorado	1/32 in/day	0.0312	0.794
Connecticut	500 gals/acre per day[1]	0.0184	0.468
Idaho	0.125 in/day	0.1250	3.175
Mississippi	500 gals/acre per day	0.0184	0.468
Montana	6 in/year	0.0164	0.418
Nebraska	1/8 in/day	0.1250	3.175
New Hampshire	500 gals/acre per day[1]	0.0184	0.468
Oregon	1/8 in/day	0.1250	3.175
Rhode Island	500 gals/acre per day[1]	0.0184	0.468
South Dakota	1/8 in/day for cells	0.1250	3.175
Tennessee	1/4 in/day	0.250	6.350
Vermont	500 gals/acre per day[1]	0.0184	0.468
Virginia	3 cm/year	0.0032	0.082
Wisconsin	1,000 gals/acre per day	0.0368	0.936

1. Stated standard is "TR-16 Guides for Design of Wastewater Treatment Works 1998 Edition."

Based upon the above ranges of criteria established by other states, the City proposes that if the computed seepage rate from the Lubbock LAS ponds is less than 1/4 inches per day (6.350 mm per day), then the pond liners can be certified as functioning adequately.

[1] US EPA, Principles of Design and Operations of Wastewater Treatment Pond Systems for Plant Operations, Engineers and Managers, EPA/600/R-11/088, August 2011.
[2] Ibid.

Water Balance Methodology to Determine Pond Seepage Rates

The City performed a water balance analysis at each of the four LAS ponds in January 2019, between the dates January 15, 2019, and January 29, 2019. The City utilized the following methodology to perform the water balance at each pond.

1. The City installed a stilling well at each pond consisting of a vertically oriented pipe, 4 inches in diameter and approximately 12 inches long. The pipe was capped at the bottom, with small holes drilled to allow entry of water into the pipe. The purpose of the stilling wells was to dampen the effects of waves caused by wind and facilitate precise (+/- 0.002") water level measurements. Water level measurements were made from the top of the stilling well to the water surface inside the well.
2. The City isolated each pond from inflows and outflows for at least three (3) 24-hour periods. With isolation, the only water entering or leaving the ponds was due to evaporation, precipitation and seepage. For the LLAS Pond, as will be explained later, a small amount of water continued to flow into the pond from the SEWRP due to operational complexities that do not allow for complete isolation of the LLAS. This flow was measured by a meter and recorded by the City's Supervisory Control and Data Acquisition (SCADA) system.
3. The City measured evaporation, precipitation, and air temperature at the ponds during the water balance period. Evaporation was measured using a Class A evaporation pan. No precipitation was recorded during the measurement period. The measured pan evaporation for each day was multiplied by a pan correction coefficient that is a function of the median air temperature during the measurement period (Appendix C).
4. Pond and evaporation pan water levels were measured with a hook gage, with minor dial graduation divisions of 0.002 inches. Each water level measurement consisted of 7 separate readings. The highest and lowest readings were omitted, and the average (arithmetic mean) of the 5 remaining readings was computed. Water levels in the pond and evaporation pan were measured at the start and end of each 24-hour period. Intermediate measurements were made as labor resources allowed. A photograph of the stilling well was taken before and after each measurement to document that the stilling well had not moved relative to the mounting bracket since the previous measurement. In addition, a spirit level was used to ensure that the top of the stilling well remained level throughout the data collection period.
5. The pond seepage rate was computed utilizing the cumulative drop in the water surface of the pond during the measurement period, although intermediate computations were performed to confirm the overall stability of the pond system. Seepage was computed as follows:

$$S = \frac{ES - I + 12 * Q/A}{n}$$

Where:

- S = Seepage rate, inches per day
- ES = Cumulative change in pond water level over the measurement period, inches
- I = Net evaporation[3] during the measurement period, inches
- Q = flow into (+) or out of (-) pond during the measurement period, if pond couldn't be isolated, cubic feet
- A = surface area of the pond, square feet
- n = number of days (decimal fraction, based on actual measurement times)

[3] Days with precipitation were avoided during the measurement period.

6. The computed seepage rate from each pond was compared to a criteria of 0.25 inches/day to certify that the pond liners are functioning adequately.

Water Balance Computations

Hancock LAS Ponds

The HLAS includes three ponds, as shown in Appendix A. Treated effluent from the SEWRP is transmitted into Pond 1, which can be pumped into Ponds 2 and 3. Water is pumped from all three ponds for land application. Each pond is constructed of an earthen berm lined with a clay liner to minimize seepage. The City records water levels in the ponds regularly, although not with the precision required for a water balance analysis. No water can flow into or out of the ponds unless it is pumped.

On January 14, 2019, City staff ceased pumping water from the SEWRP to the HLAS and monitored Pond 1 to confirm that flow from the transmission pipeline had ceased. It took approximately 16 hours for flow to cease from the pipeline after pumping was stopped. During this time, staff installed stilling wells in each of the ponds (Appendix E).

A Class A evaporation pan was deployed near the base of the embankment of Pond 2, which is a centralized location at HLAS. A temperature gage was deployed adjacent to the evaporation pan and set to record air temperature at 5-minute intervals.

Data collection began the morning of January 15, 2019, at approximately 8:20 AM and concluded the morning of January 18, 2019. Evaporation pan and pond water level readings were generally made between 8 and 9 AM each morning and between 4:00 and 5:00 PM each afternoon during the 3-day measurement period. Data collection sheets for the HLAS measurements are included in Appendix I.

Evaporation Computations

The first and last evaporation pan readings of the measurement period were taken so as to bracket the pond water level readings. For each roughly 24-hour period, the total evaporation was computed as the difference in the evaporation pan water level between subsequent daily readings. The mean air temperature recorded during the day was determined from the temperature data. The total evaporation depth for each day was computed by multiplying the pan evaporation by a pan coefficient determined as a function of the mean air temperature as shown in Appendix C. The sum of the three individual daily evaporation depths were summed, and the resulting total evaporation was divided by the actual time in decimal days to determine the average evaporation rate in inches per day (in/day). A summary of the computation is presented in Table 2.

Table 2. Evaporation Measured at the HLAS during Water Balance Period

Date	Time	Pan Water Level (in)	Pan Drawdown (in)	Daily Mean Temp (°F)	Pan Coefficient	Pond Evaporation (in)
Jan 15, 2019	8:20	2.410				
			0.090	43.92	0.8701	0.078
Jan 16, 2019	8:07	2.320				
			0.205	52.53	0.7903	0.162
Jan 17, 2019	8:14	2.115				
			0.129	48.43	0.8246	0.107
Jan 18, 2019	8:48	1.986				
			Total Evaporation (in)			0.347
			Measurement Days			3.019
			Mean Evaporation (in/day)			**0.115**

Water Balance Computations for HLAS Ponds

Tables 3, 4 and 5 present the summary water balance computations for the three HLAS ponds. The seepage from the ponds was computed over the measurement period and is compared to the allowable seepage rate of 0.25 in/day. As shown in the tables, **the computed seepage rate is less than the allowable rate, indicating that the pond liners are performing satisfactorily.**

Table 3. Water Balance Measured at HLAS Pond 1

Date	Time	Water Level (in)	Drawdown (in)	Meas. Days	Drawdown Rate (in/day)	Mean Evaporation (in/day)	Seepage Rate (in/day)
Jan 15, 2019	9:40	1.839					
			1.013	2.936	0.345	0.115	**0.230**
Jan 18, 2019	8:08	0.826					
				Allowable Seepage Rate (in/day)			0.250
				Seepage Rate Is Acceptable			

Table 4. Water Balance Measured at HLAS Pond 2

Date	Time	Water Level (in)	Drawdown (in)	Meas. Days	Drawdown Rate (in/day)	Mean Evaporation (in/day)	Seepage Rate (in/day)
Jan 15, 2019	9:20	2.748					
			1.027	2.971	0.346	0.115	**0.231**
Jan 18, 2019	8:38	1.721					
				Allowable Seepage Rate (in/day)			0.250
				Seepage Rate Is Acceptable			

Table 5. Water Balance Measured at HLAS Pond 3

Date	Time	Water Level (in)	Drawdown (in)	Meas. Days	Drawdown Rate (in/day)	Meas. Evaporation (in/day)	Seepage Rate (in/day)
Jan 15, 2019	10:13	2.574					
			1.012	2.925	0.346	0.115	**0.231**
Jan 18, 2019	8:25	1.562					
				Allowable Seepage Rate (in/day)			0.250
				Seepage Rate Is Acceptable			

Lubbock LAS Pond

The Lubbock LAS (LLAS) Pond is constructed of an earthen embankment, and is lined with a high-density polyethylene (HDPE) synthetic membrane liner, which was installed about 1991. Documents provided by the City indicate that the physical and mechanical properties of the liner were tested in 1998. A letter from GSE Lining Technology, Inc. states "All properties tested well exceed the current minimum value for new sheet production."

The pond is divided into two cells. A smaller cell, referred to as the "suction cell" (LLAS-S) receives water pumped from the SEWRP. Water is transferred to the larger, "main cell" (LLAS-M) through an inverted syphon that discharges above the water surface in the main cell. The water surface in LLAS-S is kept higher than the water surface in the LLAS-M to facilitate transfer of water between the cells. A second pipe is capable of transferring water between the cells, and was used at one point to maintain equal water levels in the cells. This pipe is no longer in use, but City staff believe that a valve isolating the two cells may not be closed completely, allowing some water to flow from the LLAS-S into the LLAS-M. Because the two cells cannot be isolated from each other, the cells have to be treated as a single system for purposes of computing a water balance for the LLAS Pond.

On January 23, 2019, the City ceased pumping from the SEWRP into the LLAS-S. City staff installed stilling wells in each cell, similar to those installed at the HLAS (Appendix E). A Class A evaporation pan was deployed near the base of the pond embankment. A temperature gage was deployed adjacent to the evaporation pan and set to record air temperature at 5 minute intervals.

Data collection began the afternoon of January 24, 2019, at approximately 5:15 PM and concluded the afternoon of January 29, 2019. Evaporation pan and pond water level readings were generally made between 8:00 and 9:00 AM each morning and between 4:00 and 5:00 PM each afternoon during the 4.5-day measurement period. Data collection sheets for the LLAS measurements are included in Appendix J.

The intention was to isolate the two cells and treat them as entirely different ponds. However, water continued to flow through the inverted syphon, finally ceasing prior to the morning reading of January 26, 2019. Only data from January 26, 2019, to the end of the measurement period on January 29, 2019, were utilized for water balance computations. During this time it was also discovered that approximately 37,000 gallons per day continued to be discharged into the LLAS-S from the SEWRP due

to operational complexities that do not allow for complete isolation of the LLAS. These flows were measured by a meter and recorded by the City's SCADA system.

With a known volume of water flowing into the LLAS-S, but an unknown volume transferring between the two cells, a volumetric computation utilizing the water surface areas of the separate cells is required in order to compute a water balance for the LLAS Pond.

Ice formed in the evaporation pan during freezing temperatures overnight, rendering the pan inoperable for measuring evaporation. Alternatively, potential evapotranspiration (ETo) data from the Texas A&M AgriLife Extension Texas ET Network Halfway station[4] was used to estimate evaporation during the measurement period. ETo is considered to be equivalent to evaporation from open water because in both cases the supply of water is non-limiting, and an infinite supply of water exists for the evaporation process[5]. The daily ETo data for the Halfway station are shown in Appendix D.

Water Balance Computation for the LLAS Pond

Tables 6 and 7 present the summary water balance computations for the LLAS pond. The seepage from the ponds was computed over the measurement period and is compared to the allowable seepage rate of 0.25 in/day. As shown in the table, **the computed seepage rate of 0.0496 in/day is an order of magnitude less than the allowable rate, indicating that the pond liner is performing satisfactorily.**

Table 6. Water Level Changes Measured at LLAS Pond

Date	Time	Water Level (ft)	Drawdown (ft)
LLAS-S (Suction Cell)			
Jan 15, 2019	8:13	1.001	
			0.929
Jan 18, 2019	16:25	0.072	
LLAS-M (Main Cell)			
Jan 15, 2019	8:25	1.437	
			0.355
Jan 18, 2019	16:15	1.082	

[4] https://texaset.tamu.edu/DataSummary/Daily/120?daysInSummary=14

[5] Harwell, G.R., 2012, Estimation of Evaporation from Open Water – A Review of Selected Studies, Summary of U.S. Army Corps of Engineers Data Collection and Methods, and Evaluation of Two Methods for Estimation of Evaporation from Five Reservoirs in Texas, U.S. Geological Survey Scientific Investigations Report 2012-5202, Pg. 11

Table 7. Water Balance Measured at LLAS Pond

	LLAS-6	LLAS-9	Total
Water Surface Area (SF)	267,847	1,653,483	1,921,330
Drawdown (ft)	-0.07747	-0.02955	
Volume Change (CF)	-20,749	-48,860	-69,610
Evaporation (ft)	0.03272	0.03272	
Evaporation Volume (CF)	8,764	54,103	62,867
Inflow (CF)	19,807	0	19,807
		Total Seepage (CF)	26,550
		Total Seepage (in)	0.166
		Measurement Time (days)	3.342
		Seepage Rate (in/day)	**0.0496**
		Allowable Seepage Rate (in/day)	0.250
		Seepage Rate Is Acceptable	

Seepage (CF) = Inflow – EvapVolume – VolumeChange
Seepage (in) = Seepage (CF)/Water Surface Area
Seepage Rate (in/day) = Seepage (in)/Measurement Time (days)

Conclusion

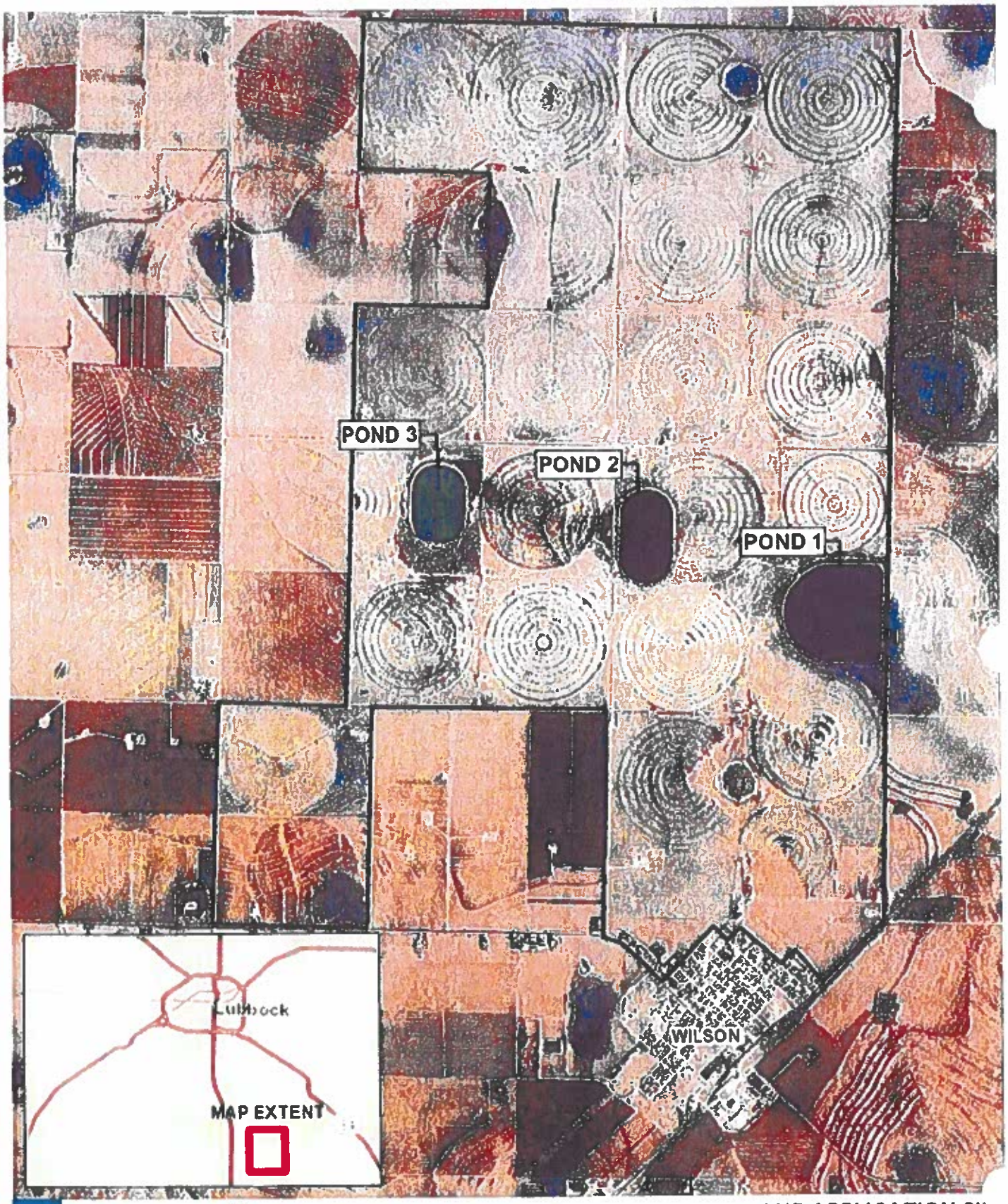
The seepage rates of 0.230, 0.231, and 0.231 in/day at HLAS, and 0.0496 in/day at the LLAS were calculated using the water balance methodology described above. Based on the water balance data collected at all four ponds located at the HLAS and LLAS, the pond lining systems are operating for their intended purpose.

Appendices

A. Hancock Land Application Site Pond Locations
B. Lubbock Land Application Site Pond Location
C. Evaporation Pan Coefficients
D. Texas A&M AgriLife Extension Potential Evapotranspiration Data
E. Photos of Evaporation Station and Pond Measurement Stilling Wells
F. Evaporation Pan and Hook gage Data Sheet from Manufacturer
G. Temperature Gage Data Sheet from Manufacturer
H. Blank Measurement Data Sheets
I. Hancock LAS Data Sheets
J. Lubbock LAS Data Sheets

Appendix A

Hancock Land Application Site Pond Locations



HANCOCK LAND APPLICATION SITE

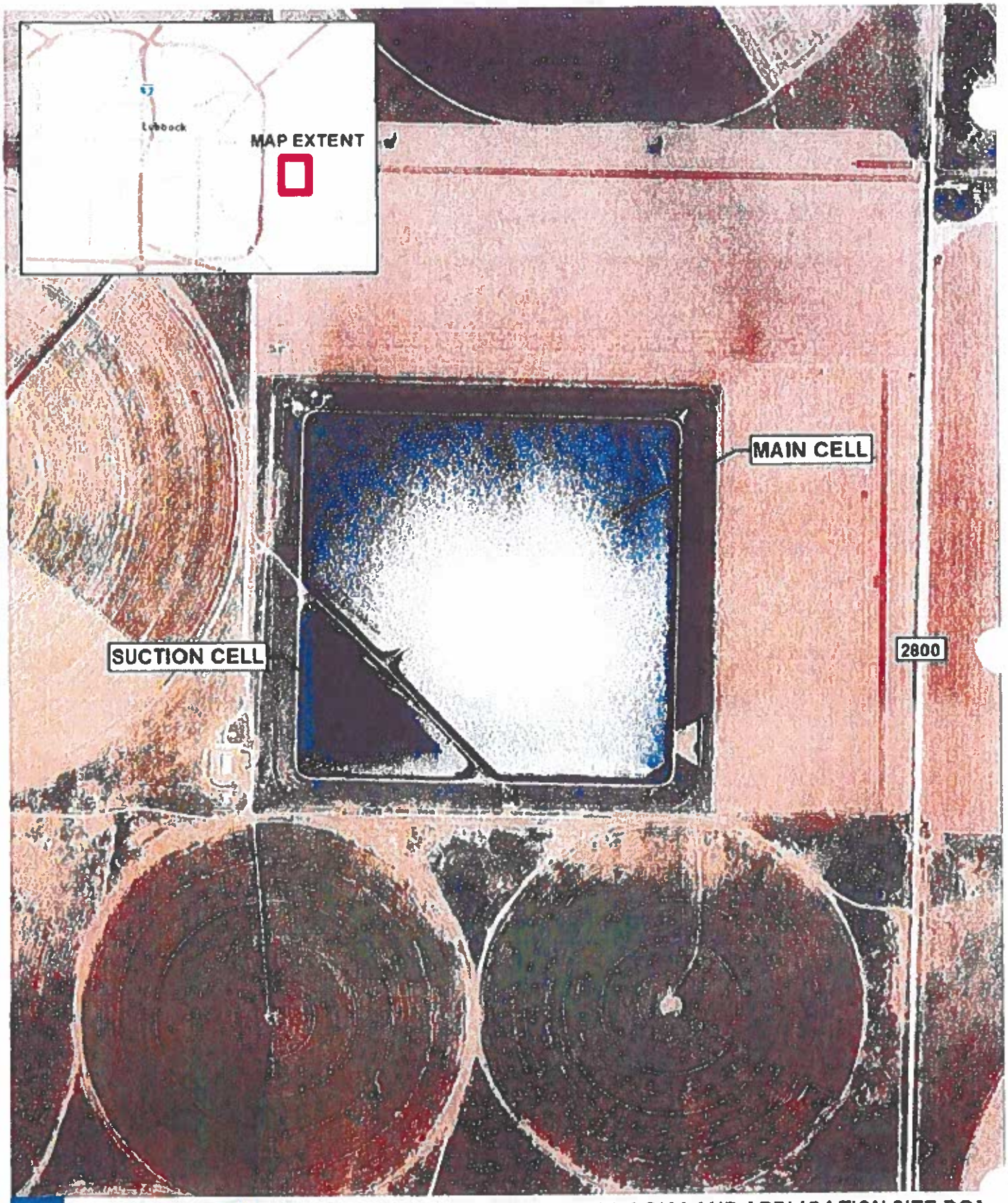
HDR

City of Lubbock

0 Feet 2,500

Appendix B

Lubbock Land Application Site Pond Location



LUBBOCK LAND APPLICATION SITE PONDS

HDR

City of Lubbock

0 Feet 500

Appendix C

Evaporation Pan Coefficients

Appendix C. Evaporation Pan Coefficients

Median Air Temperature (°F)	Pan Coefficient (P)	Median Air Temperature (°F)	Pan Coefficient (P)
30	1.0000	60	0.7210
31	0.9906	61	0.7116
32	0.9812	62	0.7022
33	0.9718	63	0.6928
34	0.9624	64	0.6834
35	0.9530	65	0.6740
36	0.9438	66	0.6648
37	0.9346	67	0.6556
38	0.9254	68	0.6464
39	0.9162	69	0.6372
40	0.9070	70	0.6280
41	0.8976	71	0.6186
42	0.8882	72	0.6092
43	0.8788	73	0.5998
44	0.8694	74	0.5904
45	0.8600	75	0.5810
46	0.8508	76	0.5720
47	0.8416	77	0.5630
48	0.8324	78	0.5540
49	0.8232	79	0.5450
50	0.8140	80	0.5360
51	0.8046	81	0.5264
52	0.7952	82	0.5168
53	0.7858	83	0.5072
54	0.7764	84	0.4976
55	0.7670	85	0.4880
56	0.7578		
57	0.7486		
58	0.7394		
59	0.7302		

Source: Idaho Department of Environmental Quality, "Guidance for Evaluating Wastewater Lagoon Seepage Rates," August 2016, pg. 26.

Appendix D

Texas A&M AgriLife Extension

Potential Evapotranspiration Data

Halfway's 14 Day Weather Summary ***Sponsored by Texas A&M Agrilife Research***

Detailed Weather Data and Heat Units

Date	ETo (in)	Max Temp (f)	Min Temp (f)	Min RH (%)	Solar Rad. (MJ/m2)	Rainfall (in)	Wind 4am (mph)	Wind 4pm (mph)	Battery (v)
Jan 29, 2019 - Tue	0.07	39	16	32	9.36	0.00	3.23	16.16	
Jan 28, 2019 - Mon	0.12	46	30	33	12.48	0.00	3.76	22.46	
Jan 27, 2019 - Sun	0.16	58	23	14	15.11	0.00	5.87	19.86	
Jan 26, 2019 - Sat	0.12	55	20	18	15.16	0.00	5.74	9.02	
Jan 25, 2019 - Fri	0.07	45	16	29	13.25	0.00	2.90	12.27	
Jan 24, 2019 - Thu	0.12	48	22	26	14.53	0.00	3.75	9.80	
Jan 23, 2019 - Wed	0.09	49	18	19	15.05	0.00	3.22	6.05	
Jan 22, 2019 - Tue	0.13	51	25	35	9.82	0.00	11.78	24.97	
Jan 21, 2019 - Mon	0.29	72	30	11	12.49	0.00	7.66	23.67	
Jan 20, 2019 - Sun	0.18	64	23	19	12.43	0.00	4.72	16.12	
Jan 19, 2019 - Sat	0.10	48	25	36	14.47	0.00	15.67	12.57	
Jan 18, 2019 - Fri	0.22	63	33	19	12.63	0.01	7.94	25.95	
Jan 17, 2019 - Thu	0.15	64	35	18	14.31	0.00	4.95	9.61	
Jan 16, 2019 - Wed	0.19	66	31	23	12.34	0.00	6.83	23.85	
Data Summary	2.01	72	16	23	183.45	0.01	6.29	16.60	

3-Day Summary (https://texaset.tamu.edu/DataSummary/Daily/120?daysInSummary=3)

5-Day Summary (https://texaset.tamu.edu/DataSummary/Daily/120?daysInSummary=5)

7-Day Summary (https://texaset.tamu.edu/DataSummary/Daily/120?daysInSummary=7)

2-Week Summary (https://texaset.tamu.edu/DataSummary/Daily/120?daysInSummary=14)

Calculators

Home Owner

Landscape

Crop

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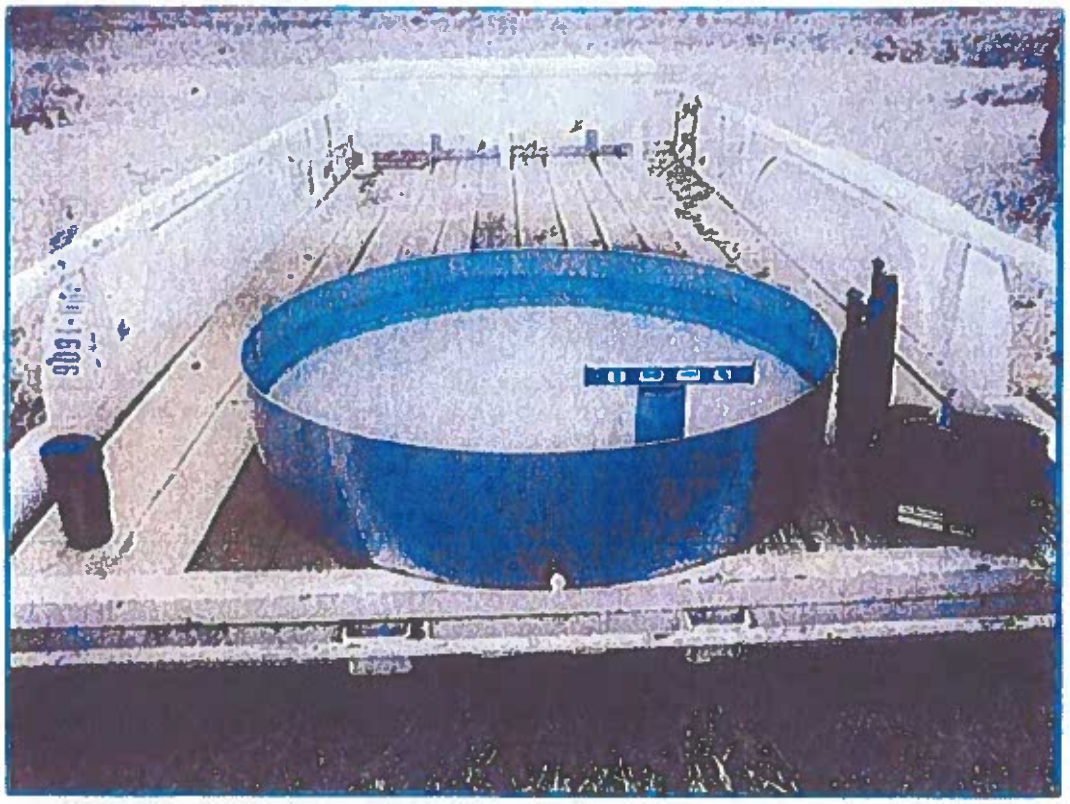
Contact

Appendix E

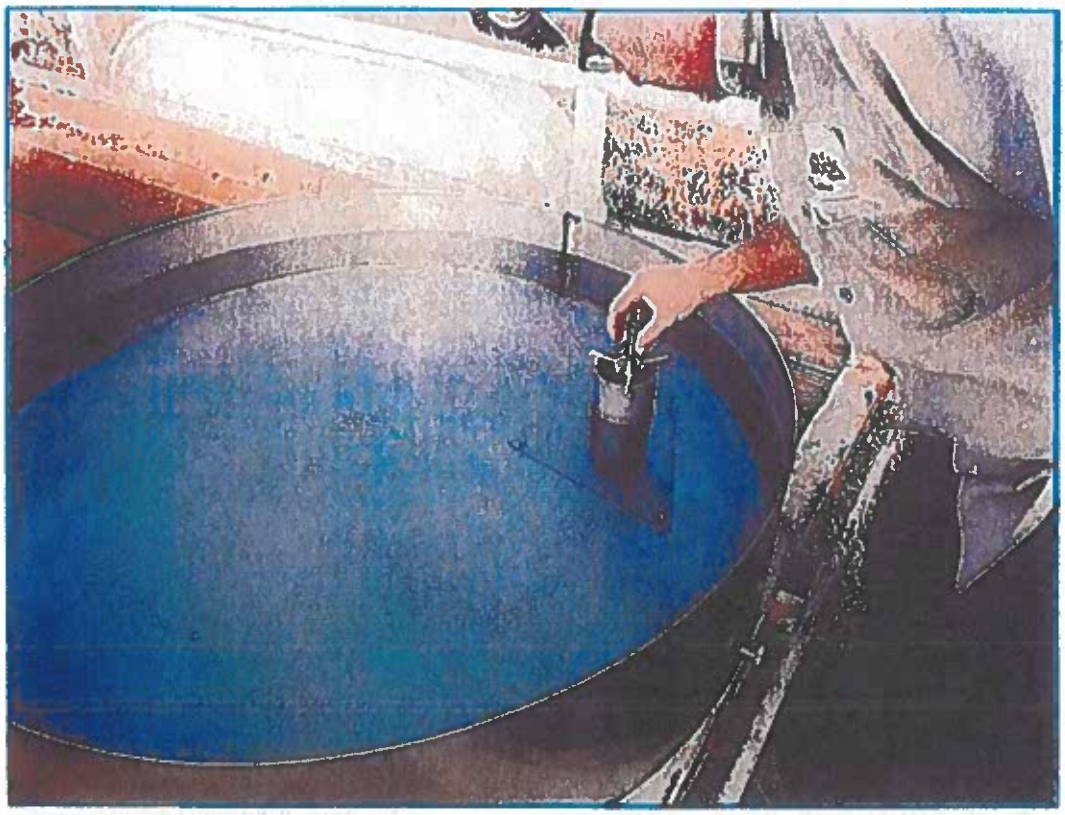
Photos of Evaporation Station

and

Pond Measurement Stilling Wells

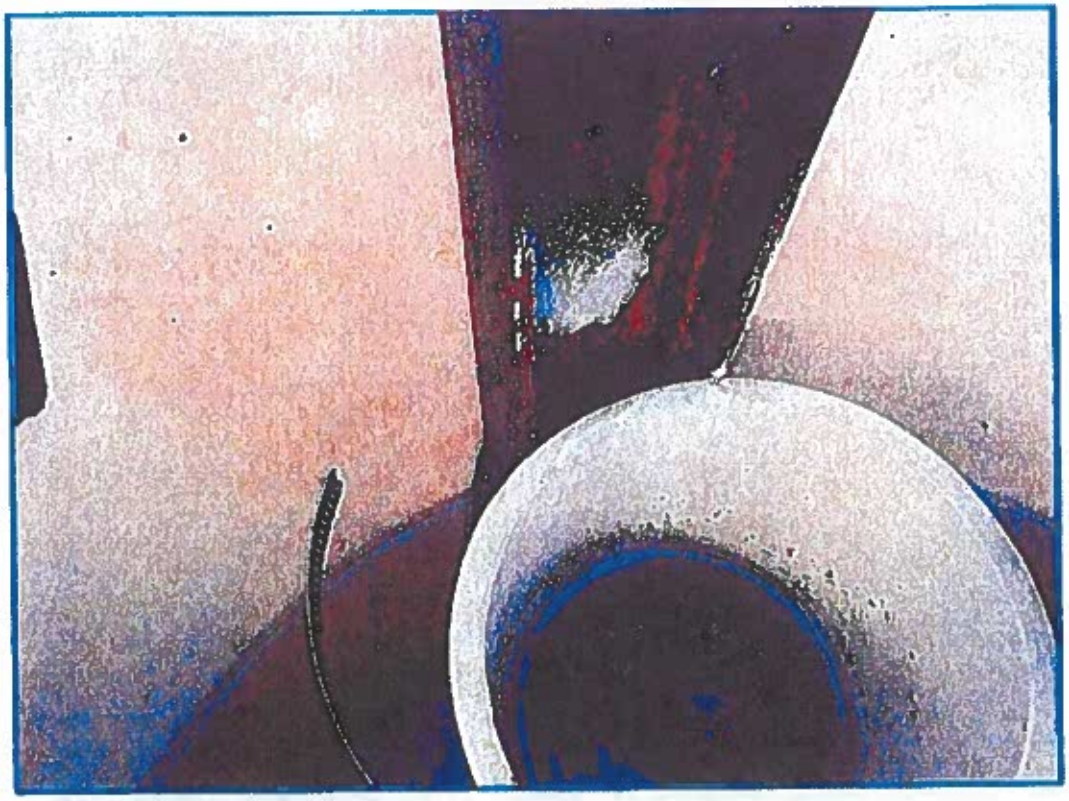


E-1 Evaporation Pan Deployment

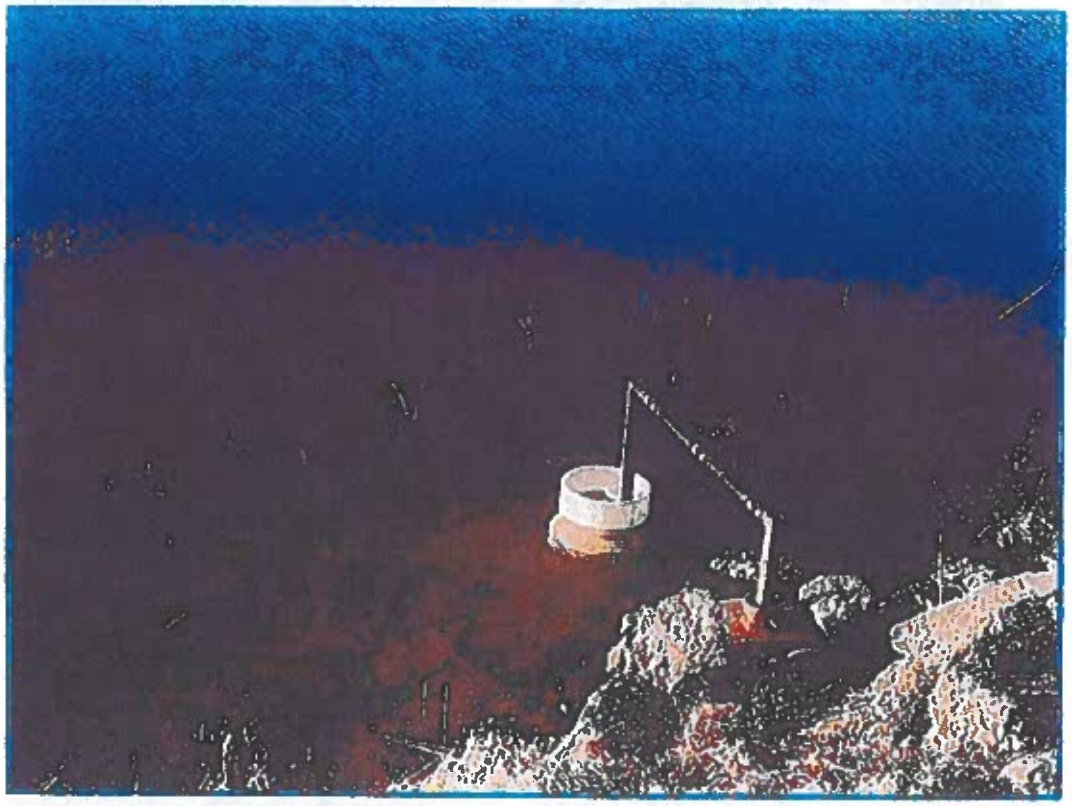


E-2 Evaporation Pan Measurement

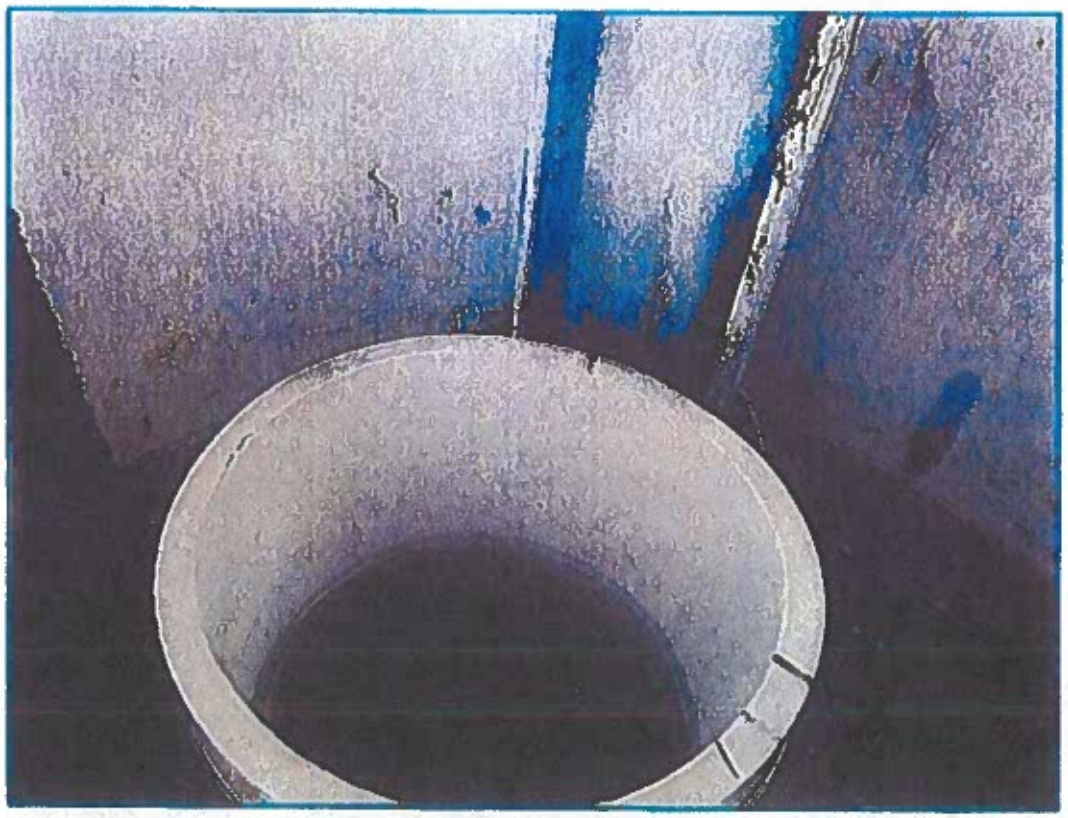
E-3. Stilling Well Installation at HLAS Pond 1



E-4. Stilling Well at HLAS Pond 1

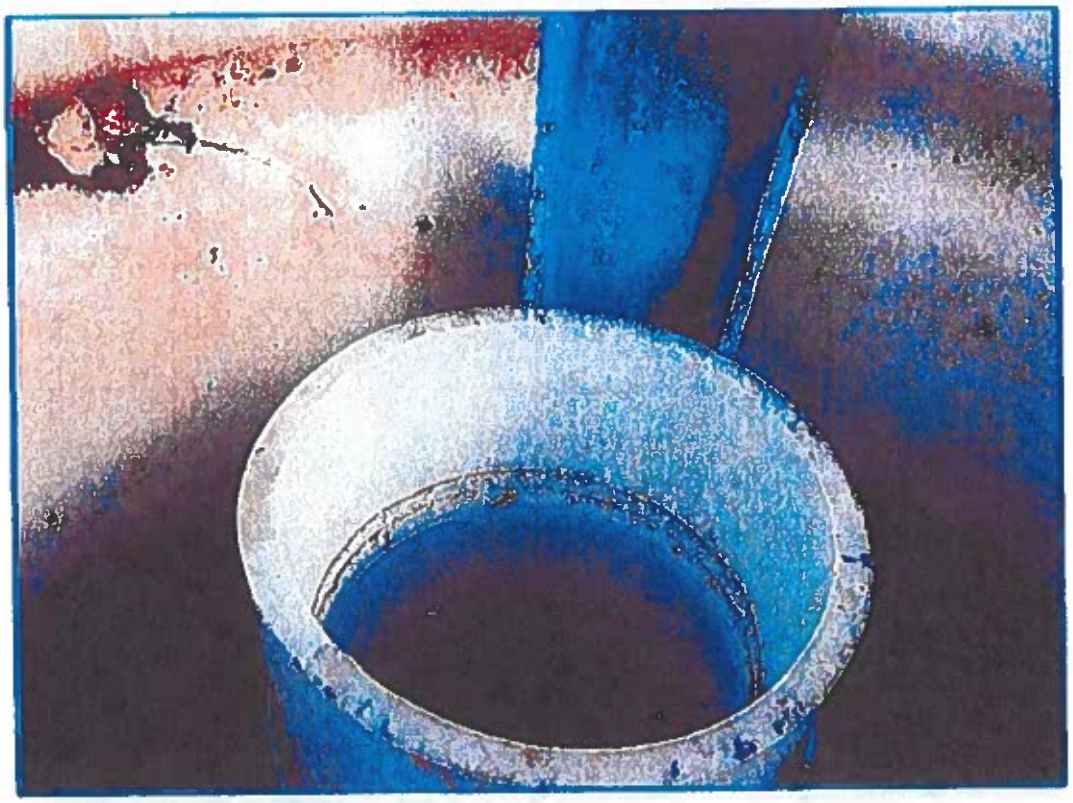


E-5. Stilling Well Installation at HLAS Pond 2

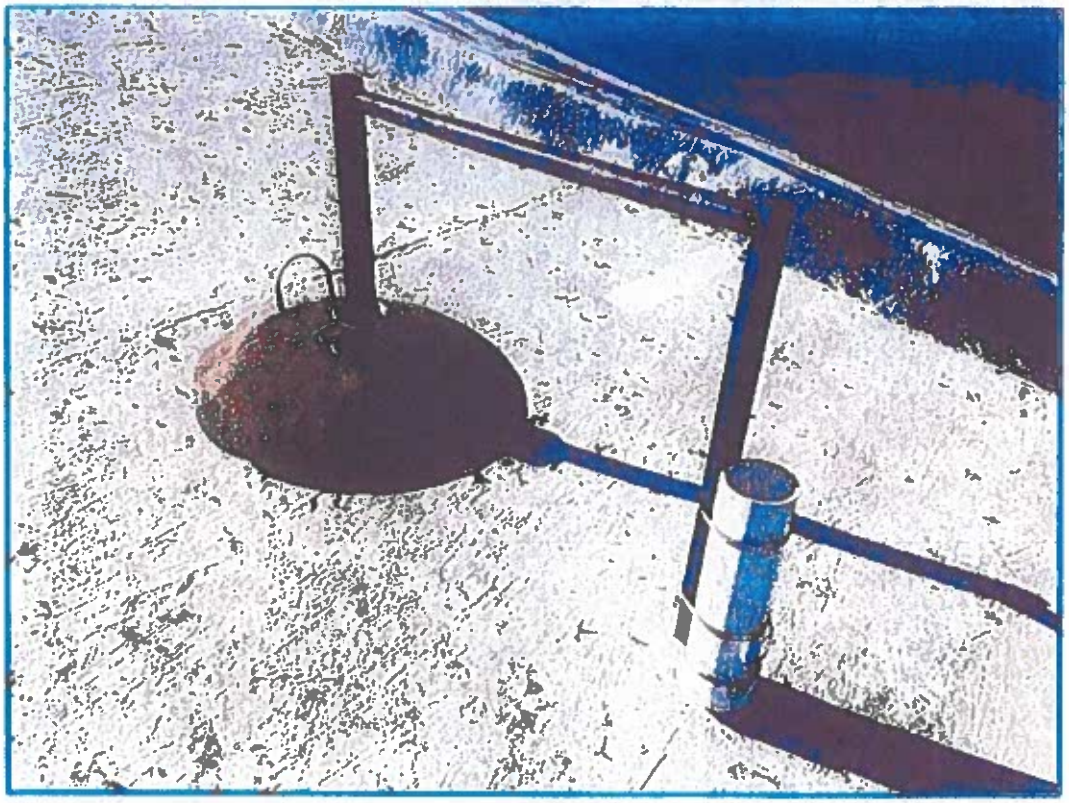


E-6. Stilling Well at HLAS Pond 2

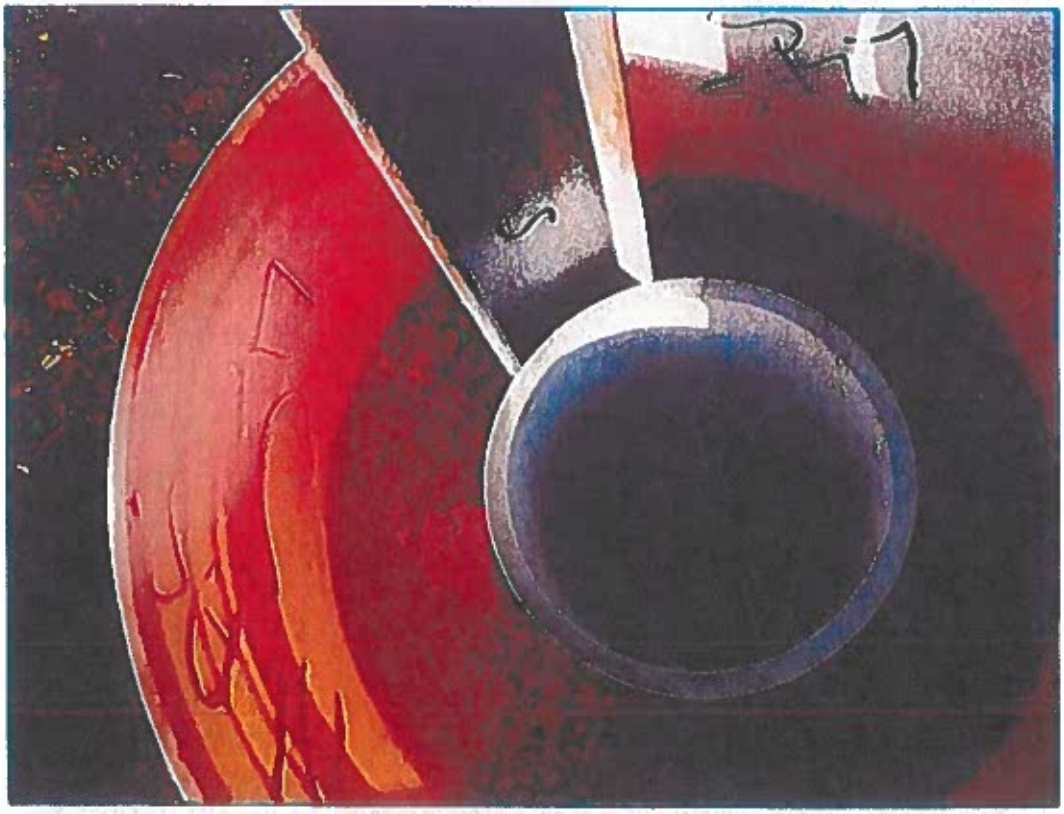
E-7. Stilling Well Installation at HLAS Pond 3



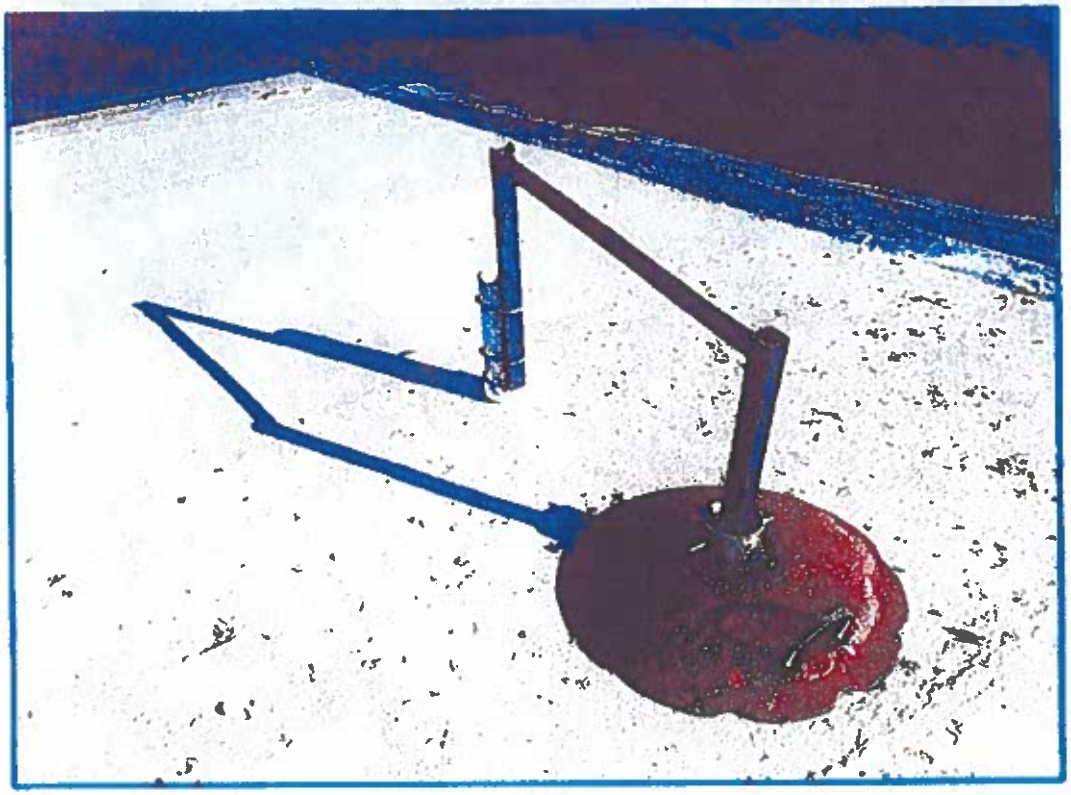
E-8. Stilling Well at HLAS Pond 3



E-9. Stilling Well Apparatus at LLAS Pond Suction Cell



E-10. Stilling Well at LLAS Pond Suction Cell



E-11. Stilling Well Apparatus at LLAS Pond Main Cell

E12. Stilling Well at LLAS Pond Main Cell

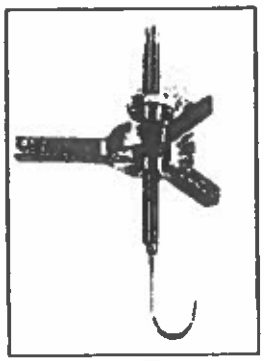
Appendix F

Evaporation Pan and Hook Gage Data Sheet

from Manufacturer

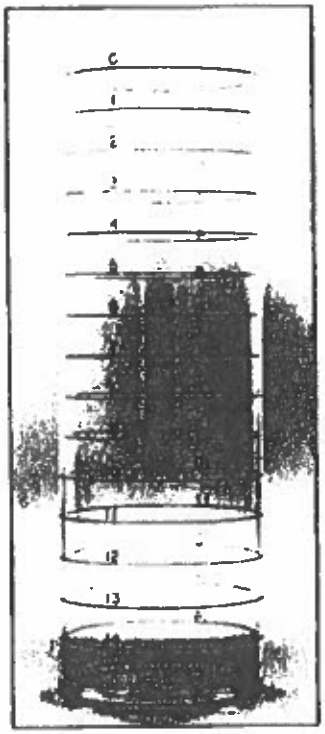
Group 255 Evaporation Stations

The **Group 255 Evaporation Stations** are complete systems used to measure the amount of water lost each day to evaporation. There are two commonly used procedures for making these measurements. In both, a U.S. National Weather Service Class A Evaporation Pan, 10 inches deep and 47.5 inches in diameter, holds the water and is normally installed on a wooden platform set on the ground in a grassy location.



255-214 Hook Gauge

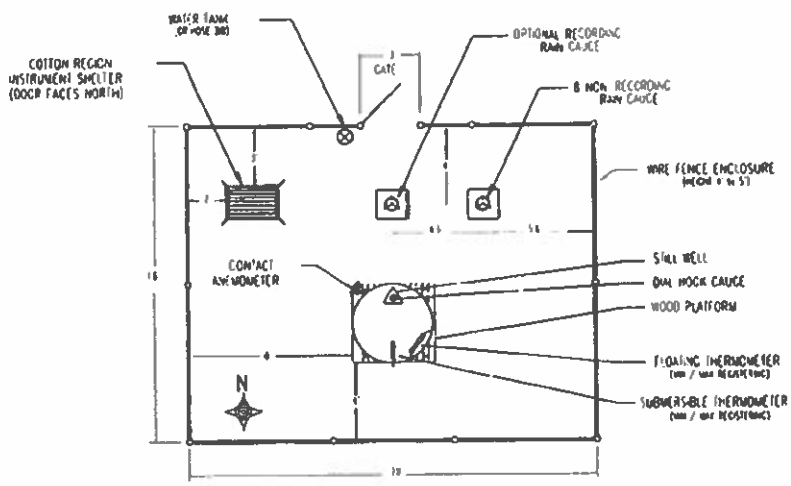
255-205 Stillwell



255-211E Replacement Graduate

One alternative for measuring the daily evaporation loss is to use a graduated hook gauge set on a stillwell to determine the water level in the pan. The hook gauge is adjusted until the point just breaks the water surface, and a reading is taken from the attached scale. The second alternative uses a stillwell with a fixed point. Each time a measurement is taken, the pan is refilled to the level of the point using a calibrated graduate. The graduate has a surface area of 1/100 that of the pan, so that the amount of water added is the equivalent evaporation. The choice between these alternatives is generally made on a practical basis, such as the availability of daily replacement water.

The U.S. National Weather Service standard evaporation and climatological station requires daily observations to collect the data; thus, it is not suitable for remote, unattended locations. The recommended layout of the plot and instruments for a station in the northern hemisphere is shown in the diagram. The 16' x 20' plot is the minimum for the equipment shown. Accessories such as a rain gauge wind screen would require enlargement of the plot to 20' x 20'. This station should be installed on a sod surface where obstructions are no closer than 4 times their height. Shadows should not fall on the evaporation pan except for brief periods at sunrise and sundown. NovaLynx can provide the instruments to satisfy U.S. National Weather Service requirements.



EVAPORATION STATION
RECOMMENDED N W S CONFIGURATION

Group 255 Evaporation Stations

The amount of evaporation is a function of temperature humidity wind and other ambient conditions In order to relate the evaporation to current or expected conditions the maximum and minimum temperatures of the water and the amount of air passage are normally recorded along with evaporation Instruments for measuring air temperature humidity rainfall and other parameters are described in their respective catalog sections

Specifications

Evaporation Pan
Material Low carbon stainless steel
Construction Heliarc welded with 1/2" drain plug
Size 10" H x 47.5" I.D. (254 mm x 1206 mm)
Weight/shipping 50 lbs/68 lbs (23 kg/31 kg) (Box 50" x 49" x 11")

Hook Gauge
Span 3" or 7 cm
Graduations stem Major divisions 1" or 1 cm
Minor divisions 0.1" or 0.1 cm (1 mm)
Graduations dial Major divisions 0.01" or 0.1 mm
Minor divisions 0.002" or .02 mm
Size 7" L x 5.25" Dia (178 mm x 133 mm)
Weight/shipping 1 lb/3 lbs (0.5 kg/1.4 kg)

Stillwell
Material Stainless steel
Size 4" Dia x 9" H (102 mm x 229 mm)
Weight/shipping 6.5 lbs/10 lbs (2.9 kg/4.5 kg)

Stillwell with Fixed Point
Height of point 7.5" (191 mm)
Material Stainless steel
Size 4" Dia x 9" H (102 mm x 229 mm)
Weight/shipping 6.6 lbs/10 lbs (3.0 kg/4.5 kg)

Replacement Graduate
Graduations 0.01" or 0.2 mm
Material Polycarbonate
Size 4.75" I.D. x 16" H (121 mm x 406 mm)
Weight/shipping 1.5 lbs/3 lbs (0.7 kg/1.4 kg)

Floating/Submersible Thermometer
Type Digital minimum maximum
Typical range -18° to +65° C or 0° to +150° F
Mounting Polypropylene floats with sun shield
Size 11-1/4" long without floats 13-1/2" with floats
Weight/shipping 1 lb/3 lbs (0.5 kg/1.4 kg)

Totalizing Anemometer
Sensor 3 cup assembly glass reinforced nylon 1.125" dia cups
Counter type 8-digit electronic LCD in NEMA-4X enclosure
Resolution (counter and contact) 0.1 mile or 0.1 km
Materials Thermoplastic anodized aluminum stainless steel
Mounting Pre-drilled flanged base
Size 5.5" W x 5" D x 16" H (140 x 127 x 400 mm)
Weight/shipping 5 lbs/9 lbs (2.3 kg/4 kg)

Wooden Platform
Material Pressure treated 2x6 & 2x4 lumber
Size Assembled 4' x 4' Disassembled 10" x 10" x 4"
Weight/shipping 55 lbs/60 lbs

Ordering Information

Hook Gauge Evaporation Station, English (Class A Station)

255-200	Evaporation Pan
255-205	Stillwell
255-212	Floating/Submersible Min Max Thermometer °F
255-214	Hook Gauge English units
200-2510-A	Totalizing Anemometer miles

Hook Gauge Evaporation Station, Metric

255-200	Evaporation Pan
255-205	Stillwell
255-212	Floating/Submersible Min-Max Thermometer °C
255-215	Hook Gauge, metric
200-2511-A	Totalizing Anemometer kilometers

Fixed Point Evaporation Station, English

255-200	Evaporation Pan
255-210	Stillwell with Fixed Point
255-211E	Replacement Graduate English
255-212	Floating/Submersible Min-Max Thermometer °F
200-2510-A	Totalizing Anemometer miles

Fixed Point Evaporation Station, Metric

255-200	Evaporation Pan
255-210	Stillwell with Fixed Point
255-211M	Replacement Graduate Metric
255-212	Floating/Submersible Min-Max Thermometer °C
200-2511-A	Totalizing Anemometer kilometers

Appendix G

Temperature Gage Data Sheet from Manufacturer

ONSET

HOBO® MX2201 Data Logger

Pendant MX Water Temperature Data Logger

The HOBO MX2201 waterproof temperature logger leverages the power of Bluetooth Low Energy (BLE) to deliver accurate temperature measurements straight to your iOS or Android mobile device. Designed for durability, this compact waterproof logger is ideal for measuring temperature in streams, lakes, oceans, and soil environments. Data collection in the field has never been easier!

Supported Measurements:

Temperature and Water Temperature

Key Advantages:

- Convenient wireless setup and download via Bluetooth Low Energy (BLE)
- Large memory stores 96,000 measurements
- Waterproof to 30 meters (100 feet)
- User-replaceable battery
- Mounting tabs for fast, easy deployment
- LED alarm notifies you when temperature exceeds set threshold
- Works with Onset's free HOBOmobile app
- ±0.5°C (±0.9°F) accuracy

HOBO MX2201 Data Logger Specifications

Temperature Sensor (MX2201 and MX2202)	
Range	-20° to 70°C (-4° to 158°F) in air -20° to 50°C (-4° to 122°F) in water
Accuracy	±0.5°C from -20° to 70°C (-4° to 158°F)
Resolution	0.04°C (0.072°F)
Drift	<0.1°C (0.18°F) per year
Response Time	17 minutes typical to 90% in air moving 1 m/s, unmounted 7 minutes typical to 90% in stirred water, unmounted

Logger	
Radio Power	1 mW (0 dBm)
Transmission Range	Approximately 30.5 m (100 ft) line-of-sight
Wireless Data Standard	Bluetooth Smart (Bluetooth Low Energy, Bluetooth 4.0)
Logger Operating Range	-20° to 70°C (-4° to 158°F) in air
Logging Rate	1 second to 18 hours
Buoyancy (Fresh Water)	2g (0.07 oz) positive
Waterproof	To 30.5 m (100 ft)
Memory	96,000 measurements
Battery	CR2032 3V lithium, user replaceable
Battery Life	1 year typical at 25°C (77°F) with logging interval of 1 minute and Bluetooth Always Off disabled in software. 2 years typical at 25°C (77°F) with logging interval of 1 minute and Bluetooth Always Off enabled in software. Faster logging intervals and statistics sampling intervals, burst logging, remaining connected with the app, excessive downloads, and paging may impact battery life. To ensure proper battery installation, see Battery Information for detailed instructions on replacing the battery.
Time Accuracy	± 1 minute per month at 25°C (77°F)
Full Memory Download	Approximately 45 seconds; may take longer the farther the device is from the logger
Wetted Materials	Polypropylene case, EPDM O-ring
Dimensions	3.35 x 5.64 x 1.8 cm (1.32 x 2.22 x 0.69 inches)
Weight	12.75 g (.45 oz)

The CE Marking identifies this product as complying with all relevant directives in the European Union (EU). This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules.

Contact Us

Sales (8am to 5pm ET, Monday through Friday)

- Email sales@onsetcomp.com
- Call 1-508-759-9500
- In U.S. toll free 1-800-564-4377
- Fax 1-508-759-9100

Technical Support (8am to 8pm ET, Monday through Friday)

- Contact Product Support www.onsetcomp.com/support/contact
- Call 1-508-759-9500
- In U.S. toll free 1-877-564-4377

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Bourne, MA 02532

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Appendix H. Blank Measurement Data Sheet

City of Lubbock
LAS Pond Seepage Testing Procedures

Start of Measurement Period[1]

Evaporation Pan Initiation

1. Ensure evaporation pan and stilling well are level.
2. Fill evaporation pan to within 2 inches (50 mm) of the top of the stilling well.
3. Start temperature data logger.
4. Record person's name who is taking the hook gage readings. The same person should do all of the readings taken at the evaporation pan for consistency.
5. Record the time hook gage readings start.
6. Take evaporation pan hook gage measurement. The average of seven (7) separate readings will constitute one measurement. After each reading, remove the hook gage from the stilling well, adjust the hook gage by at least one-half inch, then replace the hook gage and take the next reading.
7. Record the time hook gage readings finish.
8. Take a photograph of the evaporation pan as you leave.
9. Secure the evaporation pan as necessary (barrier, temp fencing, etc.).

Pond Measurement Initiation

1. Take adequate safety precautions (personal flotation devices, 3 persons present, etc.).
2. Adjust the stilling well so water surface is within the range of the hook gage (about 2.5 inches).
3. Verify the top of the stilling well is level.
4. Spray paint a mark along top of the stilling well and the mounting post to mark the position of the stilling well.
5. Mark the orientation of the hook gage "legs" on the stilling well. Use this same orientation every reading.
6. Record person's name who is taking the hook gage readings. The same person should do all of the readings taken at a pond over the three-day period for consistency.
7. Photograph the stilling well close enough to easily capture the relation between the mark and the top of the stilling well.
8. Record the time hook gage readings start.
9. Take hook gage measurement. The average of seven (7) separate readings will constitute one measurement. After each reading, remove the hook gage from the stilling well, adjust the hook gage by at least one-half inch, then replace the hook gage and take the next reading.
10. Record the time hook gage readings finish.
11. Photograph the stilling well close enough to easily capture the relation between the mark and the top of the stilling well.

During the Measurement Period (measurements at 24-hour intervals, or more frequently if resources allow)

Evaporation Pan Measurements

1. Check rain gage for any precipitation since the last measurement.
2. Repeat steps 4-9 for evaporation pan measurements, above.

Pond Level Measurements

1. Repeat steps 6-11 for pond level measurements, above.

---

[1] Take the initial evaporation pan measurement first before initiating the first pond measurement, then always take subsequent evaporation pan measurements after the pond level measurements.

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: _____

Technician: _____

Date: _____

Conditions (clear, cloudy, warm, cool, etc.): _____

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____ Depth of Rainfall Measured: _____

Air Temperature: _____ Water Temperature: _____

Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☐ Starting Photograph of Stilling Well

☐ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Ending Photograph of Stilling Well

Notes:

Appendix I

Hancock LAS Data Collection Sheets

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Tank / Res 2

Technician: Timmy Gilbreath

Date: 11/15/19

Conditions (clear, cloudy, warm, cool, etc.): cold cloudy windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N

Air Temperature: Logger Water Temperature: _____

Start Time: 8:20 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2400	2492	2403	2403	2421	2401	2419

End Time: 825 (AM/PM)

☒ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: ~~0 [illegible]~~ (AM/PM) 920

Reading No.	1	2	3	4	5	6	7
Reading	2751	2721	2749	2750	2762	2755	2736

End Time: 923 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes: ~~1 8/10~~ 1 8/10

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Rsv 1

Technician: Jimmy G. Breath

Date: 1/15/19

Conditions (clear, cloudy, warm, cool, etc.): cold, cloudy, windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____

Air Temperature: _____ Water Temperature: _____

Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 940 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1832	1993	1840	1744	1703	1936	1843

End Time: 946 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes:
~~2.5"~~ 2 5/10

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: RSU 3

Technician: Jimmy Gilbreath

Date: 11/15/19

Conditions (clear, cloudy, warm, cool, etc.): cold, cloudy windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____

Air Temperature: _____ Water Temperature: _____

Start Time: _____(AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____(AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1013 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2640	2566	2534	2561	2586	2568	2590

End Time: 1019 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes: ~~1.84~~ 1.810

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: PSV. 1

Technician: Jimmy Gilbreath

Date: 1/15/19

Conditions (clear, cloudy, warm, cool, etc.): Warm. Cool. Sunny

Evaporation Pan Measurement

Precipitation Present in Rain Gage ~~(Y/N)~~ 0

Air Temperature: _____ Water Temperature: _____

Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1654 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1763	1766	1723	1751	1792	1750	1700

End Time: 1658 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes: 2.7" 0.28

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Tank | Rsv 2

Technician: Jimmy Gilbreath

Date: 01/15/19

Conditions (clear, cloudy, warm, cool, etc.): cool, clear, windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? No

Air Temperature: 60 / 59.02 Water Temperature: _____

Start Time: 1611 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2367	2373	2380	2367	2369	2384	2379

End Time: 1618 (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1622 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	~~2619~~	~~2663~~	~~2766~~	~~2726~~	~~2842~~	~~2810~~	~~2821~~

End Time: ~~1624~~ (AM/PM) 1633

☒ Ending Photograph of Stilling Well

Notes:

3	4	5	6	7
2789	2822	2754	2600	2417	2754	2772
~~0.19'~~	0.19'					

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: TGU 3

Technician: Jimmy Gilbreath

Date: 11/15/19

Conditions (clear, cloudy, warm, cool, etc.): Cold, windy, sunny

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____

Air Temperature: _____ Water Temperature: _____

Start Time: _____(AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____(AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1716 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2546	2546	2522	2522	2504	2506	2518

End Time: 1719 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes: 0.59

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: RSV 1

Technician: Jimmy Gilbreath

Date: 11/16/19

Conditions (clear, cloudy, warm, cool, etc.): Partly cloudy, cold

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____

Air Temperature: _____ Water Temperature: _____

Start Time: _____(AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____(AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 833 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1606	1768	1632	1630	1650	1643	1584

End Time: 834 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes:

0.250

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Tank 1 Rev 2

Technician: Jimmy G. [illegible]

Date: 1/16/19

Conditions (clear, cloudy, warm, cool, etc.): Partly Cloudy, cold

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N

Air Temperature: 40° 41.34° Water Temperature: _____

Start Time: 807 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2341	2328	2312	2322	2323	2313	2305

End Time: 810 (AM/PM) .210

☒ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 819 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2373	2383	2380	2322	2368	2349	2340

End Time: 821 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes: 0.20

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: RSV 3

Technician: Jimmy Gilbreath

Date: 1/16/19

Conditions (clear, cloudy, warm, cool, etc.): Partly cloudy, cold

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____

Air Temperature: _____ Water Temperature: _____

Start Time: _____(AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____(AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 851 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2312	2244	2264	2244	2262	2279	2322

End Time: 854 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes: .216

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: RSV 1

Technician: Jimmy Gilbreath

Date: 1/16/19

Conditions (clear, cloudy, warm, cool, etc.): Cloudy, windy cool

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____

Air Temperature: _____ Water Temperature: _____

Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1638 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1269						

End Time: 1648 (AM/PM)

Reading not taken

☐ Ending Photograph of Stilling Well

Notes:

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Pond 1 Pond 2

Technician: Jimmy Gilbreath

Date: 11/16/19

Conditions (clear, cloudy, warm, cool, etc.): Cloudy, windy cool

Evaporation Pan Measurement

Precipitation Present In Rain Gage (Y/N)? N

Air Temperature: 69 Water Temperature: _____

Start Time: 1612 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2243	2253	2262	2294	2259	2240	2239

End Time: 1614 (AM/PM)

☒ Photograph of Evaporation Pan

Pond Level Measurement

☒ Starting Photograph of Stilling Well

☒ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1623 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2474	2410	2438	2406	2444	2322	2356

End Time: 1627 (AM/PM)

☒ Ending Photograph of Stilling Well

Notes: .20

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: RSV 3

Technician: Jimmy Gilbreath

Date: 1/16/19

Conditions (clear, cloudy, warm, cool, etc.): Cloudy, cool windy

<u>Evaporation Pan Measurement</u>

Precipitation Present in Rain Gage (Y/N)? ____

Air Temperature: _____ Water Temperature: _____

Start Time: _____(AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____(AM/PM)

☐ Photograph of Evaporation Pan

<u>Pond Level Measurement</u>

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1700 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2279	2296	2242	2024	2110	2198	2139

End Time: 1704 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes: .210

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: R1

Technician _____

Date: 1-17-19 AM

Conditions (clear, cloudy, warm, cool, etc.) clear, cold, calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N) ____ Depth of Rainfall Measured: 0

Air Temperature: _____ Water Temperature: _____

Start Time: _____ (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☐ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 9:38 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: (AM/PM)

☐ Ending Photograph of Stilling Well

Notes:

0.32

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: R2

Technician:

Date: 1-17-19 - AM

Conditions (clear, cloudy, warm, cool, etc.): Clear, cool, calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? Depth of Rainfall Measured: 0

Air Temperature: Water Temperature:

Start Time: 0814 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	2128	2118	2112	2117	2116	2108	2112

End Time: 0819 (AM/PM)

☑ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 0826 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	2173	2230	2217	2174	2160	2146	2124

End Time: 0829 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes: 0.22

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: R3

Technician:

Date: 1-17-19 AM

Conditions (clear, cloudy, warm, cool, etc.): cool, clear, calm/breezy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? Depth of Rainfall Measured:

Air Temperature: Water Temperature:

Start Time: (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 8 57 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	~~1900~~ 1900	1878	1904	1907	1926	1910	1951

End Time: 9:00 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:

0.24

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: R-1

Technician: Jimmy Gilbreath

Date 1-17-19 PM

Conditions (clear, cloudy, warm, cool, etc.) clear, Warm, calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N) Depth of Rainfall Measured

Air Temperature: _____ Water Temperature

Start Time (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time 1711 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	3362	3380	3360	3388	~~335~~ 3458	3396	3382

End Time 1714 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes

0.315

Hook gauge extention - need to mivos

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: R-2

Technician: Simmy Gilbreath

Date: 1-17-19 PM

Conditions (clear, cloudy, warm, cool, etc.): warm, clear, calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N): N Depth of Rainfall Measured: 0

Air Temperature: Water Temperature:

Start Time: 1646 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	~~2054~~ 2054	2056	2057	2048	2048	2056	2040

End Time: 1648 (AM/PM)

☑ Photograph of Evaporation Pan

Fixed Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1657 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2053	2032	1988	2022	2030	2035	2042

End Time: 1659 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:

0.23

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: R-3

Technician: Jimmy Gilbreath

Date: 1-17-19 PM

Conditions (clear, cloudy, warm, cool, etc.): warm, clear, calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? _____ Depth of Rainfall Measured _____

Air Temperature: _____ Water Temperature: _____

Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photographed Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 17:27 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1795	1784	1774	1802	1770	1778	1782

End Time: 1731 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:

0.25

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name R1

Technician Jimmy Gibbs

Date 1-18-19 AM

Conditions (clear, cloudy, warm, cool, etc.): cool, ~~clear~~ Partly Cloudy, Windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? Depth of Rainfall Measured

Air Temperature: Water Temperature:

Start Time (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading							

End Time. (AM/PM)

[ ] Photograph of Evaporation Pan

Pond Level Measurement

[✓] Starting Photograph of Stilling Well

[✓] Hook gage orientation marked (initial reading line, level on mark (subsequent readings)

Start Time 0808 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	3154	3148	3142	3134	3168	3140	3200

End Time 0811 (AM/PM)

[✓] Ending Photograph of Stilling Well

Notes

Hook gage has extension went to minus -
0.34

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: R-2

Technician: Jimmy Gilbreath

Date: 1-18-19 AM

Conditions (clear, cloudy, warm, cool, etc.): Cool, Partly Cloudy, Breezy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? (N) Depth of Rain Measured: Ø

Air Temperature: Water Temperature:

Start Time: 0848 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1986	1990	1982	1996	1978	1978	1993

End Time: 0849 (AM/PM)

☑ Pond Depth of Evaporation Pan

Pond Level Measurement

☑ Start of Photograph of Stilling Well

☑ Hook Reconciliation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 0838 (AM/PM)

Reading No.	1	2	3	4	5	6	7	
Reading	~~1682~~	1763	1730	1748	1724	1706	1688	1698

End Time: 0841 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:

0.25
to
0.26

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: R3

Technician: Jimmy Gilbreath

Date: 1-18-19 AM

Conditions (clear, cloudy, warm, cool, etc.): Cool, Partly Cloudy Breezy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N): Y ___ Depth of R[illegible] f[illegible] M[illegible] as i[illegible]e: Ø

Air Temperature: _____ Water Temper[illegible] i[illegible]e

Start Time _____ (AM/PM)

Reading No.	1	2	3	4	5
Reading					

End Time _____ (AM

☐ Ph[illegible]o[illegible]raph of [illegible]apo[illegible]at[illegible] P[illegible]

[illegible]on[illegible] Le[illegible] M[illegible]asu[illegible]ment

☑ Start[illegible] Photograph of St[illegible]

☑ Hook ga[illegible] one[illegible]tation marked (initia[illegible] [illegible]) or place [illegible] [illegible] (subsequent readings)

Start Time 0825 (AM/PM)

Reading No.	1	2	3		5	6	7
Reading	1586	1528	1606	1507	1586	1538	1574

End Time 0827 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes

0.28

Appendix J

Lubbock LAS Data Collection Sheets

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: LLAS - 5

Technician: Jimmy Gilbreath

Date: 1-24-19

Conditions (clear, cloudy, warm, cool, etc.): clear, warm, calm-breezy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N): N Depth of Rainfall Measured: NA

Air Temperature: Water Temperature:

Start Time: 1717 (AM/PM)

Reading No	1	2	3	4	5	6	7	Tape
Reading	1.880	1.877	1.876	1.882	1.904	1.894	1.887	0.25

End Time: 1719 (AM/PM)

[✓] Photograph of Evaporation Pan

Pond Level Measurement

[✓] Starting Photograph of Stilling Well

[✓] Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1742 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	1.765	1.753	1.762	1.775	1.783	1.752	1.788

End Time: 17:44 (AM/PM)

[✓] Ending Photograph of Stilling Well

Notes

LLAS-5 - 31.25
Tape .26

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: LLAS - L

Technician: Jimmy Gilbreath

Date: 1-24-19

Conditions (clear, cloudy, warm, cool, etc.): clear warm, calm-breezy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N): Depth of Rainfall Measured:

Air Temperature: Water Temperature:

Start Time: (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading							

End Time: (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: ~~1724~~ 1725 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	~~1.534~~ 1.460	1.448	1.586	1.478	1.538	1.555	1.521

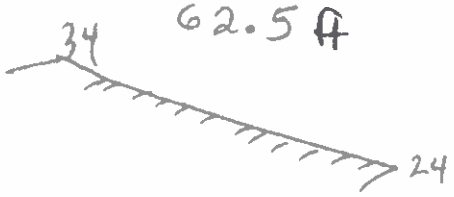
End Time: 1728 (AM/PM)

☐ Ending Photograph of Stilling Well

Notes

LLAS-L - 24 ft has mark

Tape measure 0.29
Tape marker 0.29



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Evap tank

Technician: Jimmy C

Date: 1-25

Conditions (clear, cloudy, warm, cool, etc.): 9664 Cold

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured N -

Air Temperature: 20 - Water Temperature

Start Time: 0803 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	1.574	1584	1.598	1.599	1.599	1.606	16.03

End Time: 0806 (AM/PM)

☑ Photograph of Evaporation Pan

Point Level Measurement:

☐ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading							

End Time (AM/PM)

☑ Ending Photograph of Stilling Well

Notes

Ice in Tank = .5 inch

0 29

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Small Res

Technician: Jimmy Lilbfeth

Date: 1-25-19

Conditions (clear, cloudy, warm, cool, etc.): Cold foggy calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured: N/A

Air Temperature: 23° Water Temperature

Start Time: 0817 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	1.325	1.336	1.328	1.357	1.340	1.333	1.350

End Time: 0822 (AM/PM)

[✓] Photograph of Evaporation Pan

Pond Level Measurement

[✓] Starting Photograph of Stilling Well

[✓] Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: (AM/PM)

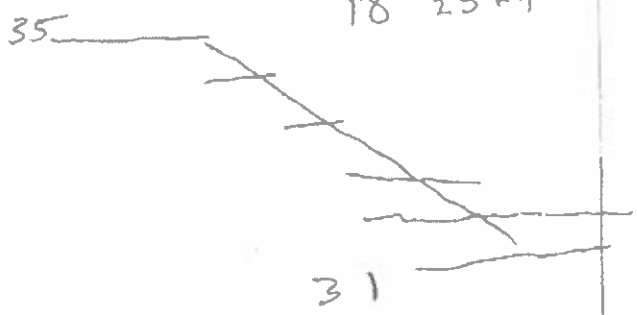
Reading No	1	2	3	4	5	6	7
Reading	1.325	1.336	1.328	1.357	1.340	1.333	1.350

End Time: (AM/PM)

[ ] Ending Photograph of Stilling Well

Notes

0.29 measurement
18 25 ft



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Large Res

Technician: Jimmy

Date: 1-25

Conditions (clear, cloudy, warm, cool, etc.): Cold Foggy Calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured Na

Air Temperature: 23° Water Temperature

Start Time: (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 0837 (AM/PM)

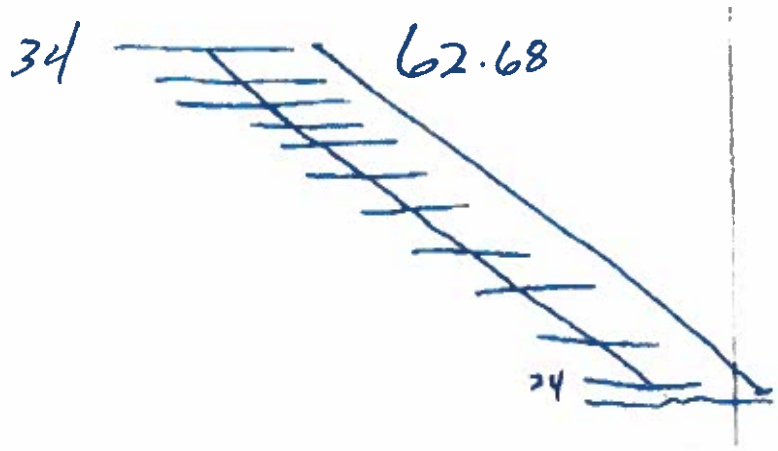
Reading No	1	2	3	4	5	6	7
Reading	1.518	1.508	1.506	1.526	1.478	1.513	1.518

End Time: 0839 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:

measure TBPE 0.29



City of Lubbock
LAS Pond Seepage Testing Datasheets

noon

Pond Name Evap tank

Technician Jimmy G

Date 1-25-19

Conditions (clear, cloudy, warm, cool, etc.) Cool Breezy sunny

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured. N/A

Air Temperature _____ Water Temperature

Start Time: 12:46 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	1.833	1.844	1.811	1.833	1.834	1.828	1.849

End Time 12:49 (AM/PM)

[✓] Photograph of Evaporation Pan

Pond Level Measurement SMALL

[✓] Starting Photograph of Stilling Well

[✓] Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

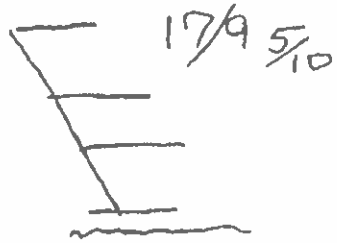
Start Time: 1250 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	1.304	1.280	1.304	1.282	1.300	1.271	1.269

End Time 1253 (AM/PM)

[✓] Ending Photograph of Stilling Well

Notes Pond small



measure tape 29 Evap tank

Ice 1/2 inch But melting

TAPE measure 3

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name:

Technician:

Date:

Conditions (clear, cloudy, warm, cool, etc.): Cool Breezy Sunny

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? Depth of Rainfall Measured

Air Temperature: Water Temperature:

Start Time: (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading							

End Time: (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement Large

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time 1305 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	1.510	1.508	1.494	1.500	1.490	1.484	1.520

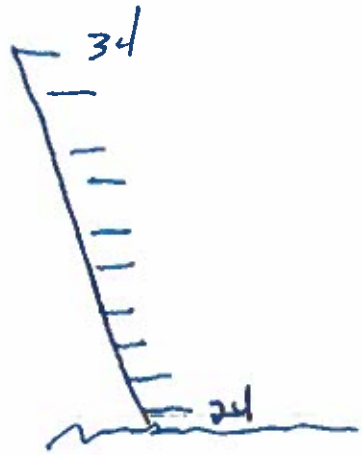
End Time 1310 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:

62.8/10

TAPE measure 2.7



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Evap tank

Technician: Jimmy

Date: 1-25-19

Conditions (clear, cloudy, warm, cool, etc.): Clear Warm Calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured: N/A

Air Temperature: 49° Water Temperature: _____

Start Time: 16:00 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.824	1.819	1.820	1.821	1.808	1.820	1.804

End Time: 16:05 (AM/PM)

☑ Photograph of Evaporation Pan

Pond Level Measurement Small

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 16:10 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.312	1.204	1.176	1.198	1.220	1.208	1.182

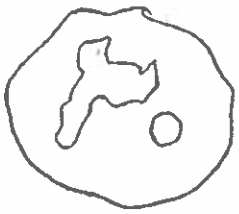
End Time: 16:20 (AM/PM)

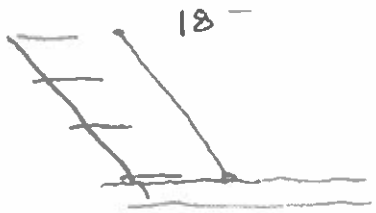
☑ Ending Photograph of Stilling Well

Notes:

Evap tank

Small amount of Ice in Center 1/16" thick





0.25 measure tape

30 measure tape

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Large LLAS

Technician: Jimmy G

Date: 1-25-19

Conditions (clear, cloudy, warm, cool, etc.): Clear Warm calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? n Depth of Rainfall Measured: n/A

Air Temperature: 61.9° Water Temperature: -

Start Time: 1612 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.470	1.468	1.529	1.500	1.470	1.402	1.502

End Time: 16 ~~15~~ (AM/PM)

☑ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

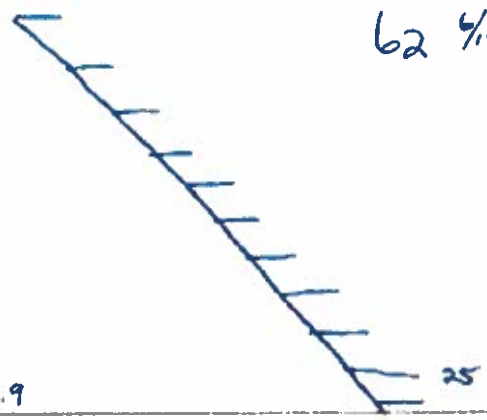
Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Ending Photograph of Stilling Well

Notes:



measure tape 2.9

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Evap tank

Technician: Jimmy

Date: 1-26-18

Conditions (clear, cloudy, warm, cool, etc.): Clear Cold calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured: N/A

Air Temperature: 22° Water Temperature: _____

Start Time: 0809 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.536	1.540	1.555	1.560	1.590	1.592	1.584

End Time: ~~[illegible]~~ 0812 (AM/PM)

☑ Photograph of Evaporation Pan

Pond Level Measurement SMALL

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 0813 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	3.313	3.326	3.330	3.316	3.328	3.327	3.358

End Time: 0821 (AM/PM)

☐ Ending Photograph of Stilling Well

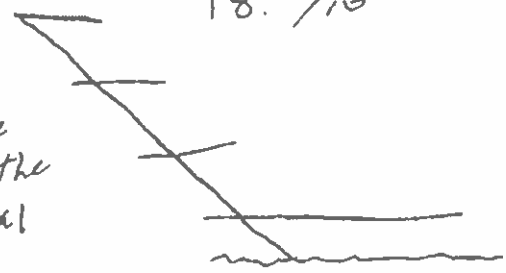
Notes:
measure tape 2.8
Evap tank

Frozen 1/2 inch

SMALL measure tape 3.2

18. 2/10

out of Range will have to add the additional hook



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Large

Technician: Jimmy G

Date: 1-26

Conditions (clear, cloudy, warm, cool, etc.): Clear Cold Calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured: n/A

Air Temperature: 42° Water Temperature: _____

Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 0025 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.468	1.425	1.425	1.429	1.430	1.432	1.438

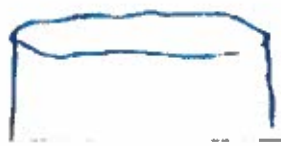
End Time: 0033 (AM/PM)

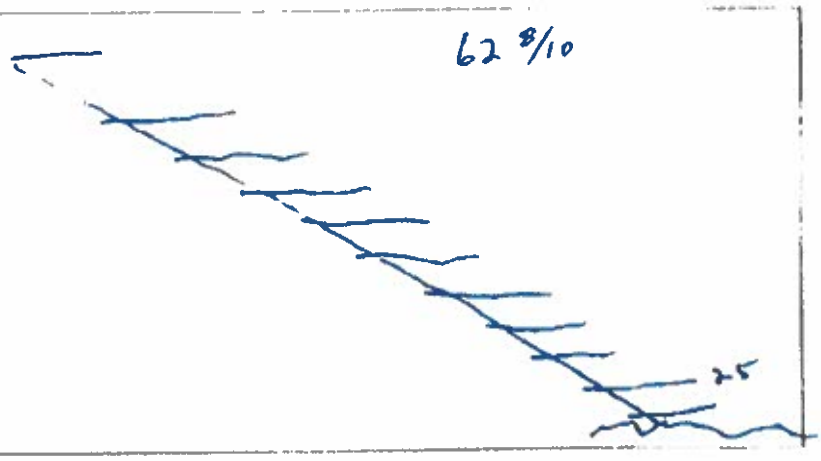
☑ Ending Photograph of Stilling Well

Notes:

TAPE 2.9

0 flow from transfer line





City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Evap tank

Technician: Jimmy

Date: 1-26-19

Conditions (clear, cloudy, warm, cool, etc.): Clear warmish breezy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured: na

Air Temperature: 52° Water Temperature: _____

Start Time: 1635 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.744	1.742	1.749	1.730	1.757	1.732	1.740

End Time: 1638 (AM/PM)

☑ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well Small

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1640 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	~~3.244~~ 3.278	3.241	3.302	3.286	3.288	3.293	3.316

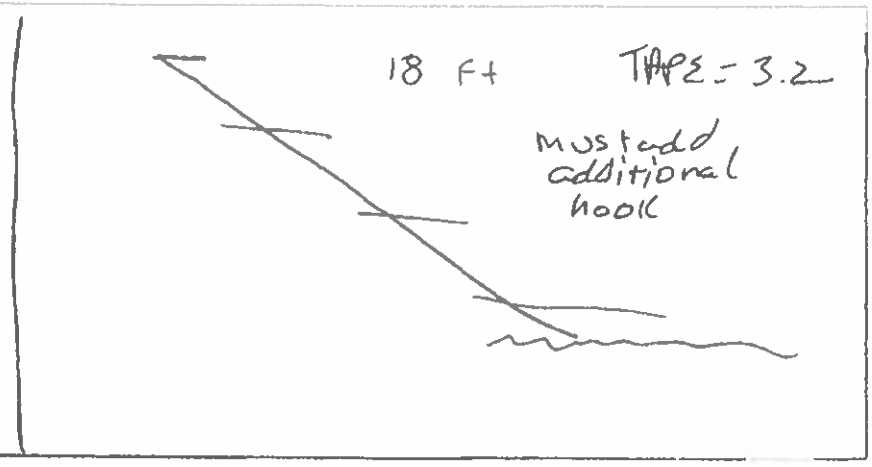
End Time: 1646 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:

no Ice

TAPE = 2.5



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Large

Technician: Jimmy

Date: 1-26-19

Conditions (clear, cloudy, warm, cool, etc.): Clear warmish Breezy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured: N/A

Air Temperature: 52 Water Temperature: _____

Start Time: 1648 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

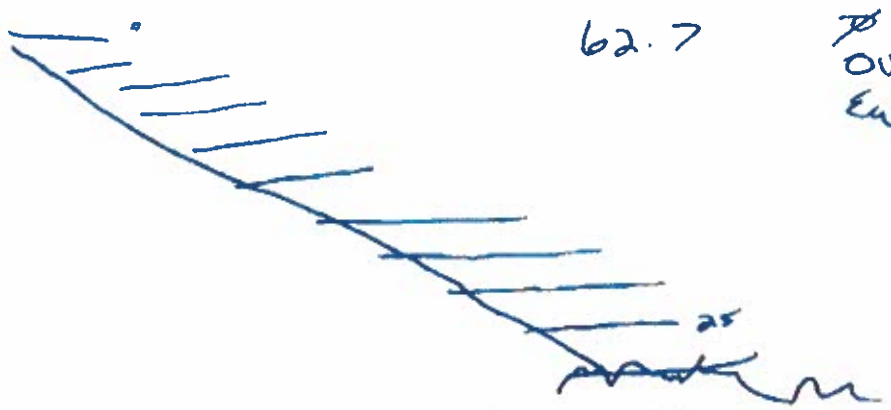
Start Time: 1646 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.432	1.370	1.412	1.406	1.419	1.494	1.413

End Time: 1653 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:



62.7

Ø flow over Ew pipe

City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Eval

Technician: Jimmy

Date: 1-27-19

Conditions (clear, cloudy, warm, cool, etc.): Clear Cold Calm

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured: N/A

Air Temperature: 28 Water Temperature: -

Start Time: 0805 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	1.605	1.607	1.622	1.598	1.611	1.611	1.612

End Time: 0808 (AM/PM)

[✓] Photograph of Evaporation Pan

Pond Level Measurement: Small

[✓] Starting Photograph of Stilling Well

[✓] Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 0811 (AM/PM) small

Reading No.	1	2	3	4	5	6	7
Reading	3.190	3.012	3.000	3.018	3.001	3.013	3.020

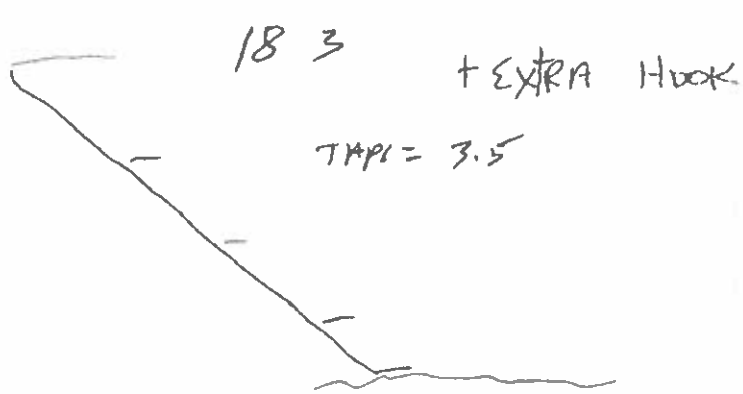
End Time: 0815 (AM/PM)

[✓] Ending Photograph of Stilling Well

Notes:

Evap tank frozen ½ inch

TAPI = 27



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Large

Technician: Jimmy

Date: 1-27

Conditions (clear, cloudy, warm, cool, etc.): Clear cold calm Brisk

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____ Depth of Rainfall Measured: ____

Air Temperature: 26° Water Temperature: ____

Start Time: ____ (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading	1.338	1.309	1.324	6336	1.313	1.331	1316

End Time: ____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

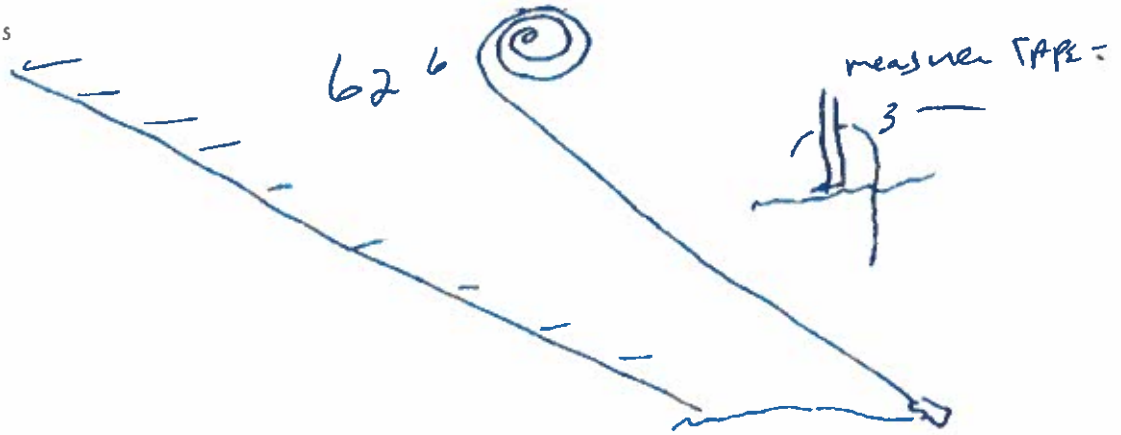
Start Time: 0817 (AM/PM)

Reading No	1	2	3	4	5	6	7
Reading							

End Time: 0822 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: EVA

Technician: Jimmy

Date: 1-27-19

Conditions (clear, cloudy, warm, cool, etc.): Warm Sunny Breezy/windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N Depth of Rainfall Measured: N/A

Air Temperature: 59 Water Temperature:

Start Time: 1643 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.526	1.578	1.572	1.574	1.573	1.567	1.574

End Time: 1645 (AM/PM)

☑ Photograph of Evaporation Pan

Pond Level Measurement

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

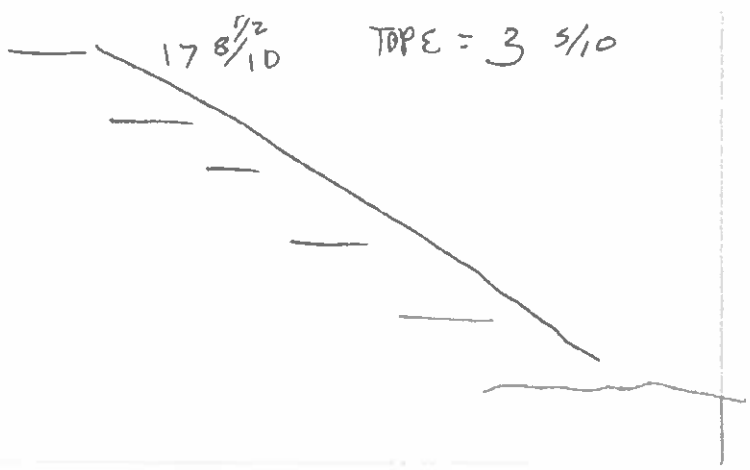
Start Time: 1652 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2.880	2.826	2.944	2.914	2.919	2.856	29.50

End Time: 1656 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes: Evap
TAPC 29



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Large

Technician: Jimmy

Date: 1-27-18

Conditions (clear, cloudy, warm, cool, etc.): warm sunny Breezy/windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? Depth of Rainfall Measured

Air Temperature Water Temperature

Start Time: (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: (AM/PM)

[ ] Photograph of Evaporation Pan

Pond Level Measurement

[✓] Starting Photograph of Stilling Well

[✓] Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 1658 (AM/PM)

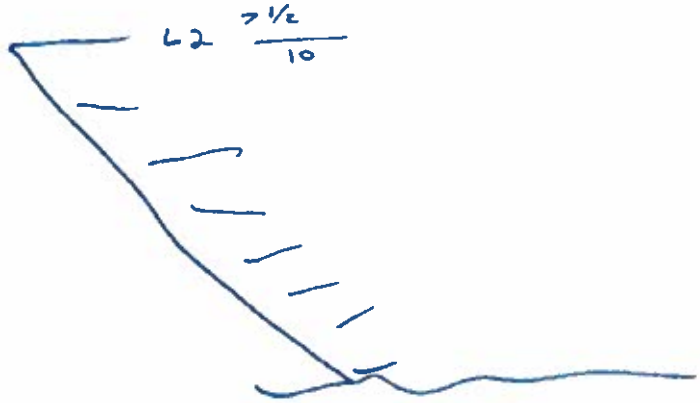
Reading No.	1	2	3	4	5	6	7
Reading	1.332	1.254	1.304	1.278	1.254	1.313	1.288

End Time: _____ (AM/PM)

[✓] Ending Photograph of Stilling Well

Notes:

Taps = 3.2



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Evap tank

Technician: Jimmy

Date: 1-28-19

Conditions (clear, cloudy, warm, cool, etc.): Cold windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? N

Air Temperature: 45 Water Temperature: _____

Start Time: 0810 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	1.478	1.456	1.467	1.465	1.466	1.463	1.471

End Time: 0814 (AM/PM)

☑ Photograph of Evaporation Pan

Pond Level Measurement SMALL

☑ Starting Photograph of Stilling Well

☑ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 0816 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	2.738	2.718	2.722	2.714	2.660	2.711	2.792

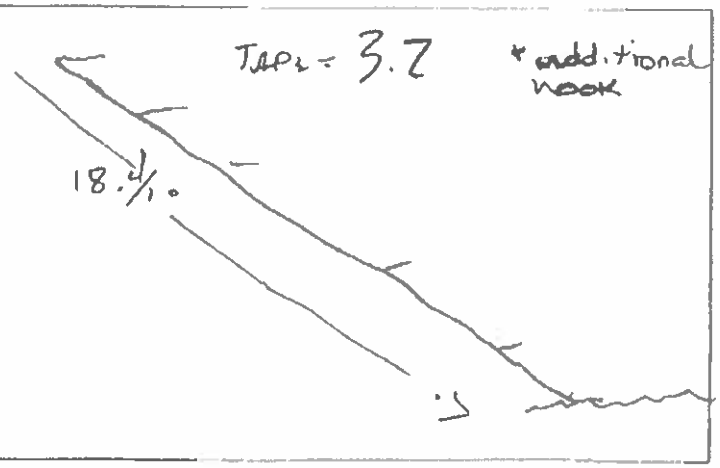
End Time: 0821 (AM/PM)

☑ Ending Photograph of Stilling Well

Notes:

TAPE = 2.9

Evap tank not frozen



City of Lubbock
LAS Pond Seepage Testing Datasheets

Pond Name: Large

Technician: Jimmy

Date: 1-27

Conditions (clear, cloudy, warm, cool, etc.): Cold windy

Evaporation Pan Measurement

Precipitation Present in Rain Gage (Y/N)? ____

Air Temperature: _____ Water Temperature: _____

Start Time: _____ (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading							

End Time: _____ (AM/PM)

☐ Photograph of Evaporation Pan

Pond Level Measurement

☐ Starting Photograph of Stilling Well

☐ Hook gage orientation marked (initial reading) or placed on mark (subsequent readings)

Start Time: 0822 (AM/PM)

Reading No.	1	2	3	4	5	6	7
Reading	NSR						

End Time: _____ (AM/PM)

☐ Ending Photograph of Stilling Well

*NSR- Wind causing water to splash over the still well

Notes:

1.3

TAPE=

165.5/10

wind is splashing over

ATTACHMENT TR-12

Well and Map Information

HLAS Well and Map Information

Effluent Land Disposal Site

Pivot Irrigation

One Mile Radius

Attachment

City of Lubbock

Map ID Number	County	Permit Number	District Number	Status	Aquifer
1	Lynn	40330	72866	Destroyed	Ogallala
2	Lynn	70403	1173	Destroyed	Ogallala
3	Lynn	2215	71239	Current	Ogallala
4	Lynn	2037	71097	Current	Ogallala
5	Lynn	2213	71237	Current	Ogallala
6	Lynn	2052	71110	Current	Ogallala
7	Lynn	3139	71836	Cancelled	Ogallala
8	Lynn	3229	71158	Current	Ogallala
9	Lynn	388	69768	Abandoned	Ogallala
10	Lynn	3191	71871	Current	Ogallala
11	Lynn	93	69565	Current	Ogallala
12	Lynn	2283	71302	Current	Ogallala
13	Lynn	1185	70411	Current	Ogallala
14	Lynn	1776	70896	Current	Ogallala
15	Lynn	41001	73390	Current	Ogallala
16	Lynn	40940	73346	Destroyed	Ogallala
17	Lynn	2081	71137	Destroyed	Ogallala
18	Lynn	1514	70672	Current	Ogallala
19	Lynn	1724	70852	Current	Ogallala
20	Lynn	2085	71138	Destroyed	Ogallala
21	Lynn	3278	71931	Current	Ogallala
22	Lynn	3277	71930	Current	Ogallala
23	Lynn	1555	70705	Abandoned	Ogallala
24	Lynn	3273	71926	Current	Ogallala
25	Lynn	40928	73334	Destroyed	Ogallala
26	Lynn	733	70026	Current	Ogallala
27	Lynn	40331	72867	Abandoned	Ogallala
28	Lynn	3279	71932	Current	Ogallala
29	Lynn	40141	72677	Current	Ogallala
30	Lynn	2335	72675	Current	Ogallala
31	Lynn	3433	72077	Abandoned	Ogallala
32	Lynn	1728	70856	Current	Ogallala
33	Lynn	268	69657	Current	Ogallala
34	Lynn	1594	70741	Current	Ogallala
35	Lynn	3124	71821	Current	Ogallala
36	Lynn	2893	71632	Current	Ogallala
37	Lynn	1420	69606	Destroyed	Ogallala
38	Lynn	40612	73148	Current	Ogallala
39	Lynn	40613	73149	Current	Ogallala
40	Lynn	2067	71123	Current	Ogallala
41	Lynn	2063	71121	Current	Ogallala
42	Lynn	1644	70785	Abandoned	Ogallala
43	Lynn	2045	71131	Destroyed	Ogallala
44	Lynn	16	69506	Current	Ogallala
45	Lynn	2245	75917	Current	Ogallala
46	Lynn	1394	70583	Current	Ogallala
47	Lynn	2158	71193	Current	Ogallala
48	Lynn	40594	73130	Current	Ogallala
49	Lynn	2269	71288	Abandoned	Ogallala
50	Lynn	1853	70950	Current	Ogallala
51	Lynn	3127	71824	Cancelled	Ogallala
52	Lynn	3595	72237	Current	Ogallala
53	Lynn	1722	70851	Current	Ogallala

54	Lynn	1184	70410	Current	Ogallala
55	Lynn	40410	72949	Current	Ogallala
56	Lynn	2426	71392	Current	Ogallala
57	Lynn	1891	70981	Current	Ogallala
58	Lynn	1736	70863	Current	Ogallala
59	Lynn	2060	71118	Current	Ogallala
60	Lynn	1737	70864	Current	Ogallala
61	Lynn	40405	72941	Destroyed	Ogallala
62	Lynn	3600	72242	Current	Ogallala
63	Lynn	3099	71798	Current	Ogallala
64	Lynn	1432	70606	Current	Ogallala
65	Lynn	2296	71313	Current	Ogallala
66	Lynn	55	69533	Destroyed	Ogallala
67	Lynn	3128	71825	Current	Ogallala
68	Lynn	72947	40411	Abandoned	Ogallala
69	Lynn	2415	71384	Current	Ogallala
70	Lynn	40412	72948	Current	Ogallala
71	Lynn	40413	72949	Destroyed	Ogallala
72	Lynn	301	69687	Destroyed	Ogallala
73	Lynn	40414	72950	Current	Ogallala
74	Lynn	680	69978	Current	Ogallala
75	Lynn	2421	71389	Current	Ogallala
76	Lynn	1535	70688	Current	Ogallala
77	Lynn	305	69691	Current	Ogallala
78	Lynn	2022	71086	Current	Ogallala
79	Lynn	1047	70297	Destroyed	Ogallala
80	Lynn	40420	72956	Current	Ogallala
81	Lynn	40416	72952	Current	Ogallala
82	Lynn	40415	72951	Current	Ogallala
83	Lynn	1871	70966	Current	Ogallala
84	Lynn	302	69688	Current	Ogallala
85	Lynn	40417	72953	Current	Ogallala
86	Lynn	40418	72954	Current	Ogallala
87	Lynn	1792	69586	Current	Ogallala
88	Lynn	614	69920	Destroyed	Ogallala
89	Lynn	717	70011	Current	Ogallala
90	Lynn	1941	71022	Current	Ogallala
91	Lynn	2769	73128	Current	Ogallala
92	Lynn	41002	73391	Current	Ogallala
93	Lynn	41014	73403	Current	Ogallala
94	Lynn	40595	73131	Current	Ogallala
95	Lynn	1847	70945	Destroyed	Ogallala
96	Lynn	1893	70982	Current	Ogallala
97	Lynn	40598	73134	Current	Ogallala
98	Lynn	2080	71136	Current	Ogallala
99	Lynn	1812	70920	Current	Ogallala
100	Lynn	2055	71113	Current	Ogallala
101	Lynn	1725	70853	Destroyed	Ogallala
102	Lynn	8	92894	Destroyed	Ogallala
103	Lynn	1529	70683	Current	Ogallala
104	Lynn	825	70104	Current	Ogallala
105	Lynn	1310	70511	Current	Ogallala
106	Lynn	2032	71094	Current	Ogallala
107	Lynn	1971	71047	Current	Ogallala
108	Lynn	1282	70486	Current	Ogallala

109	Lynn	2064	71122	Current	Ogallala
110	Lynn	2087	71140	Current	Ogallala
111	Lynn	1111	70347	Current	Ogallala
112	Lynn	1472	70635	Current	Ogallala
113	Lynn	40596	73132	Current	Ogallala
114	Lynn	41016	73405	Destroyed	Ogallala
115	Lynn	41017	73406	Destroyed	Ogallala
116	Lynn	41018	73407	Destroyed	Ogallala
117	Lynn	552	69869	Destroyed	Ogallala
118	Lynn	1112	70348	Destroyed	Ogallala
119	Lynn	381	69762	Destroyed	Ogallala
120	Lynn	1455	70624	Destroyed	Ogallala
121	Lynn	40597	73133	Current	Ogallala
122	Lynn	2254	71275	Current	Ogallala
123	Lynn	913	70179	Current	Ogallala
124	Lynn	40599	73135	Current	Ogallala
125	Lynn	2890	71629	Destroyed	Ogallala
126	Lynn	1147	70380	Current	Ogallala
127	Lynn	1107	70343	Abandoned	Ogallala
128	Lynn	1446	70617	Abandoned	Ogallala
129	Lynn	125	69597	Current	Ogallala
130	Lynn	2031	71093	Current	Ogallala
131	Lynn	66	69543	Destroyed	Ogallala
132	Lynn	1527	70682	Current	Ogallala
133	Lynn	109	69581	Destroyed	Ogallala
134	Lynn	2011	71078	Current	Ogallala
135	Lynn	41012	73401	Current	Ogallala
136	Lynn	41011	73400	Current	Ogallala
137	Lynn	2119	71162	Destroyed	Ogallala
138	Lynn	41003	73392	Destroyed	Ogallala
139	Lynn	2054	71112	Abandoned	Ogallala
140	Lynn	2344	73151	Current	Ogallala
141	Lynn	2218	71242	Current	Ogallala
142	Lynn	2246	71268	Current	Ogallala
143	Lynn	40614	73150	Current	Ogallala
144	Lynn	2130	71170	Current	Ogallala
145	Lynn	2123	71166	Current	Ogallala
146	Lynn	40616	73152	Current	Ogallala
147	Lynn	40941	73347	Current	Ogallala
148	Lynn	2069	71125	Current	Ogallala
149	Lynn	40617	73153	Current	Ogallala
150	Lynn	1416	69578	Current	Ogallala
151	Lynn	1684	70822	Destroyed	Ogallala
152	Lynn	1763	70887	Destroyed	Ogallala
153	Lynn	1537	70690	Current	Ogallala
154	Lynn	40939	73345	Current	Ogallala
155	Lynn	1691	70829	Current	Ogallala
156	Lynn	992	70251	Abandoned	Ogallala
157	Lynn	1933	71016	Destroyed	Ogallala
158	Lynn	1715	70845	Destroyed	Ogallala
159	Lynn	978	70237	Current	Ogallala
160	Lynn	40944	73350	Current	Ogallala
161	Lynn	2002	71072	Current	Ogallala
162	Lynn	1354	70549	Current	Ogallala
163	Lynn	1716	70846	Destroyed	Ogallala

164	Lynn	1774	70894	Destroyed	Ogallala
165	Lynn	40942	73348	Destroyed	Ogallala
166	Lynn	2259	71280	Destroyed	Ogallala
167	Lynn	1999	71069	Destroyed	Ogallala
168	Lynn	40943	73349	Current	Ogallala
169	Lynn	40619	73155	Current	Ogallala
170	Lynn	40618	73154	Current	Ogallala
171	Lynn	2157	71192	Abandoned	Ogallala
172	Lynn	41004	73393	Destroyed	Ogallala
173	Lynn	2257	71278	Destroyed	Ogallala
174	Lynn	1525	70680	Current	Ogallala
175	Lynn	13	69503	Current	Ogallala
176	Lynn	821	70100	Current	Ogallala
177	Lynn	2049	71107	Current	Ogallala
178	Lynn	1652	70793	Current	Ogallala
179	Lynn	1659	70800	Current	Ogallala
180	Lynn	3097	71796	Current	Ogallala
181	Lynn	12	69502	Current	Ogallala
182	Lynn	41005	73394	Current	Ogallala
183	Lynn	2010	71077	Current	Ogallala
184	Lynn	41006	73395	Current	Ogallala
185	Lynn	1351	70546	Destroyed	Ogallala
186	Lynn	304	69690	Destroyed	Ogallala
187	Lynn	1447	70618	Current	Ogallala
188	Lynn	14	69504	Current	Ogallala
189	Lynn	40620	73156	Current	Ogallala
190	Lynn	1726	70854	Current	Ogallala
191	Lynn	1344	70540	Current	Ogallala
192	Lynn	Null	92691	Current	Ogallala
193	Lynn	629	69932	Current	Ogallala
194	Lynn	Null	92690	Current	Ogallala
195	Lynn	1345	70541	Current	Ogallala
196	Lynn	1449	70620	Current	Ogallala
197	Lynn	1353	70548	Current	Ogallala
198	Lynn	1349	70544	Current	Ogallala
199	Lynn	927	70193	Current	Ogallala
200	Lynn	1091	70330	Current	Ogallala
201	Lynn	41013	73402	Current	Ogallala
202	Lynn	2070	71126	Current	Ogallala
203	Lynn	Null	92689	Current	Ogallala
204	Lynn	1515	70673	Current	Ogallala
205	Lynn	41025	73414	Destroyed	Ogallala
206	Lynn	41026	73415	Current	Ogallala
207	Lynn	41027	73416	Destroyed	Ogallala
208	Lynn	41028	73417	Destroyed	Ogallala
209	Lynn	1655	70796	Destroyed	Ogallala
210	Lynn	2933	71664	Destroyed	Ogallala
211	Lynn	1193	70418	Abandoned	Ogallala
212	Lynn	551	69868	Abandoned	Ogallala
213	Lynn	9	69500	Destroyed	Ogallala
214	Lynn	97	69569	Current	Ogallala
215	Lynn	40600	73136	Current	Ogallala
216	Lynn	550	69867	Current	Ogallala
217	Lynn	549	69866	Abandoned	Ogallala
218	Lynn	41019	73408	Destroyed	Ogallala

219	Lynn	1141	70374	Abandoned	Ogallala
220	Lynn	2889	71628	Current	Ogallala
221	Lynn	1358	70552	Destroyed	Ogallala
222	Lynn	600	69908	Destroyed	Ogallala
223	Lynn	445	69817	Current	Ogallala
224	Lynn	40601	73137	Current	Ogallala
225	Lynn	41023	73412	Destroyed	Ogallala
226	Lynn	41024	73413	Destroyed	Ogallala
227	Lynn	527	69845	Current	Ogallala
228	Lynn	526	69844	Current	Ogallala
229	Lynn	505	69824	Destroyed	Ogallala
230	Lynn	1977	71048	Current	Ogallala
231	Lynn	1647	70788	Current	Ogallala
232	Lynn	632	69935	Current	Ogallala
233	Lynn	309	69695	Current	Ogallala
234	Lynn	41029	73418	Current	Ogallala
235	Lynn	2757	71534	Current	Ogallala
236	Lynn	41030	73419	Destroyed	Ogallala
237	Lynn	41032	73421	Current	Ogallala
238	Lynn	119	69591	Current	Ogallala
239	Lynn	41031	73420	Current	Ogallala
240	Lynn	41037	73426	Current	Ogallala
241	Lynn	41038	73427	Current	Ogallala
242	Lynn	41033	73422	Destroyed	Ogallala
243	Lynn	41034	73423	Destroyed	Ogallala
244	Lynn	41039	73428	Destroyed	Ogallala
245	Lynn	41035	73424	Destroyed	Ogallala
246	Lynn	41036	73425	Current	Ogallala
247	Lynn	1952	71030	Current	Ogallala
248	Lynn	1663	70804	Current	Ogallala
249	Lynn	40603	73139	Current	Ogallala
250	Lynn	2078	71134	Current	Ogallala
251	Lynn	2498	71426	Current	Ogallala
252	Lynn	40602	73138	Current	Ogallala
253	Lynn	40602	73138	Destroyed	Ogallala
254	Lynn	2077	71133	Destroyed	Ogallala
255	Lynn	56	69534	Destroyed	Ogallala
256	Lynn	41051	73440	Destroyed	Ogallala
257	Lynn	41052	73441	Destroyed	Ogallala
258	Lynn	41053	73442	Current	Ogallala
259	Lynn	378	69759	Destroyed	Ogallala
260	Lynn	202	69610	Current	Ogallala
261	Lynn	41057	73446	Destroyed	Ogallala
262	Lynn	41056	73445	Destroyed	Ogallala
263	Lynn	395	69775	Destroyed	Ogallala
264	Lynn	908	70174	Destroyed	Ogallala
265	Lynn	909	70175	Current	Ogallala
266	Lynn	910	70176	Current	Ogallala
267	Lynn	41054	73443	Current	Ogallala
268	Lynn	41055	73444	Current	Ogallala
269	Lynn	41059	73448	Current	Ogallala
270	Lynn	2092	71142	Current	Ogallala
271	Lynn	903	70170	Current	Ogallala
272	Lynn	2028	71091	Current	Ogallala
273	Lynn	41060	73449	Current	Ogallala

274	Lynn	391	697771	Current	Ogallala
275	Lynn	1400	70587	Current	Ogallala
276	Lynn	241	69636	Destroyed	Ogallala
277	Lynn	41065	73454	Current	Ogallala
278	Lynn	1899	70987	Current	Ogallala
279	Lynn	41066	73455	Current	Ogallala
280	Lynn	41069	73458	Current	Ogallala
281	Lynn	429	69805	Current	Ogallala
282	Lynn	568	69883	Current	Ogallala
283	Lynn	1385	70576	Current	Ogallala
284	Lynn	1583	70733	Current	Ogallala
285	Lynn	1487	70647	Current	Ogallala
286	Lynn	824	70103	Current	Ogallala
287	Lynn	823	70102	Current	Ogallala
288	Lynn	41061	73450	Current	Ogallala
289	Lynn	30	69514	Current	Ogallala
290	Lynn	1701	70835	Current	Ogallala
291	Lynn	31	69548	Current	Ogallala
292	Lynn	1479	70641	Current	Ogallala
293	Lynn	Null	89888	Current	Ogallala
294	Lynn	41063	73452	Current	Ogallala
295	Lynn	1908	70995	Current	Ogallala
296	Lynn	262	69652	Current	Ogallala
297	Lynn	327	69713	Current	Ogallala
298	Lynn	41064	73453	Current	Ogallala
299	Lynn	236	69632	Current	Ogallala
300	Lynn	160093	89720	Current	Ogallala
301	Lynn	40652	73188	Current	Ogallala
302	Lynn	2322	71333	Current	Ogallala
303	Lynn	862	70136	Current	Ogallala
304	Lynn	1462	70627	Current	Ogallala
305	Lynn	1212	70431	Current	Ogallala
306	Lynn	1954	71032	Current	Ogallala
307	Lynn	1192	70417	Current	Ogallala
308	Lynn	400	69780	Current	Ogallala
309	Lynn	41062	73451	Current	Ogallala
310	Lynn	2336	71342	Current	Ogallala
311	Lynn	Null	89889	Current	Ogallala
312	Lynn	1495	70655	Current	Ogallala
313	Lynn	1174	74869	Current	Ogallala
314	Lynn	3803	72443	Current	Ogallala
315	Lynn	2488	71421	Current	Ogallala
316	Lynn	40655	73191	Current	Ogallala
317	Lynn	1956	71034	Current	Ogallala
318	Lynn	555	69872	Current	Ogallala
319	Lynn	1494	70654	Current	Ogallala
320	Lynn	396	69776	Current	Ogallala
321	Lynn	1955	71033	Current	Ogallala
322	Lynn	2448	71404	Current	Ogallala
323	Lynn	1049	70299	Current	Ogallala
324	Lynn	1159	70390	Current	Ogallala
325	Lynn	1496	70656	Current	Ogallala
326	Lynn	1109	70345	Current	Ogallala
327	Lynn	1938	69590	Destroyed	Ogallala
328	Lynn	41046	73435	Current	Ogallala

329	Lynn	41045	73434	Current	Ogallala
330	Lynn	345	69730	Current	Ogallala
331	Lynn	41047	73436	Current	Ogallala
332	Lynn	1064	70313	Abandoned	Ogallala
333	Lynn	2457	71408	Current	Ogallala
334	Lynn	41048	73437	Destroyed	Ogallala
335	Lynn	912	70178	Current	Ogallala
336	Lynn	926	70192	Current	Ogallala
337	Lynn	3234	71897	Cancelled	Ogallala
338	Lynn	276	69664	Current	Ogallala
339	Lynn	2371	71354	Current	Ogallala
340	Lynn	1657	70798	Current	Ogallala
341	Lynn	40966	73371	Current	Ogallala
342	Lynn	40969	73374	Current	Ogallala
343	Lynn	997	70256	Current	Ogallala
344	Lynn	1923	71008	Current	Ogallala
345	Lynn	2051	71109	Current	Ogallala
346	Lynn	1368	70562	Current	Ogallala
347	Lynn	40968	73373	Current	Ogallala
348	Lynn	3173	71858	Current	Ogallala
349	Lynn	587	69895	Destroyed	Ogallala
350	Lynn	3174	71859	Current	Ogallala
351	Lynn	2485	71419	Current	Ogallala
352	Lynn	278	69665	Current	Ogallala
353	Lynn	3114	71811	Current	Ogallala
354	Lynn	3105	71802	Cancelled	Ogallala
355	Lynn	2407	71378	Current	Ogallala
356	Lynn	2689	71495	Current	Ogallala
357	Lynn	2390	71367	Current	Ogallala
358	Lynn	1476	70639	Current	Ogallala
359	Lynn	1622	70766	Current	Ogallala
360	Lynn	40964	73369	Current	Ogallala
361	Lynn	2374	71356	Current	Ogallala
362	Lynn	2455	71406	Current	Ogallala
363	Lynn	314	69700	Current	Ogallala
364	Lynn	2107	71152	Destroyed	Ogallala
365	Lynn	2122	71165	Current	Ogallala
366	Lynn	145	69607	Destroyed	Ogallala
367	Lynn	656	69957	Current	Ogallala
368	Lynn	1742	70868	Current	Ogallala
369	Lynn	3360	72004	Current	Ogallala
370	Lynn	1101	70338	Current	Ogallala
371	Lynn	2960	71688	Current	Ogallala
372	Lynn	2108	71153	Current	Ogallala
373	Lynn	40967	73372	Current	Ogallala
374	Lynn	1578	70728	Current	Ogallala
375	Lynn	73195	40659	Current	Ogallala
376	Lynn	2200	71230	Destroyed	Ogallala
377	Lynn	2957	71686	Destroyed	Ogallala
378	Lynn	2250	71272	Destroyed	Ogallala
379	Lynn	3749	72390	Current	Ogallala
380	Lynn	2251	71273	Destroyed	Ogallala
381	Lynn	3361	72005	Current	Ogallala
382	Lynn	2962	716900	Current	Ogallala
383	Lynn	3748	72389	Abandoned	Ogallala

384	Lynn	41044	73433	Destroyed	Ogallala
385	Lynn	1953	71031	Destroyed	Ogallala
386	Lynn	160264	89911	Current	Ogallala
387	Lynn	43921	76045	Abandoned	Ogallala
388	Lynn	43923	76047	Current	Ogallala
389	Lynn	43922	76046	Current	Ogallala
390	Lynn	1140	70373	Current	Ogallala
391	Lynn	1651	70792	Current	Ogallala
392	Lynn	1658	70799	Current	Ogallala
393	Lynn	1477	69579	Current	Ogallala
394	Lynn	1992	71064	Current	Ogallala
395	Lynn	15	69505	Current	Ogallala
396	Lynn	2116	71159	Abandoned	Ogallala
397	Lynn	3485	72128	Current	Ogallala
398	Lynn	2117	71160	Abandoned	Ogallala
399	Lynn	160265	89912	Current	Ogallala
400	Lynn	2118	71161	Destroyed	Ogallala
401	Lynn	3486	72129	Current	Ogallala
402	Lynn	41041	73430	Abandoned	Ogallala
403	Lynn	41040	73429	Abandoned	Ogallala
404	Lynn	33	69516	Current	Ogallala
405	Lynn	1346	70542	Destroyed	Ogallala
406	Lynn	2097	71144	Destroyed	Ogallala
407	Lynn	10	69501	Current	Ogallala
408	Lynn	41043	73432	Destroyed	Ogallala
409	Lynn	41042	73431	Destroyed	Ogallala
410	Lynn	2258	71279	Destroyed	Ogallala
411	Lynn	2079	71135	Destroyed	Ogallala
412	Lynn	1434	70608	Current	Ogallala
413	Lynn	620	69924	Current	Ogallala
414	Lynn	41008	73397	Destroyed	Ogallala
415	Lynn	1355	70550	Destroyed	Ogallala
416	Lynn	41010	73399	Current	Ogallala
417	Lynn	17	69507	Current	Ogallala
418	Lynn	1453	70623	Current	Ogallala
419	Lynn	41007	73396	Current	Ogallala
420	Lynn	1654	70795	Current	Ogallala
421	Lynn	41009	73398	Current	Ogallala
422	Lynn	621	69925	Current	Ogallala
423	Lynn	1707	70839	Current	Ogallala
424	Lynn	1638	70781	Destroyed	Ogallala
425	Lynn	687	69983	Destroyed	Ogallala
426	Lynn	898	70166	Destroyed	Ogallala
427	Lynn	72422	3782	Current	Ogallala
428	Lynn	1749	70874	Current	Ogallala
429	Lynn	2487	71422	Current	Ogallala
430	Lynn	963	70225	Current	Ogallala
431	Lynn	2480	71416	Current	Ogallala
432	Lynn	3172	71857	Current	Ogallala
433	Lynn	2950	71681	Destroyed	Ogallala
434	Lynn	558	69874	Current	Ogallala
435	Lynn	43913	76037	Current	Ogallala
436	Lynn	2255	71276	Current	Ogallala
437	Lynn	1883	70976	Current	Ogallala
438	Lynn	2086	71139	Current	Ogallala

439	Lynn	43914	76038	Current	Ogallala
440	Lynn	891	70160	Current	Ogallala
441	Lynn	3115	71812	Current	Ogallala
442	Lynn	40959	73364	Current	Ogallala
443	Lynn	960	70223	Current	Ogallala
444	Lynn	40951	73357	Current	Ogallala
445	Lynn	40950	73356	Current	Ogallala
446	Lynn	40949	73355	Current	Ogallala
447	Lynn	40948	73354	Current	Ogallala
448	Lynn	40952	73358	Current	Ogallala
449	Lynn	40956	73361	Current	Ogallala
450	Lynn	40960	73365	Current	Ogallala
451	Lynn	40961	73366	Current	Ogallala
452	Lynn	3877	72516	Current	Ogallala
453	Lynn	2959	71687	Current	Ogallala
454	Lynn	1548	70700	Current	Ogallala
455	Lynn	40962	73367	Current	Ogallala
456	Lynn	1296	70499	Current	Ogallala
457	Lynn	344	69729	Destroyed	Ogallala
458	Lynn	40957	73362	Current	Ogallala
459	Lynn	925	70191	Current	Ogallala
460	Lynn	40953	73359	Current	Ogallala
461	Lynn	979	70238	Current	Ogallala
462	Lynn	1536	70689	Current	Ogallala
463	Lynn	699	69995	Current	Ogallala
464	Lynn	40654	73190	Current	Ogallala
465	Lynn	40955	73360	Current	Ogallala
466	Lynn	2104	71149	Destroyed	Ogallala
467	Lynn	2103	71148	Destroyed	Ogallala
468	Lynn	2102	71147	Destroyed	Ogallala
469	Lynn	380	69761	Destroyed	Ogallala
470	Lynn	630	69933	Current	Ogallala
471	Lynn	2098	71145	Current	Ogallala
472	Lynn	1530	70684	Current	Ogallala

LLAS Well and Map Information

One Mile Radius

Effluent Land Disposal Site

Pivot Irrigation

HPWD Wells (394)

Attachment
City of Lubbock
Southeast Water Reclamation Plant
TPDES Permit Application
LLAS-Wells Map

0 0.325 0.65 1.3 1.95 2.6 Miles

City of Lubbock TEXAS

Map ID Number	County	Permit Number	District Number	Status	Aquifer	Type
1	Lubbock	5579	62276	Current	Ogallala	
2	Lubbock	9067	65189	Current	Ogallala	
3	Lubbock	295	57996	Destroyed	Ogallala	
4	Lubbock	6555	63053	Current	Ogallala	
5	Lubbock	42562	67764	Current	Ogallala	
6	Lubbock	42563	67765	Current	Ogallala	
7	Lubbock	9068	65190	Current	Ogallala	
8	Lubbock	4027	61079	Current	Ogallala	
9	Lubbock	1361	58864	Current	Ogallala	
10	Lubbock	42845	67951	Current	Ogallala	
11	Lubbock	42844	67950	Current	Ogallala	
12	Lubbock	2498	59814	Current	Ogallala	
13	Lubbock	7196	63598	Current	Ogallala	
14	Lubbock	6502	63009	Current	Ogallala	
15	Lubbock	42582	67784	Current	Ogallala	
16	Lubbock	1315	58824	Abandoned	Ogallala	
17	Lubbock	4513	61464	Current	Ogallala	
18	Lubbock	765	58345	Destroyed	Ogallala	
19	Lubbock	2959	60180	Current	Ogallala	
20	Lubbock	5160	61974	Current	Ogallala	
21	Lubbock	5463	62188	Current	Ogallala	
22	Lubbock	323	58019	Current	Ogallala	
23	Lubbock	2937	60159	Current	Ogallala	
24	Lubbock	2625	59917	Current	Ogallala	
25	Lubbock	42876	67982	Current	Ogallala	
26	Lubbock	9150	65271	Canceled	Ogallala	
27	Lubbock	8364	64521	Destroyed	Ogallala	
28	Lubbock	7490	63843	Current	Ogallala	
29	Lubbock	8823	64951	Canceled	Ogallala	
30	Lubbock	42890	67996	Destroyed	Ogallala	
31	Lubbock	7586	63918	Current	Ogallala	
32	Lubbock	6783	63242	Current	Ogallala	
33	Lubbock	205	57912	Current	Ogallala	
34	Lubbock	42889	67995	Current	Ogallala	
35	Lubbock	2282	59629	Current	Ogallala	
36	Lubbock	7823	64111	Current	Ogallala	
37	Lubbock	7587	63919	Current	Ogallala	
38	Lubbock	166	57879	Current	Ogallala	
39	Lubbock	7343	63724	Current	Ogallala	
40	Lubbock	42892	67998	Current	Ogallala	
41	Lubbock	42893	67999	Current	Ogallala	
42	Lubbock	2169	59530	Destroyed	Ogallala	
43	Lubbock	8516	64662	Current	Ogallala	
44	Lubbock	8515	64661	Current	Ogallala	
45	Lubbock	2477	59795	Abandoned	Ogallala	
46	Lubbock	8994	65117	Current	Ogallala	
47	Lubbock	8280	64455	Current	Ogallala	
48	Lubbock	42894	68000	Current	Ogallala	

49	Lubbock	4481	61435	Current	Ogallala
50	Lubbock	5668	52347	Current	Ogallala
51	Lubbock	5669	62348	Current	Ogallala
52	Lubbock	180163	92955	In Progress	Ogallala
53	Lubbock	42926	68032	Current	Ogallala
54	Lubbock	42927	68033	Current	Ogallala
55	Lubbock	2967	60187	Current	Ogallala
56	Lubbock	42929	68035	Current	Ogallala
57	Lubbock	42928	68034	Current	Ogallala
58	Lubbock	3948	61012	Destroyed	Ogallala
59	Lubbock	4961	61813	Current	Ogallala
60	Lubbock	974	58530	Current	Ogallala
61	Lubbock	996	58551	Current	Ogallala
62	Lubbock	3456	60593	Current	Ogallala
63	Lubbock	42931	68037	Abandoned	Ogallala
64	Lubbock	4461	61421	Current	Ogallala
65	Lubbock	2747	60020	Current	Ogallala
66	Lubbock	1504	58977	Current	Ogallala
67	Lubbock	42930	68036	Current	Ogallala
68	Lubbock	3789	60870	Current	Ogallala
69	Lubbock	8301	64474	Current	Ogallala
70	Lubbock	42900	68006	Current	Ogallala
71	Lubbock	8	57747	Current	Ogallala
72	Lubbock	42935	68041	Current	Ogallala
73	Lubbock	42937	68043	Current	Ogallala
74	Lubbock	42936	68042	Current	Ogallala
75	Lubbock	45058	69222	Current	Ogallala
76	Lubbock	no record	93051	Current	Ogallala
77	Lubbock	no record	93052	Current	Ogallala
78	Lubbock	4122	61157	Current	Ogallala
79	Lubbock	1633	59081	Current	Ogallala
80	Lubbock	42933	68039	Current	Ogallala
81	Lubbock	42932	68038	Current	Ogallala
82	Lubbock	42940	68046	Current	Ogallala
83	Lubbock	9078	65200	Current	Ogallala
84	Lubbock	42941	68047	Current	Ogallala
85	Lubbock	6285	62830	Current	Ogallala
86	Lubbock	42938	68044	Current	Ogallala
87	Lubbock	7545	63882	Current	Ogallala
88	Lubbock	640	58235	Destroyed	Ogallala
89	Lubbock	5918	62545	Current	Ogallala
90	Lubbock	2480	59798	Destroyed	Ogallala
91	Lubbock	42942	68048	Current	Ogallala
92	Lubbock	8381	64535	Current	Ogallala
93	Lubbock	2343	59686	Current	Ogallala
94	Lubbock	7724	64031	Current	Ogallala
95	Lubbock	2374	59708	Current	Ogallala
96	Lubbock	42943	68049	Current	Ogallala
97	Lubbock	[illegible]	[illegible]	[illegible]	[illegible]

98	Lubbock	5823	62474	Destroyed	Ogallala
99	Lubbock	45028	69192	Current	Ogallala
100	Lubbock	5742	62408	Abandoned	Ogallala
101	Lubbock	7485	63838	Current	Ogallala
102	Lubbock	3750	60839	Current	Ogallala
103	Lubbock	7805	64094	Current	Ogallala
104	Lubbock	42974	68080	Current	Ogallala
105	Lubbock	7604	63932	Current	Ogallala
106	Lubbock	4968	61818	Abandoned	Ogallala
107	Lubbock	8175	64369	Cureent	Ogallala
108	Lubbock	5091	61921	Current	Ogallala
109	Lubbock	5177	61986	Current	Ogallala
110	Lubbock	2107	59480	Current	Ogallala
111	Lubbock	5122	61945	Current	Ogallala
112	Lubbock	7699	64010	Current	Ogallala
113	Lubbock	3995	61054	Current	Ogallala
114	Lubbock	7666	63985	Current	Ogallala
115	Lubbock	3349	60496	Destroyed	Ogallala
116	Lubbock	7577	63909	Current	Ogallala
117	Lubbock	3177	60360	Destroyed	Ogallala
118	Lubbock	3873	60943	Destroyed	Ogallala
119	Lubbock	151	57865	Destroyed	Ogallala
120	Lubbock	3872	60942	Destroyed	Ogallala
121	Lubbock	3435	60573	Abandoned	Ogallala
122	Lubbock	3403	60542	current	Ogallala
123	Lubbock	42975	68081	Current	Ogallala
124	Lubbock	4358	61335	Current	Ogallala
125	Lubbock	849	58423	Destroyed	Ogallala
126	Lubbock	2178	59538	Destroyed	Ogallala
127	Lubbock	1916	59317	Destroyed	Ogallala
128	Lubbock	291	57992	Destroyed	Ogallala
129	Lubbock	3751	60840	Current	Ogallala
130	Lubbock	9712	65828	Destroyed	Ogallala
131	Lubbock	3453	60590	Current	Ogallala
132	Lubbock	3448	60586	current	Ogallala
133	Lubbock	2949	60170	Current	Ogallala
134	Lubbock	2950	60171	Destroyed	Ogallala
135	Lubbock	5323	62092	Current	Ogallala
136	Lubbock	42973	68079	Current	Ogallala
137	Lubbock	4591	61530	Current	Ogallala
138	Lubbock	191	57902	Current	Ogallala
139	Lubbock	1547	59010	Current	Ogallala
140	Lubbock	5077	61910	Current	Ogallala
141	Lubbock	1546	59009	Current	Ogallala
142	Lubbock	42970	68076	Current	Ogallala
143	Lubbock	42934	68040	Current	Ogallala
144	Lubbock	3085	60278	Current	Ogallala
145	Lubbock	5230	62028	Current	Ogallala

147	Lubbock	42972	68078	Current	Ogallala
148	Lubbock	5145	61962	Destroyed	Ogallala
149	Lubbock	3464	60601	Current	Ogallala
150	Lubbock	45060	69224	Current	Ogallala
151	Lubbock	2951	60172	Current	Ogallala
152	Lubbock	2948	60169	Destroyed	Ogallala
153	Lubbock	2946	60167	Destroyed	Ogallala
154	Lubbock	634	58229	Current	Ogallala
155	Lubbock	2954	60175	Current	Ogallala
156	Lubbock	6946	63382	Current	Ogallala
157	Lubbock	43000	68106	Current	Ogallala
158	Lubbock	3288	60449	Current	Ogallala
159	Lubbock	42999	68105	Current	Ogallala
160	Lubbock	42998	68104	Current	Ogallala
161	Lubbock	3289	60450	Current	Ogallala
162	Lubbock	2568	59873	Current	Ogallala
163	Lubbock	42997	68103	Current	Ogallala
164	Lubbock	42996	68102	Current	Ogallala
165	Lubbock	7578	63910	Current	Ogallala
166	Lubbock	42995	68101	Current	Ogallala
167	Lubbock	42994	68100	Current	Ogallala
168	Lubbock	2793	60053	Current	Ogallala
169	Lubbock	7283	63679	Current	Ogallala
170	Lubbock	174	57887	Current	Ogallala
171	Lubbock	5967	62583	Current	Ogallala
172	Lubbock	4407	61375	Destroyed	Ogallala
173	Lubbock	4610	61546	Current	Ogallala
174	Lubbock	5763	62428	Current	Ogallala
175	Lubbock	1826	59236	Current	Ogallala
176	Lubbock	1827	59237	Destroyed	Ogallala
177	Lubbock	160378	90121	Canceled	Ogallala
178	Lubbock	160360	90071	Canceled	Ogallala
179	Lubbock	160359	90070	Current	Ogallala
180	Lubbock	42992	68098	Destroyed	Ogallala
181	Lubbock	42993	68099	Current	Ogallala
182	Lubbock	2935	60157	Current	Ogallala
183	Lubbock	5692	62368	Abandoned	Ogallala
184	Lubbock	8774	64902	Current	Ogallala
185	Lubbock	4752	61666	Current	Ogallala
186	Lubbock	3859	60931	Current	Ogallala
187	Lubbock	662	58255	Destroyed	Ogallala
188	Lubbock	147	57862	Destroyed	Ogallala
189	Lubbock	5621	62307	Current	Ogallala
190	Lubbock	170420	92022	Current	Ogallala
191	Lubbock	747	58329	Destroyed	Ogallala
192	Lubbock	42967	68073	Current	Ogallala
193	Lubbock	42966	68072	Current	Ogallala
194	Lubbock	3007	60216	Current	Ogallala

196	Lubbock	42968	68074	Current	Ogallala
197	Lubbock	5234	62032	Destroyed	Ogallala
198	Lubbock	541	58202	Current	Ogallala
199	Lubbock	5229	62060	Current	Ogallala
200	Lubbock	42965	68071	Current	Ogallala
201	Lubbock	1175	58708	Current	Ogallala
202	Lubbock	42925	68031	Current	Ogallala
203	Lubbock	7142	63549	Current	Ogallala
204	Lubbock	1615	59065	Current	Ogallala
205	Lubbock	42964	68070	Current	Ogallala
206	Lubbock	7218	63620	Current	Ogallala
207	Lubbock	5282	62062	Current	Ogallala
208	Lubbock	5316	62086	Current	Ogallala
209	Lubbock	42963	68069	Destroyed	Ogallala
210	Lubbock	5370	62124	Current	Ogallala
211	Lubbock	7240	63642	Current	Ogallala
212	Lubbock	7044	58592	Destroyed	Ogallala
213	Lubbock	2489	59807	Destroyed	Ogallala
214	Lubbock	3274	60439	Destroyed	Ogallala
215	Lubbock	5488	62206	Destroyed	Ogallala
216	Lubbock	3201	60379	Current	Ogallala
217	Lubbock	42924	68030	Current	Ogallala
218	Lubbock	42922	68028	Current	Ogallala
219	Lubbock	42921	68027	Current	Ogallala
220	Lubbock	1641	59088	Current	Ogallala
221	Lubbock	42923	68029	Current	Ogallala
222	Lubbock	42916	68022	Destroyed	Ogallala
223	Lubbock	42961	68067	Current	Ogallala
224	Lubbock	2213	59571	Current	Ogallala
225	Lubbock	42920	68026	Destroyed	Ogallala
226	Lubbock	42919	68025	Current	Ogallala
227	Lubbock	42883	67989	Current	Ogallala
228	Lubbock	42918	68024	Current	Ogallala
229	Lubbock	4062	61104	Current	Ogallala
230	Lubbock	2536	59845	Current	Ogallala
231	Lubbock	42917	68023	Current	Ogallala
232	Lubbock	42882	67988	Current	Ogallala
233	Lubbock	42881	67987	Current	Ogallala
234	Lubbock	42914	68020	Current	Ogallala
235	Lubbock	4777	61682	Current	Ogallala
236	Lubbock	42913	68019	Current	Ogallala
237	Lubbock	170174	91631	Current	Ogallala
238	Lubbock	170173	91630	Current	Ogallala
239	Lubbock	170175	91632	Current	Ogallala
240	Lubbock	42875	67981	Current	Ogallala
241	Lubbock	1912	59313	Current	Ogallala
242	Lubbock	42912	68018	Current	Ogallala
243	Lubbock	42874	67980	Current	Ogallala

245	Lubbock	5609	62298	current	Ogallala
246	Lubbock	42915	68021	Current	Ogallala
247	Lubbock	65	57795	Current	Ogallala
248	Lubbock	3737	60827	Current	Ogallala
249	Lubbock	1621	59070	Abandoned	Ogallala
250	Lubbock	8806	64934	Current	Ogallala
251	Lubbock	42960	68066	Current	Ogallala
252	Lubbock	5930	62556	Current	Ogallala
253	Lubbock	9632	65749	Current	Ogallala
254	Lubbock	5855	62495	Current	Ogallala
255	Lubbock	5776	62441	Current	Ogallala
256	Lubbock	42962	68068	Current	Ogallala
257	Lubbock	2315	59660	Current	Ogallala
258	Lubbock	8449	64599	Current	Ogallala
259	Lubbock	5078	61911	Destroyed	Ogallala
260	Lubbock	1799	59213	Current	Ogallala
261	Lubbock	9308	65426	Canceled	Ogallala
262	Lubbock	6871	63322	Current	Ogallala
263	Lubbock	4648	61580	Current	Ogallala
264	Lubbock	8452	64602	Current	Ogallala
265	Lubbock	6872	63323	Current	Ogallala
266	Lubbock	6870	63321	Current	Ogallala
267	Lubbock	6869	63320	Current	Ogallala
268	Lubbock	6868	63319	Current	Ogallala
269					
270	Lubbock	6865	63316	Current	Ogallala
271	Lubbock	6867	63318	Current	Ogallala
272	Lubbock	6864	63315	Abandoned	Ogallala
273	Lubbock	6866	63317	Current	Ogallala
247	Lubbock	6863	63314	Current	Ogallala
275	Lubbock	6862	63313	Abandoned	Ogallala
276	Lubbock	6861	63312	Current	Ogallala
277	Lubbock	6860	63311	Current	Ogallala
278	Lubbock	6859	63110	Current	Ogallala
279	Lubbock	8448	64598	Current	Ogallala
280	Lubbock	5958	62575	Current	Ogallala
281	Lubbock	42604	67806	Abandoned	Ogallala
282	Lubbock	8446	64596	Current	Ogallala
283	Lubbock	1630	59078	Current	Ogallala
284	Lubbock	8807	64935	Current	Ogallala
285	Lubbock	888	58457	Current	Ogallala
286	Lubbock	2081	59455	Current	Ogallala
287	Lubbock	542	58203	Current	Ogallala
288	Lubbock	5637	62320	Current	Ogallala
289	Lubbock	5551	62256	Current	Ogallala
290	Lubbock	42584	67786	Current	Ogallala
291	Lubbock	42583	67785	Current	Ogallala
292	Lubbock	4103	61141	Current	Ogallala

294	Lubbock	496	58173	Destroyed	Ogallala
295	Lubbock	246	57948	Destroyed	Ogallala
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298	Lubbock	1066	58609	Current	Ogallala
299	Lubbock	42576	67778	Abandoned	Ogallala
300	Lubbock	64548	8396	Current	Ogallala
301	Lubbock	330	58025	Destroyed	Ogallala
302	Lubbock	417	58098	Abandoned	Ogallala
303	Lubbock	42558	67760	Current	Ogallala
304	Lubbock	61	57791	Current	Ogallala
305	Lubbock	876	58447	Current	Ogallala
306	Lubbock	9614	65731	Current	Ogallala
307	Lubbock	42577	67779	Current	Ogallala
308	Lubbock	6393	62921	Current	Ogallala
309	Lubbock	9680	65797	Current	Ogallala
310	Lubbock	42595	67797	Current	Ogallala
311	Lubbock	64936	8808	Current	Ogallala
312	Lubbock	897	58465	Current	Ogallala
313	Lubbock	7242	63643	Current	Ogallala
314	Lubbock	1084	58626	Destroyed	Ogallala
315	Lubbock	42598	67800	Current	Ogallala
316	Lubbock	8451	64601	Current	Ogallala
317	Lubbock	42597	67799	Current	Ogallala
318	Lubbock	42599	67801	Destroyed	Ogallala
319	Lubbock	976	58532	Current	Ogallala
320	Lubbock	7219	63621	Destroyed	Ogallala
321	Lubbock	8447	64597	Current	Ogallala
322	Lubbock	170284	91742	Current	Ogallala
323	Lubbock	9536	65653	Canceled	Ogallala
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325	Lubbock	7321	63707	Current	Ogallala
326	Lubbock	5657	62339	Abandoned	Ogallala
327	Lubbock	7319	63705	Current	Ogallala
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329	Lubbock	5659	62341	Current	Ogallala
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333	Lubbock	6855	63306	Current	Ogallala
334	Lubbock	6857	63308	Current	Ogallala
335	Lubbock	6852	63303	Current	Ogallala
336	Lubbock	6856	63307	Current	Ogallala
337	Lubbock	8445	64595	Current	Ogallala
338	Lubbock	6851	63302	Current	Ogallala
339	Lubbock	6044	62645	Destroyed	Ogallala
340	Lubbock	6854	63305	Current	Ogallala
341	Lubbock	5854	62494	Current	Ogallala

343	Lubbock	6853	63304	Current	Ogallala
344	Lubbock	6848	63299	Current	Ogallala
345	Lubbock	6850	63301	Current	Ogallala
346	Lubbock	8450	64600	Current	Ogallala
347	Lubbock	3220	60394	Current	Ogallala
348	Lubbock	42593	67795	Current	Ogallala
349	Lubbock	42596	67798	Current	Ogallala
350	Lubbock	42594	67796	Current	Ogallala
351	Lubbock	42592	67794	Current	Ogallala
352	Lubbock	42581	67783	Current	Ogallala
353	Lubbock	42580	67782	Current	Ogallala
354	Lubbock	42591	67793	Destroyed	Ogallala
355	Lubbock	3391	60532	Current	Ogallala
356	Lubbock	9059	65181	Current	Ogallala
357	Lubbock	170480	92300	Current	Ogallala
358	Lubbock	170480	92300	Current	Ogallala
359	Lubbock	42579	67781	Current	Ogallala
360	Lubbock	42578	67780	Current	Ogallala
361	Lubbock	6238	62789	Current	Ogallala
362	Lubbock	6963	63396	Current	Ogallala
363	Lubbock	6324	62867	Abandoned	Ogallala
364	Lubbock	7167	63571	Current	Ogallala
365	Lubbock	42572	67774	Current	Ogallala
366	Lubbock	9518	65635	Current	Ogallala
367	Lubbock	7551	63888	Current	Ogallala
368	Lubbock	42574	67776	Current	Ogallala
369	Lubbock	42573	67775	Current	Ogallala
370	Lubbock	42575	67777	Current	Ogallala
371	Lubbock	unknown	89950	Current	Ogallala
372	Lubbock	1936	59334	Current	Ogallala
373	Lubbock	unknown	89961	Current	Ogallala
374	Lubbock	42589	67791	Current	Ogallala
375	Lubbock	42569	67771	Current	Ogallala
376	Lubbock	7247	63648	Current	Ogallala
377	Lubbock	42588	67790	Current	Ogallala
378	Lubbock	8655	64789	Current	Ogallala
379	Lubbock	42590	67792	Current	Ogallala
380	Lubbock	1589	59040	Current	Ogallala
381	Lubbock	6846	63297	Current	Ogallala
382	Lubbock	6847	63298	Current	Ogallala
383	Lubbock	9443	65560	Current	Ogallala
384	Lubbock	7964	64204	Abandoned	Ogallala
385	Lubbock	9683	65799	Current	Ogallala
386	Lubbock	9088	65210	Current	Ogallala
387	Lubbock	1588	59039	Current	Ogallala
388	Lubbock	9087	65209	Current	Ogallala
389	Lubbock	9442	65559	Current	Ogallala
390	Lubbock	1414	92628	Current	Ogallala
391	Lubbock	290	57991	Current	Ogallala

392	Lubbock	1289	58803	Current	Ogallala
393	Lubbock	3821	60897	Current	Ogallala

ATTACHMENT TR-13

Groundwater Quality Reports

Annual Report

Groundwater Quality, Water Level Elevations, and Remediation Efforts

Hancock Land Application Site (HLAS)
City of Lubbock

TPDES Permit WQ0010353002

Lynn County, TX
May 2023

Prepared by HDR Engineering, Inc.
TBPE Firm No. F-754
TBPG Firm No. 50226

Prepared for City of Lubbock

Annual Report

May 2023

May 24,2023

Paula Jo Lemonds, P.E., P.G.

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Acronyms

Term	Definition
AWT	Agri-Waste Technology Inc.
City	City of Lubbock
HLAS	Hancock Land Application Site
HPWD	High Plains Water District
LLAS	Lubbock Land Application Site
MCL	maximum contaminant level
mg/L	milligrams per liter
SEWRP	Southeast Water Reclamation Plant
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TWDB	Texas Water Development Board

1 Introduction

The City of Lubbock (City) applies reclaimed water at the Lubbock Land Application Site (LLAS) in Lubbock County and at the Hancock Land Application Site (HLAS) in Lynn County as permitted by the Texas Commission on Environmental Quality (TCEQ). This 2023 annual report summarizes the results of groundwater quality and water level measurements and remediation efforts at the HLAS.

The location of the HLAS is shown in Figure 1 and Figure 2. The City's current permit requires them to conduct semi-annual sampling at approximately 140 wells at the LLAS and 40 wells at the HLAS. City personnel collect the data and provide an annual report for each site in late May to the TCEQ.

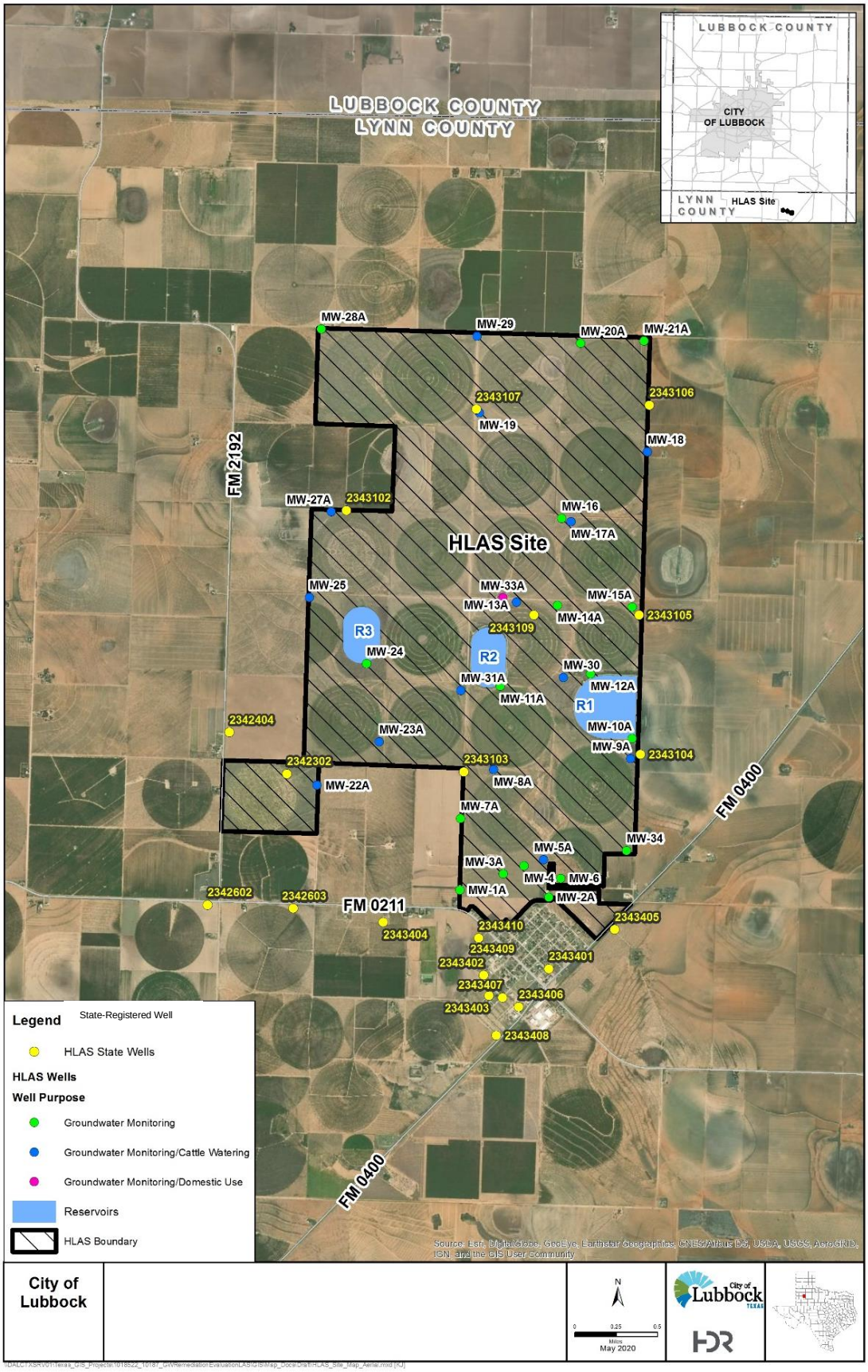

Figure 1. Hancock Land Application Site, location map

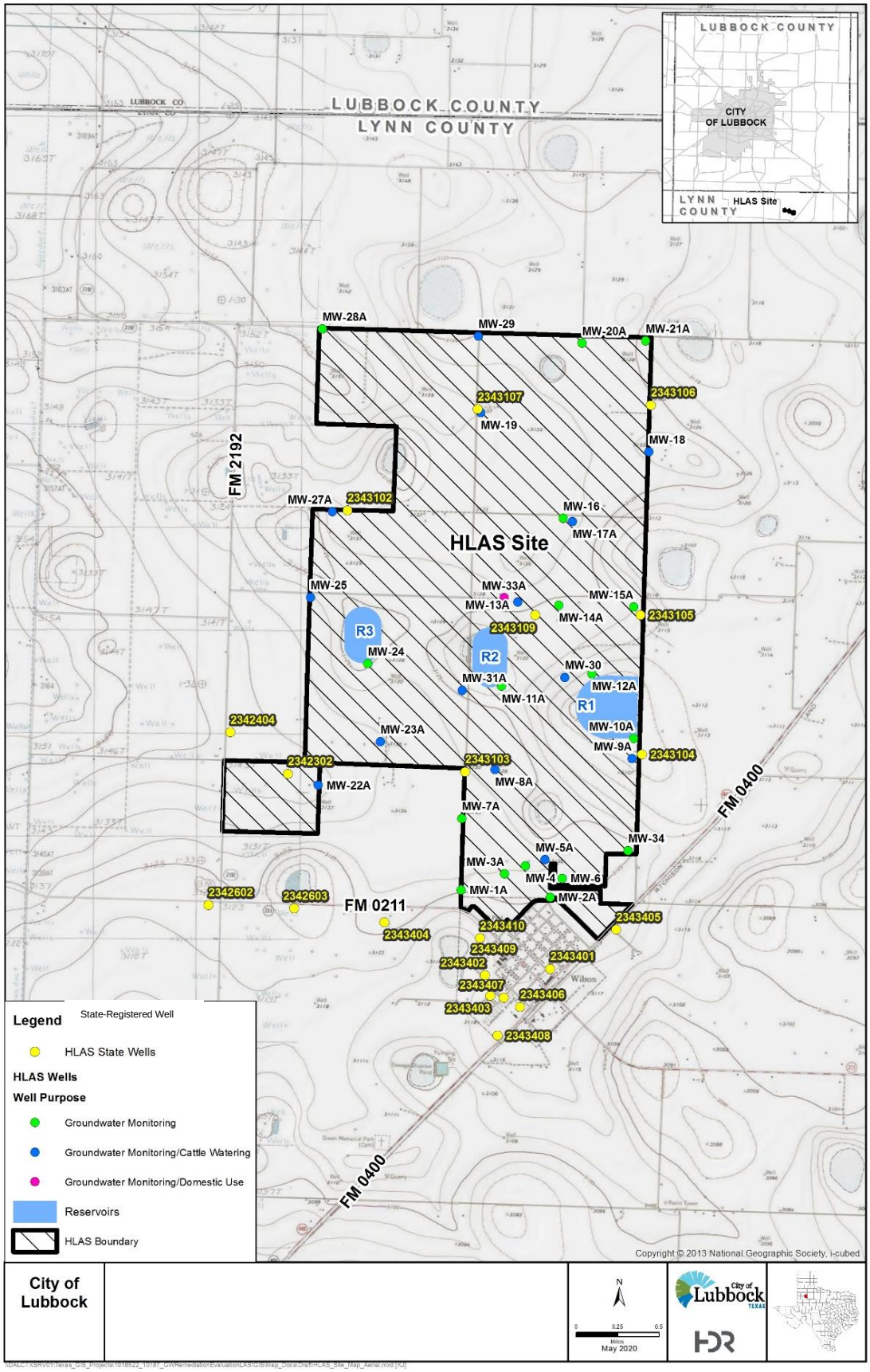

Figure 2. Hancock Land Application Site, topographic map

1.1 Purpose

This report presents the results of groundwater level and sampling activities at the HLAS. The purpose of this report is to comply with the terms stated in Other Requirement No. 18 of the permit to discharge wastes under provisions of Chapter 26 of the Texas Water Code, Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0010353002 renewed through November 27, 2024. Other Requirement No. 18 states:

> *18. The permittee shall continue to implement the "City of Lubbock - Lubbock Land Application Site Ground Water Remediation Plan - Lubbock County, Texas" dated August 23, 1989, and the "Revised Remediation Work Plan - City of Lubbock Land Application Site (LLAS) Prepared for the City of Lubbock - Lubbock County, Texas" dated November 26, 2002, and all subsequent modifications, on the Lubbock Land Application Site (LLAS). Groundwater quality, water elevation levels, and remediation efforts shall be incorporated into an annual report. This annual report at a minimum shall include:*
>
> *a. Static water level results from all monitoring and groundwater recovery wells and a resulting water table map;*
>
> *b. Analytical laboratory results from groundwater sampling at all monitoring and groundwater recovery wells and a resulting nitrate concentration map;*
>
> *c. Annual updates of groundwater modeling summarizing predictive results of the remediation system;*
>
> *d. Volume of groundwater routed through the Jim Bertram Lake System; and volume of groundwater routed for irrigation at other locations;*
>
> *e. In situ groundwater remediation activities (if applicable);*
>
> *f. Any alteration to the cropping and water application plans resulting from water and nitrogen balance models; and*
>
> *g. Any recommended adjustments to the remediation system based on experiences learned from past activities.*
>
> *The permittee shall also implement these plans at the Hancock Land Application Site (HLAS), with the exception of the remediation (groundwater pumping) and groundwater modeling components of these plans. Groundwater quality and water elevation levels shall be incorporated into a similar annual report as established above for the LLAS.*
>
> *All groundwater quality monitoring and water level measurements at the LLAS and HLAS shall comply with the TCEQ approved "Groundwater Sample Collection Quality Assurance Plan for the City of Lubbock Land Application Site - Lubbock County, Texas" dated December 19, 2000 and "Groundwater Level Measurement Quality Assurance Plan for the City of Lubbock Land Application Site - Lubbock County, Texas" dated December 19, 2000 and all TCEQ approved modifications to these plans.*
>
> *All annual groundwater quality samples and static water level measurements shall occur during the late winter months. In addition to the requirements of the above referenced*

plans, the permittee shall obtain semi-annual samples for nitrate from the LLAS and HLAS monitoring wells.

The permittee shall submit annual reports for the LLAS and HLAS to the TCEQ Region 2 Office in Lubbock, the TCEQ Compliance Monitoring Section (MC-224), and the Water Quality Assessment Team (MC-150) which summarizes the ongoing activities related to groundwater remediation and monitoring at the LLAS and groundwater monitoring at the HLAS. Reports are due prior to May 31st of each calendar year.

The TPDES permit is a combined permit for both the LLAS and the HLAS. The HLAS is currently permitted to receive and apply up to 12 million gallons per day (MGD) of treated wastewater effluent.

The annual report is organized to follow the requirements of Other Requirement 18 of TPDES Permit No. WQ0010353002. Report sections correspond to permit subsection letters *a*, *b*, and *g.* The remaining subsections of Other Requirement No. 18 of the permit address activities at the LLAS, addressed under separate cover.

1.2 Background

Since the HLAS has been in operation for multiple decades, significant information about the site exists. Following is a brief summary of information available in previously prepared documents.

1.2.1 Site Location and History

The City's wastewater system group monitors and maintains the sewer collection system, manholes, and lift stations. In addition, they operate the Northwest Water Reclamation Plant (NWWRP) and the Southeast Water Reclamation Plant (SEWRP). These two treatment facilities treat the water for beneficial uses, including stream discharge, agriculture irrigation, and electric generation. The HLAS is a 3,400-acre farming operation located in northern Lynn County, north of the community of Wilson, Texas. HLAS consists of three terminal reservoirs (reservoirs #1, #2, and #3) and a total of 22 center pivot irrigation plots (Figure 1). Treated effluent water from the SEWRP is delivered directly to Reservoir #1 and is then transferred into reservoirs #2 and #3. Water is pumped from reservoirs #1, #2, and #3 into the center pivot irrigation systems for application to the farm plots.

In 1980, the City constructed a storage and distribution system to divert a portion of SEWRP effluent to the HLAS plots located near the City of Wilson in Lynn County. Lubbock Christian University owned and operated the HLAS plots for cotton research until 1999. The City purchased the LLAS in 1986 and began upgrading drainage berms and installing center pivot irrigation systems. The City converted to growing crops with high nitrogen and water consumption capacity, including wheat, corn, alfalfa, and hay. By 1990, the City's efforts to improve farming practices, their incorporation of the Jim Bertram Lake System (JBLS) project, and the addition of the HLAS resulted in a net decrease in groundwater levels beneath the LLAS.

Groundwater quality investigations in the 1980s revealed elevated nitrate-N concentrations. Reed & Associates (now Arcadis) and the Texas Water Commission (TWC) (now TCEQ) conducted an inventory of water wells over an approximately 80-square-mile area to the northeast, east, and southeast of Lubbock. Data showed nitrate-N concentrations in the groundwater mound were greater than the Safe Drinking Water Act's maximum contaminant level (MCL) of 10 milligrams per liter (mg/L).

1.2.2 Site Stratigraphy and Hydrogeology

The Ogallala Aquifer is the dominant groundwater unit in the region. Geologic references indicate the Pliocene age Ogallala Aquifer consists of predominantly sand, gravel, and clay deposits of the Ogallala Formation. Underlying the Ogallala Formation are sandstones and limestones of the Edwards-Trinity Group of Cretaceous age. The Ogallala Formation consists of fluvial gravel, sand, and silt, and eolian sand and silt.

The HLAS in Lynn County is located on an east-west trending buried ridge atop a Cretaceous section with predominantly west-to-east trending paleo-channels located to both the north and south of the HLAS.[1] The freshwater wells located in Lynn County are generally drilled into the Duck Creek Formation or the Kiamichi Formation. Both are Cretaceous age shale, which are the two major aquitards underlying the Ogallala Formation and overlying the Edwards and Comanche Peak formations and the underlying Antlers sand.

Based on a review of available drillers' logs from 2004, the replacement monitoring wells at the HLAS are of PVC construction and were drilled to total depths ranging from 100 feet (MW-10A) to 177 feet (MW-28A). The wells contain between 40 feet (MW-1A) and 65 feet (MW-11A) of well screen. The wells beneath the HLAS property typically encountered alternating layers of clay, sand, and gravel (with occasional beds of sandstone, chert, and caliche). Gravels, when present, are generally in the lower portions of the borings. The wells encountered blue and/or yellow clays at total depth, and the depths of the monitoring wells increase toward the north. This thickening trend to the north is indicative of the overall increase in the thickness of the Ogallala Aquifer along an east-west trending trough near the border of Lynn and Lubbock counties[2].

1.2.3 Installed Monitoring Wells

At the HLAS, there are 58 wells, including original wells (which have either been plugged and abandoned or are otherwise no longer used for monitoring purposes) and replacement wells now used for monitoring. These include, but are not limited to, three wells (MW-26A, MW-32, and MW-33) used for domestic purposes and 14 wells used for livestock (MW-5, MW-8, MW-9, MW-13, MW-17, MW-18, MW-19, MW-22, MW-23, MW-25, MW-26, MW-29, MW-30, and MW-31). The following wells are currently used to monitor water levels and/or groundwater quality on a semi-annual or quarterly basis: MW-1A, MW-2A, MW-3A, MW-4, MW-5A, MW-6, MW-7A, MW-8A, MW-9A, MW-10A, MW-11A, MW-12A, MW-13A, MW-14A, MW-15A, MW-16, MW-17A, MW-18, MW-19, MW-20A, MW-21A, MW-22A, MW-23A, MW-24, MW-25, MW-26A, MW-27A, MW-28A, MW-29, MW-29A, MW-30, MW-31A, MW-32, MW-33A, MW-34, MW-35, and MW-36. Table 1 shows each monitoring well and the corresponding latitude and longitude.

Water level information from monitoring events is reported in Section 2 and the groundwater quality results are discussed in Section 3. Historically, groundwater quality samples have been collected from off-site, private wells as part of the Bottled Water program. The City provides water to homes near the HLAS where wells have had nitrate-N concentrations in excess of the MCL of 10 mg/L.

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[1] Goolsby, J.E. 1975. Cenozoic Stratigraphy and Geomorphology of Lynn and Terry Counties, Texas. PhD Dissertation, Texas Tech University. August 1975.

[2] TWDB. 2003. Groundwater Availability of the Southern Ogallala Aquifer in Texas and New Mexico. February 2003.

Table 1. Monitoring Wells for the HLAS

Well Name	Latitude	Longitude
MW-28A	33.37411707	-101.7497756
MW-22A	33.33412303	-101.7487545
MW-23A	33.33810698	-101.7424094
MW-24	33.34490959	-101.7439774
MW-1A	33.32532874	-101.7334878
MW-7A	33.33159439	-101.7336507
MW-31A	33.34282609	-101.7340318
MW-27A	33.35812255	-101.7481648
MW-18	33.36423687	-101.7153166
MW-26A	33.35070395	-101.7332809
MW-29	33.373911	-101.7334685
MW-36	33.32327687	-101.7290347
MW-3A	33.32685135	-101.7290075
MW-4	33.32762002	-101.7268614
MW-2A	33.32492211	-101.7241931
MW-5A	33.32820982	-101.7248558
MW-6	33.32660719	-101.7229855
MW-8A	33.33598639	-101.7303563
MW-11A	33.34328721	-101.7299202
MW-35	33.32200139	-101.7194853
MW-34	33.32923306	-101.716204
MW-30	33.34422853	-101.7233626
MW-12A	33.34461736	-101.7205417
MW-9A	33.33728476	-101.7160707
MW-33A	33.35104277	-101.7299525
MW-13A	33.35072192	-101.7285102
MW-14A	33.35052714	-101.7242248
MW-16	33.3581633	-101.7240585
MW-19	33.36719559	-101.7329773
MW-17A	33.35791711	-101.7230811
MW-15A	33.35058268	-101.716408
MW-25	33.35056453	-101.7501667
MW-20A	33.37357096	-101.7226221
MW-21A	33.37394186	-101.7160024
MW-10A	33.33907285	-101.7159851

2 Static Water Level Elevations

[TPDES Permit Other Requirement 18a]

Static water level elevations are typically measured in January or February. For the annual report, static water level elevations were measured on January 20, 2023.

Static water level elevations from 1981 through the most recent measurement are shown in Appendix B, Table 1. On January 17, 2012, the TCEQ approved a modification to the procedures used to conduct the static water level recovery for the annual static water level measurement program at the HLAS. This modification allowed for collecting all static water levels during a single phase (rather than in two phases) once all the cattle watering wells and domestic wells at the HLAS property had been turned off for a minimum of 12 hours.

The High Plains Water District (HPWD) annually measures the static water level elevations in irrigation wells within the HPWD. These off-site wells surrounding the site provide useful information for understanding the water table in the greater area. Static water level elevations for HPWD-registered wells for 2005 to the most recent measurement are shown in Appendix B, Table 2 for the nearby off-site irrigation wells, as measured by the HPWD.

2.1 Water Table Map

The groundwater table, as measured on January 20, 2023, is shown in Figure 3. The gradient is from south to north. There is a potentiometric high point at Reservoir #2.

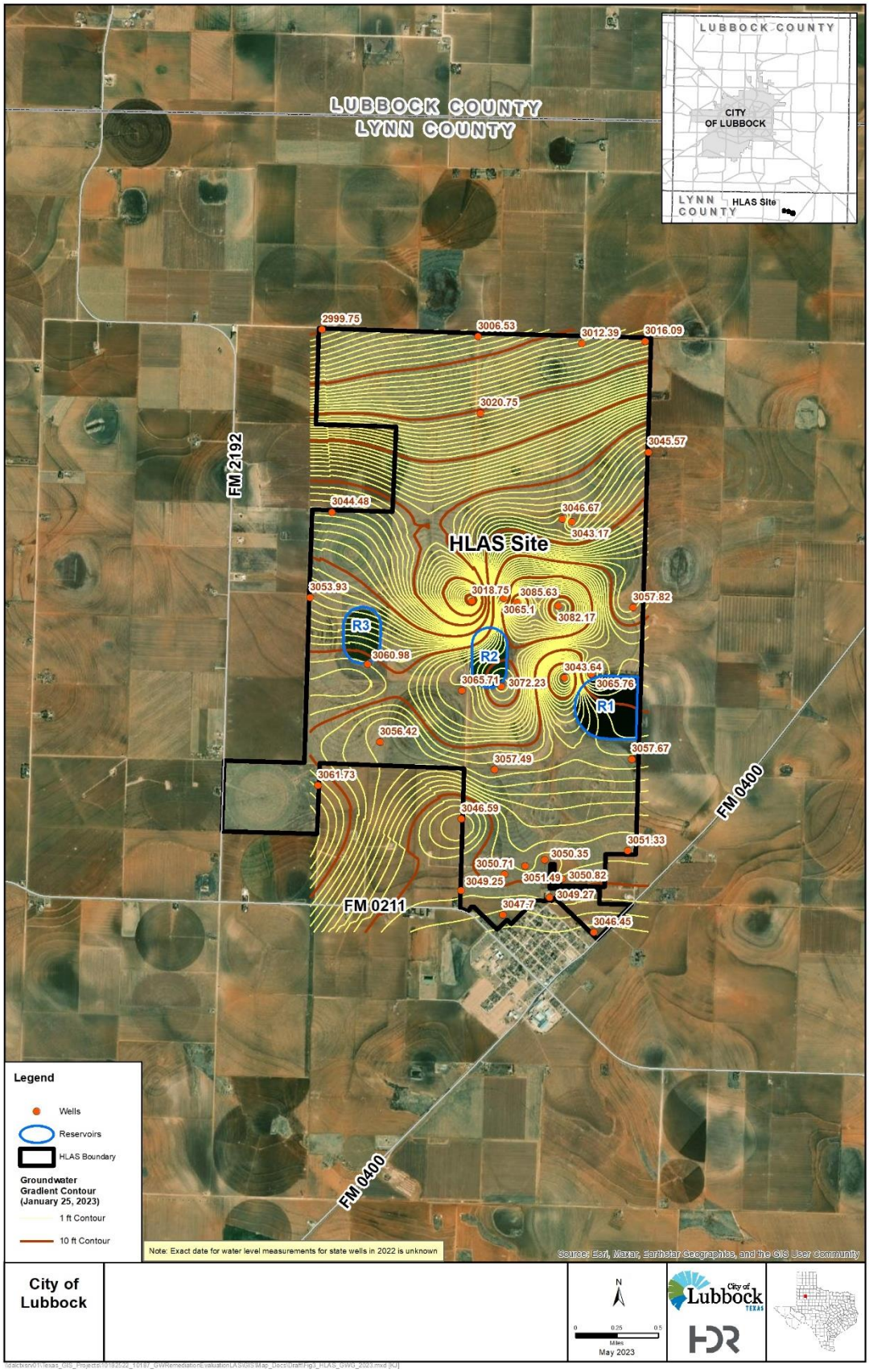

Figure 3. January 2023 Groundwater Gradient

2.2 Historical Water Level Trends

The City has a provision that monitoring wells, which are used for domestic purposes, will only be used for household water during the static water level recovery period. In addition, wells used for livestock are now operated in a manner that requires they are turned off the day before the static water level measurements are taken to minimize effects on adjacent wells. Water level data from the HPWD annual survey in 2023 were used to supplement the 2023 annual HLAS measurements (Appendix B, Table 2).

Based on previous reports, the calculated average measured depth to water of the HLAS farm wells and selected nearby state wells decreased (i.e., the groundwater elevation has increased) approximately 20 feet between the years of 1982 to 1992 but was generally stable from 1992 to 2000. Since 2000, the average groundwater elevation has increased slightly. Beginning in 2004, previous reports also calculated the average groundwater elevation of wells MW-1A through MW-31A, including all non-replaced wells, and MW-34, MW-35, and MW-36 on the HLAS. The average groundwater elevation beneath the HLAS has been 3,050 feet with a minimum of 3,001 feet to maximum of 3,083 feet above mean sea level (MSL) from 2004 through 2021.

Individual hydrographs of groundwater elevation versus time are presented in Appendix C. As discussed above, several of the individual wells/well pairs have been monitored since the early 1980s and the hydrographs show an initial period through approximately 1992 where elevations increased from between 10 to 30 feet but have since stabilized or exhibited a slightly declining trend.

3 Groundwater Quality Sampling Results

[TPDES Permit Other Requirement 18b]

This section discusses historical groundwater quality near the HLAS and the results from the semi-annual groundwater quality sampling event. Treated wastewater effluent from the SEWRP was first applied between 1981 and 1982, when the land was still owned by Lubbock Christian College. The area surrounding the HLAS is, and has been, in agricultural use for several years with some oil wells present in the vicinity. In addition, the City of Wilson is located immediately to the south of the HLAS property. The City of Wilson’s wastewater treatment pond is located to the southwest of the center of Wilson and less than one mile from the southern boundary of the HLAS.

The 2023 semi-annual sampling events occurred over 36 days between August 3 and September 8, 2022, and over 37 days between April 2 and May 9, 2023. Groundwater field data, including pH, temperature, conductivity, dissolved oxygen, and oxygen-reduction potential (ORP) are included in Appendix B, Table 3.

Nitrate-N groundwater monitoring data for the HLAS monitoring wells are included in Appendix B, Table 4. Time series figures of nitrate-N concentrations for the HLAS monitoring wells are included in Appendix D. Average nitrate-N concentrations through time are depicted in Figure 4.

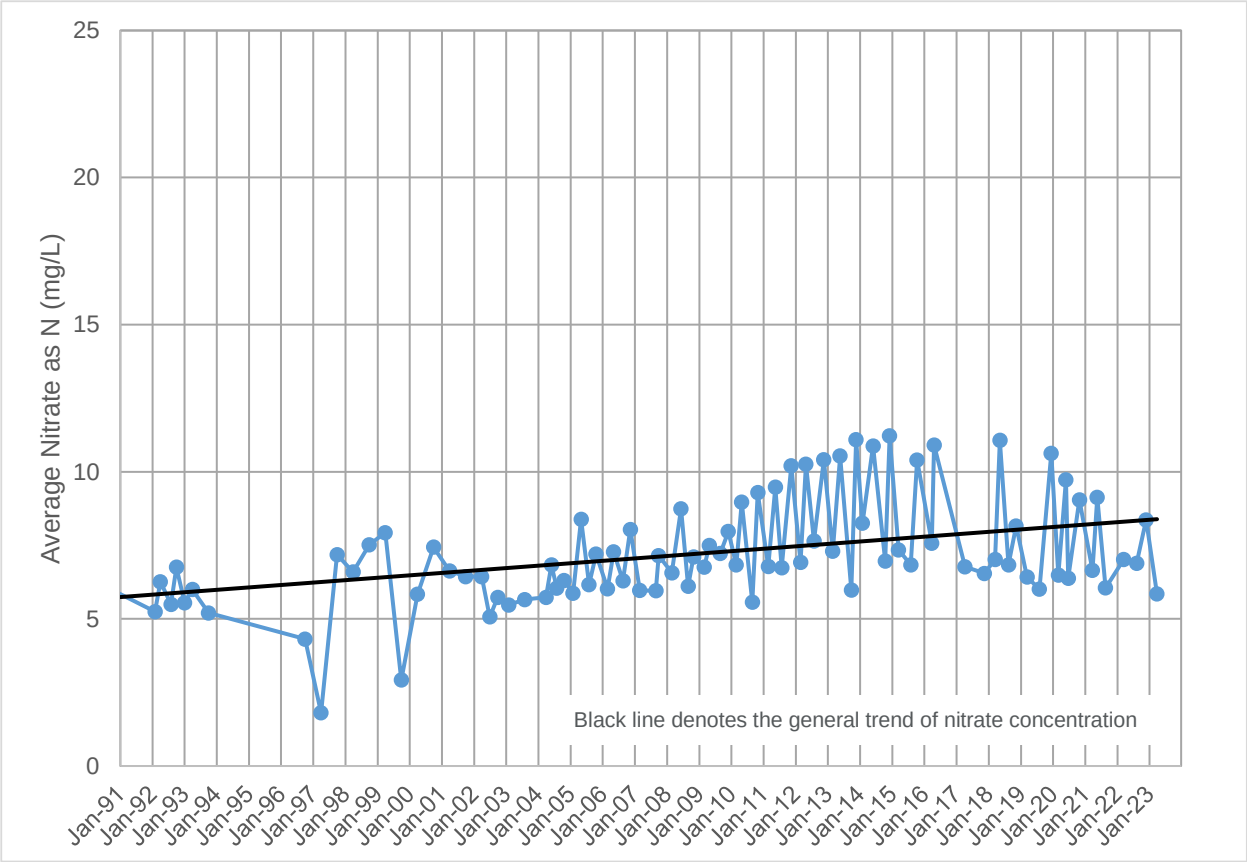

Figure 4. Average Nitrate-N Concentrations through Time for HLAS Monitoring Wells

3.1 Nitrate Concentration Map

Isoconcentration (line of equal concentration) contour maps of nitrate-N in groundwater were developed for the sampling events. The nitrate-N concentration maps for the August 2022 and April 2023 sampling events are shown in Figure 5 and Figure 6, respectively.

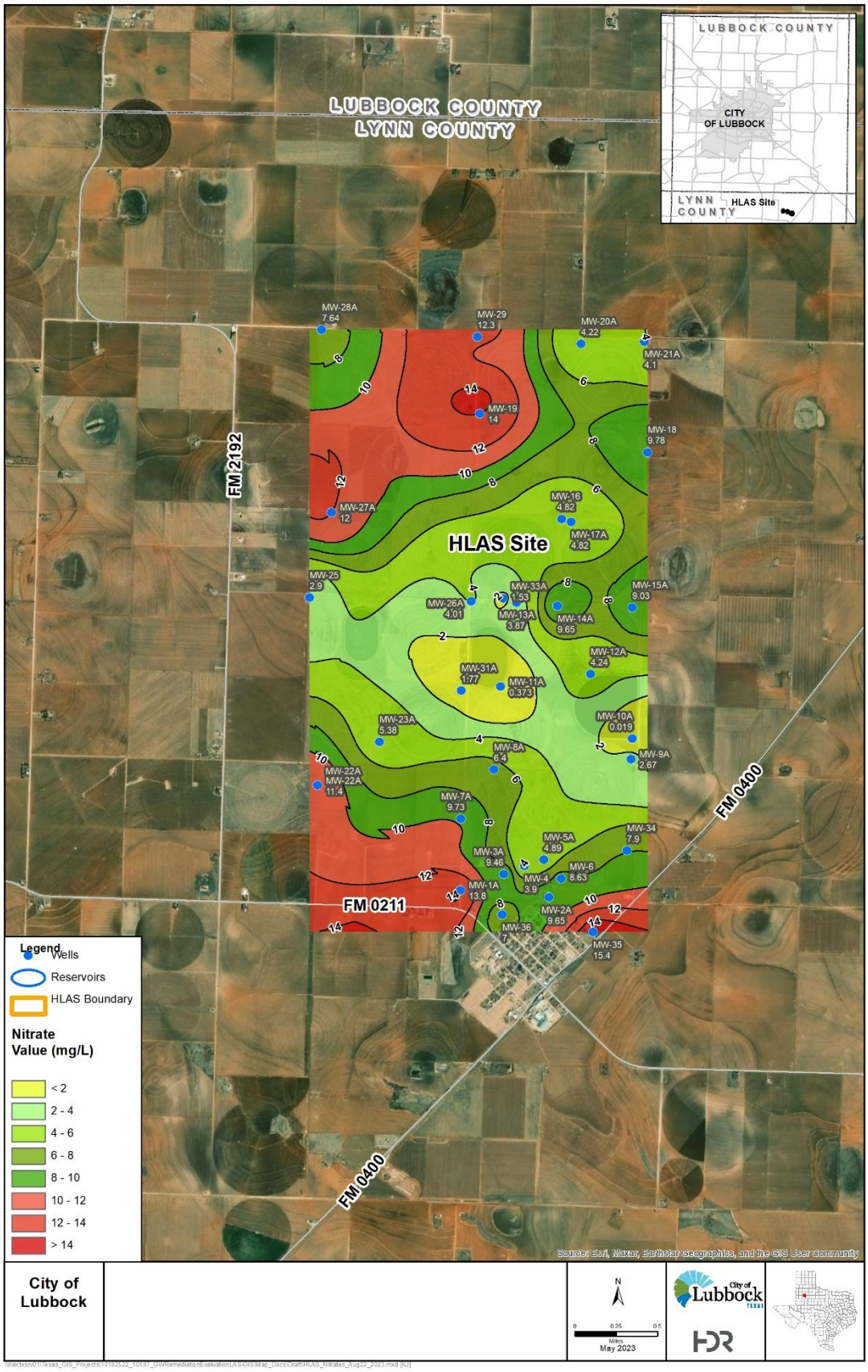

Figure 5. August 2022 Nitrate Concentrations

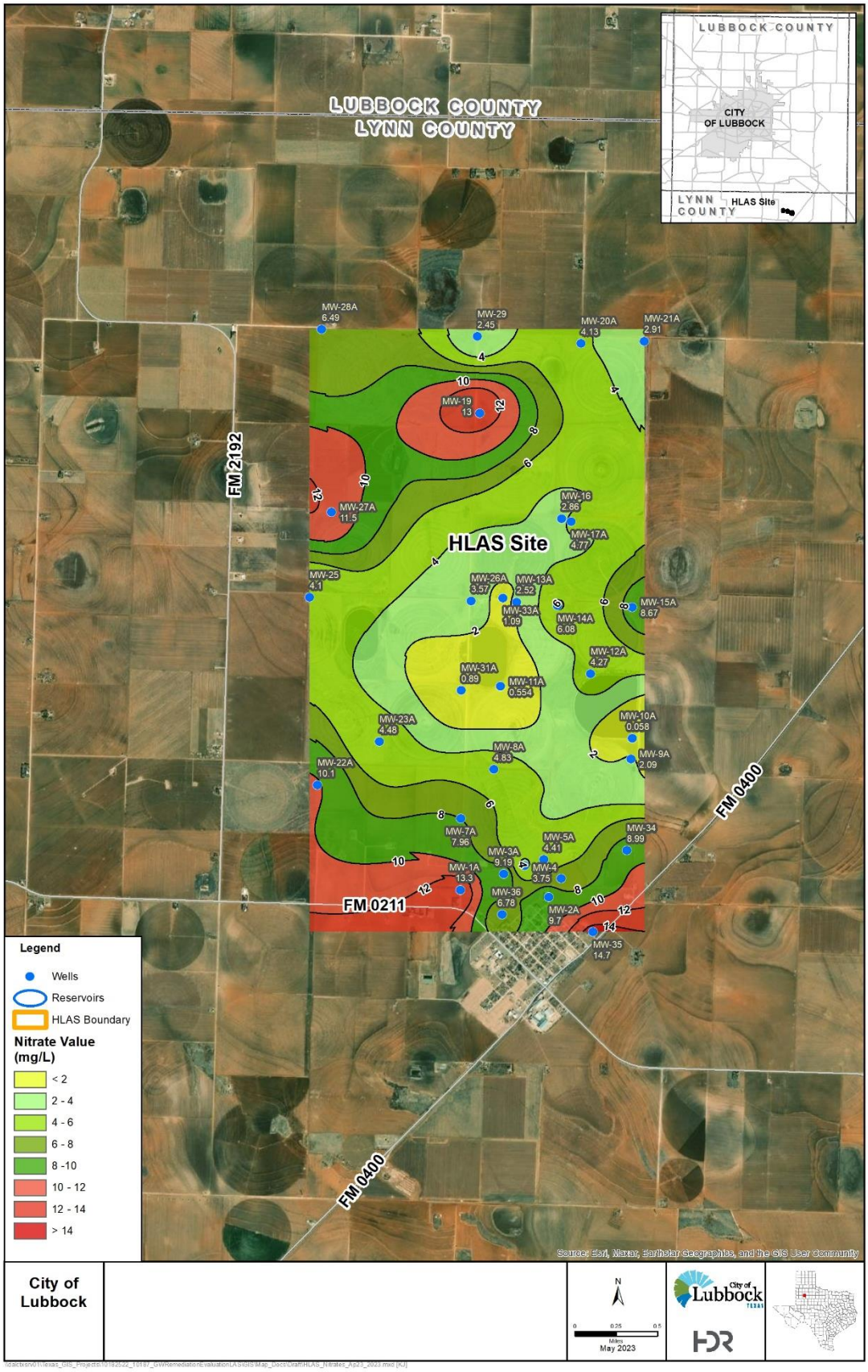

Figure 6. April 2023 Nitrate Concentrations

3.2 Historical Nitrate Trends

In October 2004, Arcadis G&M (Arcadis) prepared a report on groundwater quality in the area of the HLAS[3], which included a review of historical groundwater quality prior to initiation of land application of treated wastewater effluent. The report documented that prior to 1982, when the first effluent wastewater was delivered to reservoirs #1, #2, and #3, the nitrate-N concentrations in three water wells, 23-43-501, 23-43-301, and 23-42-601, located within approximately 2.5 to 5 miles to the south and east of the HLAS farm, exceeded the MCL of 10 mg/L nitrate-N. The groundwater nitrate-N concentrations were 10.2 mg/L, 15.8 mg/L, and 18.7 mg/L, respectively. In addition, the Arcadis report examined the history of nitrate-N concentrations observed in the City of Wilson water supply wells located in the southern portion of the downtown area. The nitrate-N concentrations were steadily increasing in those supply wells prior to 1982.

Despite relatively high spikes observed in the nitrate-N groundwater concentrations in some HLAS wells located in the center of the HLAS near the terminal reservoirs #1, #2, and #3 soon after delivery of the treated wastewater effluent to the three reservoirs, intervening HLAS monitoring wells located between the reservoirs and the City of Wilson water supply wells did not exhibit elevated concentrations in that time period. Based on an analysis of the concentration trends, Arcadis concluded that the source of the nitrate-N above 10 mg/L in the City of Wilson water supply wells may be derived from the Wilson wastewater treatment pond located to the southwest of town. Arcadis also noted that a gin is located in the vicinity of one of the water supply wells. Other possible sources of nitrate-N included fertilizer applications to various farms and possible occasional barnyard or septic tank contamination of the wells.

A review of the Texas Water Development Board's (TWDB) groundwater database by Terracon noted that a relatively large number of wells were sampled in the northeastern portion of Lynn County during the time periods of 1949 to 1950, 1969 to 1975, and 1977 to 1980. The August 2009 annual report included isoconcentration contour maps of nitrate-N in groundwater from the TWDB database for these periods. The 1949 to 1950 nitrate-N concentration map indicated elevated nitrate-N concentrations in the range of 6.4 to 8.6 mg/L in three wells to the immediate southeast and east of the future HLAS property. In addition, several wells to the southwest and east of the future HLAS exceeded 10 mg/L during the time from 1969 to 1975. During the period from 1977 to 1980, the nitrate-N concentration in well 23-42-601, located to the southwest of the future HLAS, had increased to 18.8 mg/L, and well 23-44-203, located to the east of the future HLAS, had a reported concentration of 15.8 mg/L nitrate-N. Therefore, several sources of elevated nitrate-N concentrations existed in the areas surrounding the HLAS and adversely impacted groundwater prior to the delivery of any treated wastewater effluent to the HLAS farm in 1982.

4 Land Application Site Operations

This section summarizes the operations at the HLAS. A report prepared by Agri-Waste Technology, Inc. (AWT) in September 10, 2003, summarizes the crop and cattle grazing operations that are conducted at the site. AWT developed a water balance model that accounts for crop water and crop nitrogen needs, as well as residual values of nitrogen in the soil. The water balance meets weekly

[3] Arcadis G&M. 2004. Area Report on the Groundwater Quality and Water Level Elevations at the City of Lubbock, Texas Hancock Land Application Site (HLAS) - Lynn County, Texas. October 20, 2004.

crop nitrogen requirements and prevents over-application that may result nitrogen leaching to groundwater. Since at least 2002, wheatgrass has been grown at the HLAS with the exception of Plot H21, which is a combination of small grains and grasses. The City continues to follow the cropping and water balance management plans developed by AWT.

Groundwater from monitoring wells MW-26A, MW-32, and MW-33 are used for domestic purposes at the farm. Wells MW-5, MW-8, MW-9, MW-13, MW-17, MW-18, MW-19, MW-22, MW-23, MW-25, MW-26, MW-29, MW-30, and MW-31 are used for livestock. Although these wells do not have flow meters, the City estimates that these wells pump a maximum total of approximately 3 million gallons per year. As discussed below, this estimated groundwater pumpage at the HLAS is a very small percentage of the amount of treated wastewater effluent applied to the crops. The rainfall total at the HLAS was 20.55 inches in calendar year 2021; when compared to the annual rainfall amounts from 2002 to 2021, 10 years had less and 9 years had more.

5 Treated Wastewater Effluent Application

Approximately 790 million gallons, or 2,424 acre-feet, of treated wastewater effluent was applied to the HLAS plots in 2022, and as of April 2023, 352 million gallons of treated wastewater effluent was applied. The approximately 2,228 irrigated acres at the HLAS received an average of 354,477 gallons per acre of applied wastewater effluent in 2022. A summary of the total gallons of water applied to each of the HLAS plots and contract plots is shown in Appendix A, Table 1. The table shows the number of acres in each HLAS plot and the total gallons of treated wastewater effluent applied to each of the 22 HLAS plots for the period from 2003 to April 2023.

6 Summary Discussion

Following is a summary of the key conclusions and recommendations from the 2023 annual sampling events and other historical data.

1. The annual groundwater level data collected in January 2023 at the HLAS demonstrates that the mound of groundwater beneath the HLAS farm and in the vicinity of the three effluent storage reservoirs is generally similar in shape and magnitude to past sampling events.

2. A total of approximately 790 million gallons of treated wastewater effluent were applied to the HLAS plots in 2022, which was less than the 809 million gallons applied in 2021, and less than the annual amounts applied from 2003 through 2021. The amount of treated wastewater effluent applied to the HLAS plots in 2022 was approximately two and half times less than the amount applied in the years 2003, 2007, and 2012.

3. The average nitrate-N concentration for the HLAS farm monitoring wells is 5.85 mg/L for the annual sampling event in April 2023, which is similar to the average nitrate-N concentration of 7.02 mg/L for the annual event in March 2022 and 6.65 mg/L for the annual event in March 2021.

4. Monitoring wells MW-1A, MW-2A, MW-6, MW-34, MW-35, and MW-36 are located on the south side of the HLAS closest to the City of Wilson. During the most recent April 2023 annual sampling event, these wells exhibited nitrate-N concentrations of 13.3 mg/L, 9.70 mg/L,

8.98 mg/L, 8.99 mg/L, 14.70 mg/L, and 6.78 mg/L nitrate-N, respectively, with two of the wells exceeding the MCL of 10 mg/L.

5. HLAS wells that exceeded the MCL of 10 mg/L nitrate-N during the April 2023 annual sampling event include the following.
   - MW-01A – 13.3 mg/L
   - MW-19 – 13.0 mg/L
   - MW-22A – 10.1 mg/L
   - MW-27A – 11.5 mg/L
   - MW-35 – 14.7 mg/L

6. Continued use of the three effluent storage reservoirs does not appear to be having a significant impact on groundwater quality, as nitrate-N concentrations in the immediate vicinity of the reservoirs continue to remain relatively low (i.e., <5 mg/L nitrate-N). However, monitoring well MW-14A, located approximately 1,800 feet to the northeast of Reservoir #2, has periodically exhibited nitrate-N concentrations exceeding 10 mg/L during the time from 2006 to early 2021 but not in 2022 or 2023. Adjacent monitoring well MW-15A, located to the east and on the border of the HLAS, exhibited a concentration of 8.67 mg/L nitrate-N in April 2023.

6.1 Recommendations
[TPDES Permit Other Requirement 18g]

1. State-registered water wells monitored annually by the HPWD should continue to be incorporated into the HLAS monitoring network to evaluate groundwater quality and groundwater elevations. The City may choose to supplement these wells with other wells for sampling and water level data.

2. The HLAS wells should be monitored on a semi-annual basis for nitrate-N and groundwater elevations and the results should be reported to the TCEQ in an annual report.

A

Treated Wastewater Effluent Application at HLAS

Table 1. Water Land Applied

Plot	Acres	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
H1	40.59	39,768,600	30,084,700	33,641,400	41,404,900	41,340,300	38,281,300	41,209,400	31,314,500	32,047,100	41,281,400
H2	98.07	106,602,700	80,972,900	83,492,700	87,295,500	102,438,300	83,808,100	88,264,200	66,345,900	66,997,500	105,044,000
H3	125.14	103,274,400	70,491,200	103,931,600	107,680,600	118,682,000	106,001,500	107,904,300	88,321,400	87,720,700	124,742,500
H4	120.33	117,099,700	74,115,800	93,880,700	119,199,200	116,565,400	124,154,300	127,700,800	121,576,100	94,162,200	140,599,500
H5	109.58	104,730,000	81,630,400	75,625,800	76,378,000	102,286,700	92,262,300	92,725,000	75,578,300	71,906,400	84,169,000
H6	100.13	80,403,000	82,583,300	84,184,600	87,659,600	88,835,100	102,178,900	93,531,600	87,859,400	72,338,400	92,843,600
H7	83.24	69,373,100	42,857,200	62,759,400	73,682,600	83,776,600	73,249,200	91,587,000	81,679,100	63,845,700	76,278,300
H8	89.46	90,571,600	58,068,000	79,764,220	81,974,000	81,855,700	87,993,800	90,168,200	82,402,600	49,465,100	74,348,800
H9	109.07	93,777,000	72,254,400	90,273,100	108,471,210	98,870,500	78,569,200	117,940,200	103,054,600	74,357,700	95,796,700
H10	121.18	55,143,400	75,063,500	63,910,100	100,535,700	106,852,000	94,590,100	97,164,300	108,844,900	80,269,700	107,228,600
H11	108.86	101,347,700	77,556,700	83,629,000	101,520,200	109,245,500	87,671,000	79,232,400	95,462,100	50,450,800	100,859,000
H12	103.28	94,503,500	78,690,500	87,295,700	94,270,800	84,407,000	81,421,900	75,663,500	75,319,200	61,181,100	85,138,300
H13	93.33	84,908,600	50,423,000	79,998,600	76,518,900	99,293,000	75,599,200	90,278,000	90,843,800	58,363,200	90,091,000
H14	141.22	121,200,800	86,457,600	89,942,200	107,047,800	113,553,100	123,325,300	106,184,900	107,048,000	77,715,300	125,914,000
H15	111.74	102,309,700	81,059,600	83,163,200	103,341,400	114,059,900	88,078,600	100,793,700	86,498,300	51,867,500	102,761,800
H16	55.87	50,543,800	42,281,700	44,558,800	44,826,300	55,392,300	39,500,900	46,441,700	41,017,000	28,560,500	54,703,000
H17	121.24	116,826,400	90,437,700	105,428,800	88,960,400	111,682,500	88,219,300	101,746,400	76,477,300	70,424,100	105,641,000
H18	107.3	109,561,700	57,713,100	88,911,100	91,157,000	79,778,300	85,159,500	97,130,000	82,314,400	84,372,200	101,008,800
H19	146.63	142,472,000	108,869,300	98,168,900	102,605,300	127,497,600	84,274,000	112,630,320	103,559,300	71,143,100	137,064,900
H20	119.53	104,903,600	83,100,400	69,747,700	87,605,600	76,800,800	74,729,300	63,589,900	94,187,900	54,957,300	95,519,000
H21	86.78	65,553,900	52,256,300	64,903,600	57,933,300	62,715,700	77,322,000	72,621,000	66,001,700	33,869,600	32,428,900
H22	35.31	26,339,900	18,939,700	28,832,500	34,098,400	37,062,900	43,770,800	37,335,900	36,277,800	27,020,400	36,650,800
Total	2,228	1,981,215,100	1,495,907,000	1,696,043,720	1,874,166,710	2,012,991,200	1,830,160,500	1,931,842,720	1,801,983,600	1,363,035,600	2,010,112,900
Applied Effluent Gallons/Acre:										611,775	902,205
Rainfall (in):										4.30	10.45
Rainfall Gallons/Acre:										116,763	283,762

* Effluent Applied through May 2023

Plot	Acres	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
H1	40.59	35,227,700	38,942,900	33,773,900	35,746,500	29,973,000	23,323,900	14,945,900	11,448,900	14,337,300	10,661,600	7,838,000
H2	98.07	70,040,500	80,506,500	76,096,000	75,356,700	67,767,200	65,835,700	140,806,100	47,845,500	40,603,800	39,594,500	22,252,900
H3	125.14	86,434,000	82,396,000	87,504,000	69,527,600	80,643,000	74,853,800	52,116,400	46,594,900	44,755,500	35,540,600	14,871,300
H4	120.33	89,173,400	98,518,100	74,642,500	76,471,600	88,765,500	87,773,700	68,641,000	40,829,100	44,265,200	34,792,000	8,791,400
H5	109.58	68,453,700	69,017,300	60,526,700	62,332,500	68,036,000	57,859,000	52,844,000	53,652,700	33,547,500	47,754,300	18,120,500
H6	100.13	56,072,000	77,813,200	46,882,800	65,401,600	65,702,400	55,117,100	45,405,600	43,616,400	39,828,500	24,996,800	23,183,300
H7	83.24	58,756,300	56,675,300	58,861,200	49,399,000	44,612,000	42,704,000	46,865,600	44,399,900	37,192,600	31,985,700	18,571,300
H8	89.46	56,161,488	51,926,100	37,527,100	45,919,600	30,012,000	50,069,000	51,351,000	35,244,000	43,314,000	27,095,200	15,345,900
H9	109.07	84,008,200	86,061,500	75,364,800	68,722,800	78,816,100	69,997,500	52,960,900	46,399,300	45,319,300	53,429,400	24,715,500
H10	121.18	77,388,600	84,442,500	69,370,800	65,297,400	76,939,100	71,013,100	37,349,100	45,755,300	45,035,600	45,867,900	25,189,400
H11	108.86	71,803,800	69,194,100	59,742,000	62,736,000	60,693,900	52,696,100	32,534,600	41,325,000	28,269,200	41,992,300	10,006,700
H12	103.28	72,055,600	86,406,800	69,113,300	67,259,100	62,877,400	68,566,100	48,871,500	48,223,600	35,757,800	48,590,400	13,616,200
H13	93.33	60,551,200	62,282,300	79,107,500	82,669,700	80,803,200	57,118,200	62,347,100	48,230,400	45,831,500	55,131,000	14,731,200
H14	141.22	76,144,000	73,839,000	90,009,000	59,430,000	81,207,000	74,798,000	50,928,000	48,354,000	54,745,000	39,269,216	26,700,500
H15	111.74	80,497,300	75,360,500	67,774,600	68,250,300	58,246,800	49,411,300	48,302,700	37,448,800	34,679,700	31,282,100	19,845,300
H16	55.87	31,532,700	43,702,720	39,546,200	52,063,100	32,732,000	33,800,000	23,069,000	18,333,000	22,622,000	23,085,700	13,560,800
H17	121.24	66,176,300	69,419,900	70,777,900	66,194,000	68,935,200	60,527,200	46,077,200	53,422,400	49,575,300	45,137,600	24,839,100
H18	107.3	65,060,400	67,860,300	66,774,000	63,672,900	64,230,000	26,723,000	49,701,000	52,800,400	41,326,400	51,752,700	14,480,000
H19	146.63	83,484,100	84,649,700	71,101,200	78,204,600	62,799,200	67,266,600	55,975,500	55,863,800	47,946,700	37,154,100	11,906,100
H20	119.53	76,413,400	71,737,000	61,393,900	55,555,000	62,587,000	34,354,000	37,676,000	45,436,100	35,731,000	30,189,400	19,757,900
H21	86.78	28,835,100	32,095,200	30,627,800	51,963,700	41,161,100	36,761,100	22,910,500	24,234,000	12,509,800	21,126,600	0
H22	35.31	20,945,000	23,676,100	19,804,300	19,965,100	14,611,600	25,231,000	17,423,000	14,509,000	11,915,000	13,346,000	3,793,100
Total	2,228	1,415,216,801	1,486,525,034	1,346,323,515	1,342,140,816	1,322,152,717	1,185,799,400	1,059,101,700	903,966,500	809,108,700	789,775,116	352,116,400
Applied Effluent Gallons/Acre:		635,196	667,202	604,274	602,397	593,426	532,226	475,360	405,730	363,155	354,477	158,041
Rainfall (in):		17.80	23.80	28.10	25.40	21.50	26.64	18.29	10.39	20.55	20.55	21.55
Rainfall Gallons/Acre:		483,346	646,272	763,035	689,719	583,817	723,390	496,652	281,997	558,021	558,021	585,175

* Effluent Applied through May 2023

B

Tables and Charts

Table 1: Historical and Recent Groundwater Elevation Data

Table 2: Historical and Recent Groundwater Levels

Table 3: Historical and Recent Field Water Quality Data

Table 4: Historical and Recent Nitrate Concentrations

Well Number	MW-1	MW-1A	MW-2	MW-2A	MW-3	MW-3A	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-7A	MW-8
Old Well Number	40331	--	40311	--	--	--	--	--	--	--	40231	--	11032
Well Elevation before 1/22/2005	3129.56	3129.24	3130.12	3129.57	3131.62	3131.65	3132.05	3131.22	3129.96	3130.39	3134.69	3133.30	3129.80
Well Elevation 1/22/2005 -	3129.46	3129.38	3130.25	3129.62	3131.59	3131.61	3131.89	3130.95	3130.06	3130.16	3134.61	3134.11	3129.37
Well Elevation 2/7/2007 -	--	3131.39	--	3131.45	--	3133.85	3135.20	--	3131.64	3133.30	--	3135.75	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
12/22/1981	--	--	--	--	--	--	--	--	--	--	3036.09	--	--
2/19/1982	--	--	--	--	--	--	--	--	--	--	3034.69	--	--
4/22/1982	--	--	--	--	--	--	--	--	--	--	3035.79	--	--
6/23/1982	--	--	--	--	--	--	--	--	--	--	3033.69	--	--
7/19/1982	--	--	--	--	--	--	--	--	--	--	3034.19	--	--
11/12/1982	--	--	--	--	--	--	--	--	--	--	3036.69	--	--
12/13/1982	--	--	--	--	--	--	--	--	--	--	3036.69	--	--
1/1/1983	3034.76	--	--	--	--	--	--	--	--	--	--	--	3037.90
2/11/1983	3034.76	--	--	--	--	--	--	--	--	--	--	--	3038.00
3/11/1983	3034.76	--	--	--	--	--	--	--	--	--	--	--	3038.20
4/7/1983	3035.96	--	--	--	--	--	--	--	--	--	--	--	3038.50
5/5/1983	3035.06	--	--	--	--	--	--	--	--	--	3036.69	--	3038.50
6/6/1983	3034.76	--	--	--	--	--	--	--	--	--	--	--	3038.80
7/6/1983	3035.36	--	--	--	--	--	--	--	--	--	--	--	3039.70
8/4/1983	3034.86	--	--	--	--	--	--	--	--	--	--	--	3038.80
9/12/1983	3035.46	--	--	--	--	--	--	--	--	--	--	--	3039.30
9/14/1983	--	--	--	--	--	--	--	--	--	--	3036.69	--	--
10/13/1983	3034.86	--	--	--	--	--	--	--	--	--	--	--	3039.30
11/14/1983	3034.96	--	--	--	--	--	--	--	--	--	--	--	3039.80
12/15/1983	3034.76	--	--	--	--	--	--	--	--	--	--	--	3039.80
7/16/1984	3033.56	--	--	--	--	--	--	--	--	--	--	--	3041.80
9/29/1984	3032.86	--	--	--	--	--	--	--	--	--	--	--	3042.10
1/9/1985	3031.56	--	--	--	--	--	--	--	--	--	3038.49	--	3043.00

Well Number	MW-1	MW-1A	MW-2	MW-2A	MW-3	MW-3A	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-7A	MW-8
Old Well Number	40331	--	40311	--	--	--	--	--	--	--	40231	--	11032
Well Elevation before 1/22/2005	3129.56	3129.24	3130.12	3129.57	3131.62	3131.65	3132.05	3131.22	3129.96	3130.39	3134.69	3133.30	3129.80
Well Elevation 1/22/2005 -	3129.46	3129.38	3130.25	3129.62	3131.59	3131.61	3131.89	3130.95	3130.06	3130.16	3134.61	3134.11	3129.37
Well Elevation 2/7/2007 -	--	3131.39	--	3131.45	--	3133.85	3135.20	--	3131.64	3133.30	--	3135.75	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/2/1985	3033.56	--	--	--	--	--	--	--	--	--	3038.89	--	3043.80
7/9/1985	3033.86	--	--	--	--	--	--	--	--	--	3039.29	--	3044.60
9/23/1985	3033.56	--	--	--	--	--	--	--	--	--	3039.59	--	3044.90
1/14/1986	3034.26	--	--	--	--	--	--	--	--	--	3040.19	--	3046.10
3/27/1986	3034.56	--	--	--	--	--	--	--	--	--	3040.69	--	3046.80
7/14/1986	3036.56	--	--	--	--	--	--	--	--	--	3041.69	--	3046.80
9/8/1986	3036.76	--	--	--	--	--	--	--	--	--	3041.89	--	3048.00
12/10/1986	3035.46	--	--	--	--	--	--	--	--	--	3041.89	--	3049.20
3/16/1987	3037.86	--	--	--	--	--	--	--	--	--	3043.19	--	3050.00
4/8/1987	--	--	--	--	--	--	--	--	--	--	--	--	--
6/23/1987	3038.76	--	--	--	--	--	--	--	--	--	--	--	--
7/23/1987	--	--	--	--	--	--	--	--	--	--	3044.69	--	--
9/24/1987	3036.66	--	--	--	--	--	--	--	--	--	--	--	--
10/27/1987	--	--	--	--	--	--	--	--	--	--	3045.49	--	--
11/11/1987	3038.96	--	--	--	--	--	--	--	--	--	3045.29	--	--
3/14/1988	3040.06	--	--	--	--	--	--	--	--	--	3047.89	--	--
6/27/1988	3039.66	--	--	--	--	--	--	--	--	--	3048.19	--	--
9/27/1988	3041.96	--	--	--	--	--	--	--	--	--	3048.89	--	3056.10
12/13/1988	3042.66	--	--	--	--	--	--	--	--	--	3049.69	--	3056.90
3/1/1989	3043.36	--	--	--	--	--	--	--	--	--	3049.79	--	3057.10
6/15/1989	3043.76	--	3051.52	--	--	--	--	--	--	--	3050.39	--	3057.30
6/30/1989	--	--	--	--	--	--	--	--	--	--	--	--	--
9/15/1989	3045.66	--	3053.02	--	--	--	--	--	--	--	3045.59	--	3058.70

Well Number	MW-1	MW-1A	MW-2	MW-2A	MW-3	MW-3A	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-7A	MW-8
Old Well Number	40331	--	40311	--	--	--	--	--	--	--	40231	--	11032
Well Elevation before 1/22/2005	3129.56	3129.24	3130.12	3129.57	3131.62	3131.65	3132.05	3131.22	3129.96	3130.39	3134.69	3133.30	3129.80
Well Elevation 1/22/2005 -	3129.46	3129.38	3130.25	3129.62	3131.59	3131.61	3131.89	3130.95	3130.06	3130.16	3134.61	3134.11	3129.37
Well Elevation 2/7/2007 -	--	3131.39	--	3131.45	--	3133.85	3135.20	--	3131.64	3133.30	--	3135.75	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/16/1989	3046.06	--	3053.22	--	--	--	--	--	--	--	3052.59	--	3059.80
3/13/1990	3045.26	--	3053.62	--	--	--	--	--	--	--	3051.89	--	3059.30
5/31/1990	3045.36	--	--	--	--	--	--	--	--	--	3051.89	--	3059.40
12/30/1991	3042.96	--	3048.52	--	--	--	--	--	--	--	3053.09	--	3059.60
3/18/1992	3051.26	--	3048.72	--	--	--	--	--	--	--	3053.49	--	3059.30
7/21/1992	3051.46	--	3048.92	--	--	--	--	--	--	--	3053.99	--	3060.40
9/21/1992	3045.46	--	3049.32	--	--	--	--	--	--	--	3054.29	--	3061.40
12/19/1992	3046.26	--	3049.92	--	--	--	--	--	--	--	3054.59	--	3061.90
3/16/1993	3046.66	--	3050.32	--	--	--	--	--	--	--	3055.49	--	3062.20
6/17/1993	3046.86	--	3053.82	--	--	--	--	--	--	--	3055.79	--	3072.30
9/9/1993	3046.66	--	3051.12	--	--	--	--	--	--	--	3055.69	--	3062.00
11/18/1993	3047.26	--	3051.32	--	--	--	--	--	--	--	3055.59	--	3062.30
3/18/1994	3045.76	--	3051.82	--	--	--	--	--	--	--	3056.59	--	3062.70
6/17/1994	3047.56	--	3052.02	--	--	--	--	--	--	--	3056.49	--	3062.20
9/27/1994	3047.56	--	3052.22	--	--	--	--	--	--	--	3056.19	--	3062.30
12/30/1994	3048.06	--	3052.42	--	--	--	--	--	--	--	3056.79	--	3062.20
3/21/1995	3048.36	--	3052.62	--	--	--	--	--	--	--	3057.09	--	3062.40
6/22/1995	3047.86	--	3051.62	--	--	--	--	--	--	--	3056.69	--	3061.50
9/14/1995	3047.46	--	3052.52	--	--	--	--	--	--	--	3056.19	--	3061.40
1/9/1996	3048.16	--	3052.42	--	--	--	--	--	--	--	3056.69	--	3061.60
7/5/1996	3047.56	--	3052.82	--	--	--	--	--	--	--	3056.29	--	3061.20
9/18/1996	3047.46	--	3052.42	--	--	--	--	--	--	--	3056.09	--	3060.90
9/29/1996	3048.16	--	3052.82	--	--	--	--	--	--	--	3057.09	--	3061.80

Well Number	MW-1	MW-1A	MW-2	MW-2A	MW-3	MW-3A	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-7A	MW-8
Old Well Number	40331	--	40311	--	--	--	--	--	--	--	40231	--	11032
Well Elevation before 1/22/2005	3129.56	3129.24	3130.12	3129.57	3131.62	3131.65	3132.05	3131.22	3129.96	3130.39	3134.69	3133.30	3129.80
Well Elevation 1/22/2005 -	3129.46	3129.38	3130.25	3129.62	3131.59	3131.61	3131.89	3130.95	3130.06	3130.16	3134.61	3134.11	3129.37
Well Elevation 2/7/2007 -	--	3131.39	--	3131.45	--	3133.85	3135.20	--	3131.64	3133.30	--	3135.75	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/15/1997	3047.36	--	--	--	--	--	--	--	--	--	3056.49	--	3061.10
6/30/1997	3047.96	--	3052.42	--	--	--	--	--	--	--	3056.39	--	3061.00
9/8/1997	3047.86	--	3052.42	--	--	--	--	--	--	--	3056.29	--	3061.00
12/15/1997	3048.16	--	3052.52	--	--	--	--	--	--	--	3056.59	--	3061.50
4/1/1998	3048.36	--	3052.72	--	--	--	--	--	--	--	3056.79	--	3061.80
6/24/1998	3048.26	--	3052.72	--	--	--	--	--	--	--	3056.49	--	3061.40
9/15/1998	3047.46	--	3052.62	--	--	--	--	--	--	--	3055.89	--	3060.90
12/30/1998	3047.86	--	3052.42	--	--	--	--	--	--	--	3056.39	--	3061.10
3/15/1999	3050.45	--	3051.96	--	--	--	--	--	--	--	3056.71	--	3061.39
4/26/1999	3049.84	--	3050.68	--	--	--	--	--	--	--	3056.18	--	3060.85
7/27/1999	3049.94	--	3050.65	--	--	--	3053.68	3053.21	--	--	3056.00	--	3060.74
12/31/1999	3049.90	--	3050.70	--	--	--	3053.48	3053.26	--	--	3055.98	--	3060.09
3/30/2000	3050.02	--	3050.31	--	--	--	3049.53	3053.58	--	--	3057.11	--	3060.79
6/30/2000	3050.10	--	3050.42	--	3052.60	--	3053.78	3053.23	--	3053.02	3056.29	--	3060.74
9/30/2000	3050.03	--	3050.35	--	3052.46	--	3054.89	--	--	3053.15	3056.41	--	3062.16
12/31/2000	3049.73	--	3050.23	--	3052.25	--	3053.30	--	--	3052.64	3056.16	--	3062.02
3/30/2001	3050.03	--	3050.30	--	3052.36	--	3053.57	3053.97	--	3052.97	3056.38	--	3062.07
6/30/2001	3050.30	--	3050.50	--	3052.45	--	3053.84	3053.71	--	3053.02	3056.54	--	3062.98
9/30/2001	3050.13	--	3050.66	--	3052.68	--	3054.06	3053.47	--	3053.60	3056.59	--	3061.87
12/31/2001	3050.12	--	3050.63	--	3052.56	--	3054.16	3053.75	--	3053.02	3056.52	--	3062.00
3/31/2002	3050.53	--	3050.67	--	3052.86	--	3054.30	3054.31	--	3053.49	3056.87	--	3061.98
4/30/2002	3050.44	--	3050.68	--	3052.86	--	3054.29	3054.48	--	3053.45	3056.71	--	3062.02
6/30/2002	3050.56	--	3050.89	--	3053.01	--	3054.25	3054.44	--	3053.51	3056.70	--	3061.79

Well Number	MW-1	MW-1A	MW-2	MW-2A	MW-3	MW-3A	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-7A	MW-8
Old Well Number	40331	--	40311	--	--	--	--	--	--	--	40231	--	11032
Well Elevation before 1/22/2005	3129.56	3129.24	3130.12	3129.57	3131.62	3131.65	3132.05	3131.22	3129.96	3130.39	3134.69	3133.30	3129.80
Well Elevation 1/22/2005 -	3129.46	3129.38	3130.25	3129.62	3131.59	3131.61	3131.89	3130.95	3130.06	3130.16	3134.61	3134.11	3129.37
Well Elevation 2/7/2007 -	--	3131.39	--	3131.45	--	3133.85	3135.20	--	3131.64	3133.30	--	3135.75	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/30/2002	3050.13	--	3050.64	--	3052.48	--	3053.78	3054.18	--	3053.05	3056.19	--	3061.22
1/31/2003	3050.18	--	3050.69	--	3052.51	--	3053.83	3054.25	--	3053.17	3056.17	--	3061.32
4/8/2003	3050.17	--	3050.99	--	3052.61	--	3054.54	3054.62	--	3053.56	3056.37	--	3061.61
7/1/2003	3049.91	--	3050.74	--	3052.46	--	3053.89	3054.33	--	3053.27	3056.05	--	3060.92
10/31/2003	3049.42	--	3050.58	--	3052.21	--	3053.65	3054.31	--	3052.94	3055.54	--	3060.87
3/31/2004	3050.01	3049.73	3050.67	3050.55	3052.28	3052.30	3053.63	3053.68	3052.61	3052.95	3056.07	3055.30	3060.87
6/28/2004	3049.99	3049.88	3050.25	3050.35	3052.21	3052.11	3053.23	3053.46	3052.34	3052.47	3055.97	3055.87	3060.42
9/13/2004	3049.47	3049.32	3050.32	3050.41	3051.90	3051.93	3053.20	3053.24	3052.27	3052.47	3055.36	3055.18	3060.17
10/15/2004	3049.58	3049.51	3050.25	3050.37	3051.93	3051.91	3053.16	3052.65	3052.26	3052.40	3055.40	3055.26	3060.16
1/22/2005	3049.67	3049.56	3049.99	3050.09	3051.83	3051.80	3053.08	3053.44	3052.21	3052.25	3055.45	3055.26	3060.08
1/31/2006	--	3050.04	--	3050.43	--	3052.11	3053.21	--	3052.27	3052.49	--	3055.81	--
2/7/2007	--	3049.92	--	3050.09	--	3051.77	3052.96	--	3051.75	3052.15	--	3055.25	--
2/6/2008	--	3050.07	--	3050.13	--	3051.83	3052.75	--	3051.80	3051.96	--	3055.19	--
8/1/2008	--	3049.48	--	3043.94	--	3051.55	3052.53	--	3051.53	3051.74	--	3054.70	--
3/4/2009	--	3050.33	--	3050.30	--	3052.10	3053.25	--	3052.19	3052.26	--	3055.61	--
10/1/2009	--	3049.76	--	3050.25	--	3051.80	3052.89	--	3052.00	3052.17	--	3054.85	--
1/1/2010	--	3050.06	--	3049.98	--	3051.66	3052.60	--	3051.61	3051.81	--	3055.21	--
6/1/2010	--	3050.18	--	3050.03	--	3051.83	3052.73	--	3051.67	3051.82	--	3056.02	--
1/1/2011	--	3050.66	--	3050.61	--	3052.34	3053.40	--	3052.59	3052.70	--	3055.56	--
8/1/2011	--	3051.04	--	3050.94	--	3052.77	3053.91	--	3052.89	3053.10	--	3056.64	--
1/11/2012	--	3051.35	--	3051.01	--	3052.96	3053.86	--	3052.85	3052.99	--	3056.91	--
8/1/2012	--	3050.13	--	3050.84	--	3052.44	3053.49	--	3052.46	3052.70	--	3055.92	--
1/29/2013	--	3050.33	--	3050.54	--	3052.15	3053.08	--	3052.02	3052.28	--	3055.64	--

Well Number	MW-1	MW-1A	MW-2	MW-2A	MW-3	MW-3A	MW-4	MW-5	MW-5A	MW-6	MW-7	MW-7A	MW-8
Old Well Number	40331	--	40311	--	--	--	--	--	--	--	40231	--	11032
Well Elevation before 1/22/2005	3129.56	3129.24	3130.12	3129.57	3131.62	3131.65	3132.05	3131.22	3129.96	3130.39	3134.69	3133.30	3129.80
Well Elevation 1/22/2005 -	3129.46	3129.38	3130.25	3129.62	3131.59	3131.61	3131.89	3130.95	3130.06	3130.16	3134.61	3134.11	3129.37
Well Elevation 2/7/2007 -	--	3131.39	--	3131.45	--	3133.85	3135.20	--	3131.64	3133.30	--	3135.75	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
8/1/2013	--	3050.13	--	3050.84	--	3052.44	3053.49	--	3052.46	3052.70	--	3055.92	--
1/10/2014	--	3049.54	--	3049.90	--	3051.40	3052.30	--	3051.33	3051.57	--	3054.89	--
10/1/2014	--	3048.83	--	3049.38	--	3050.83	3051.84	--	3052.46	3051.01	--	3054.06	--
3/10/2015	--	3049.28	--	3045.24	--	3050.90	3051.70	--	3050.74	3050.91	--	3054.54	--
8/1/2015	--	3049.53	--	3049.49	--	3051.14	3052.15	--	3050.66	3051.35	--	3054.87	--
3/1/2016	--	3049.89	--	3049.77	--	3051.43	3052.33	--	3051.41	3051.59	--	3055.06	--
2/1/2017	--	3048.89	--	3043.45	--	3050.55	3055.70	--	3049.64	3052.10	--	3055.35	--
11/20/2017	--	3046.89	--	3043.55	--	3051.25	3053.70	--	3052.34	3051.00	--	3055.15	--
1/24/2018	--	3049.69	--	3051.05	--	3054.25	3056.80	--	3050.04	3052.70	--	3056.85	--
1/24/2019	--	3048.99	--	3050.45	--	3053.55	3056.00	--	3049.74	3053.70	--	3057.35	--
1/24/2020	--	3050.59	--	3050.32	--	3052.05	3052.80	--	3051.87	3050.90	--	3052.55	--
1/27/2021	--	3049.93	--	3049.93	--	3051.39	3052.23	--	3049.35	3046.53	--	3054.13	--
1/25/2022	--	3049.55	--	3044.61	--	3051.05	3051.82	--	3051.03	3051.17	--	3054.03	--
1/20/2023	--	3049.25	--	3049.27	--	3050.71	3051.49	--	3050.35	3050.82	--	3046.59	--

Well Number	MW-8A	MW-9	MW-9A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Old Well Number	--	--	--	**10932**	--	**10731**	--	**10821**	--	--	--	**10842**	--
Well Elevation before 1/22/2005	3128.59	3106.32	3106.51	3106.00	3107.45	3118.95	3118.95	3113.92	3109.50	3129.35	3128.75	3127.42	3126.54
Well Elevation 1/22/2005 -	3129.06	3106.20	3106.60	3106.31	3107.62	3119.51	3119.07	3113.39	3109.54	3129.35	3128.83	3126.54	3126.62
Well Elevation 2/7/2007 -	3130.94	--	3108.76	--	3109.85	--	3121.12	--	3111.80	--	3130.88	--	3128.54
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
12/22/1981	--	--	--	--	--	--	--	--	--	--	--	3039.32	--
2/19/1982	--	--	--	--	--	--	--	--	--	--	--	3045.32	--
4/22/1982	--	--	--	--	--	--	--	--	--	--	--	3059.72	--
6/23/1982	--	--	--	--	--	--	--	--	--	--	--	3037.72	--
7/19/1982	--	--	--	--	--	--	--	--	--	--	--	3047.82	--
11/12/1982	--	--	--	--	--	--	--	--	--	--	--	3041.02	--
12/13/1982	--	--	--	--	--	--	--	--	--	--	--	3041.02	--
1/1/1983	--	--	--	3048.10	--	3044.25	--	--	--	--	--	--	--
2/11/1983	--	--	--	3049.50	--	3051.75	--	--	--	--	--	--	--
3/11/1983	--	--	--	3049.50	--	3054.25	--	--	--	--	--	--	--
4/7/1983	--	--	--	3051.00	--	3054.55	--	--	--	--	--	--	--
5/5/1983	--	--	--	3051.00	--	3053.95	--	3047.92	--	--	--	3042.42	--
6/6/1983	--	--	--	3050.80	--	3053.65	--	--	--	--	--	--	--
7/6/1983	--	--	--	3051.10	--	3054.65	--	--	--	--	--	--	--
8/4/1983	--	--	--	3051.10	--	3054.65	--	--	--	--	--	--	--
9/12/1983	--	--	--	3051.40	--	3054.85	--	--	--	--	--	--	--
9/14/1983	--	--	--	--	--	--	--	3049.92	--	--	--	3030.42	--
10/13/1983	--	--	--	3051.40	--	3054.85	--	--	--	--	--	--	--
11/14/1983	--	--	--	3057.60	--	3055.25	--	--	--	--	--	--	--
12/15/1983	--	--	--	3055.00	--	3056.55	--	--	--	--	--	--	--
7/16/1984	--	--	--	3055.00	--	3057.95	--	--	--	--	--	--	--
9/29/1984	--	--	--	3055.00	--	3056.95	--	--	--	--	--	--	--
1/9/1985	--	--	--	3057.00	--	3059.95	--	3057.92	--	--	--	3051.32	--

Well Number	MW-8A	MW-9	MW-9A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Old Well Number	--	--	--	**10932**	--	**10731**	--	**10821**	--	--	--	**10842**	--
Well Elevation before 1/22/2005	3128.59	3106.32	3106.51	3106.00	3107.45	3118.95	3118.95	3113.92	3109.50	3129.35	3128.75	3127.42	3126.54
Well Elevation 1/22/2005 -	3129.06	3106.20	3106.60	3106.31	3107.62	3119.51	3119.07	3113.39	3109.54	3129.35	3128.83	3126.54	3126.62
Well Elevation 2/7/2007 -	3130.94	--	3108.76	--	3109.85	--	3121.12	--	3111.80	--	3130.88	--	3128.54
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/2/1985	--	--	--	3059.00	--	3063.55	--	--	--	--	--	3052.32	--
7/9/1985	--	--	--	3058.40	--	3062.15	--	--	--	--	--	3053.62	--
9/23/1985	--	--	--	3056.10	--	3061.35	--	--	--	--	--	3053.52	--
1/14/1986	--	--	--	3057.50	--	3061.75	--	3060.82	--	--	--	3055.52	--
3/27/1986	--	--	--	3059.00	--	3064.45	--	3061.92	--	--	--	3056.22	--
7/14/1986	--	--	--	3056.20	--	3063.95	--	3061.62	--	--	--	3057.42	--
9/8/1986	--	--	--	3067.30	--	3064.85	--	3062.62	--	--	--	3057.52	--
12/10/1986	--	--	--	3075.40	--	3065.45	--	3064.32	--	--	--	3058.82	--
3/16/1987	--	--	--	3069.70	--	3068.95	--	3067.62	--	--	--	3060.62	--
4/8/1987	--	--	--		--	--	--	--	--	--	--	--	--
6/23/1987	--	--	--	3091.70	--	3068.15	--	3066.82	--	--	--	3061.72	--
7/23/1987	--	--	--		--	--	--	--	--	--	--	--	--
9/24/1987	--	--	--	3069.70	--	3067.75	--	3067.92	--	--	--	3063.32	--
10/27/1987	--	--	--		--	--	--	--	--	--	--	--	--
11/11/1987	--	--	--	3068.40	--	3069.85	--	3068.42	--	--	--	3063.82	--
3/14/1988	--	--	--	3078.70	--	3071.45	--	3072.42	--	--	--	3065.12	--
6/27/1988	--	--	--	3066.60	--	3068.75	--	3072.52	--	--	--	3066.22	--
9/27/1988	--	--	--	3065.10	--	3069.05	--	3071.02	--	--	--	3066.32	--
12/13/1988	--	--	--	3064.10	--	3068.25	--	3070.32	--	--	--	3066.42	--
3/1/1989	--	--	--	3064.20	--	3069.15	--	3071.12	--	--	--	3066.52	--
6/15/1989	--	--	--	3066.70	--	3070.95	--	3070.62	--	--	--	3067.12	--
6/30/1989	--	--	--	--	--	--	--	--	--	--	--	--	--
9/15/1989	--	--	--	3064.70	--	3070.05	--	3067.32	--	--	--	3070.12	--

Well Number	MW-8A	MW-9	MW-9A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Old Well Number	--	--	--	**10932**	--	**10731**	--	**10821**	--	--	--	**10842**	--
Well Elevation before 1/22/2005	3128.59	3106.32	3106.51	3106.00	3107.45	3118.95	3118.95	3113.92	3109.50	3129.35	3128.75	3127.42	3126.54
Well Elevation 1/22/2005 -	3129.06	3106.20	3106.60	3106.31	3107.62	3119.51	3119.07	3113.39	3109.54	3129.35	3128.83	3126.54	3126.62
Well Elevation 2/7/2007 -	3130.94	--	3108.76	--	3109.85	--	3121.12	--	3111.80	--	3130.88	--	3128.54
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/16/1989	--	--	--	3062.40	--	3071.15	--	3068.52	--	--	--	3069.02	--
3/13/1990	--	--	--	3065.10	--	3069.95	--	3069.82	--	--	--	3067.42	--
5/31/1990	--	--	--	3065.90	--	3070.85	--	3070.82	--	--	--	3067.42	--
12/30/1991	--	--	--	3064.30	--	3070.35	--	3071.72	--	--	--	3067.72	--
3/18/1992	--	--	--	3069.00	--	3074.35	--	--	--	--	--	3068.42	--
7/21/1992	--	--	--	3079.70	--	3079.15	--	3077.22	--	--	--	3069.32	--
9/21/1992	--	--	--	3071.00	--	3075.95	--	--	--	--	--	3070.32	--
12/19/1992	--	--	--	3067.20	--	3073.65	--	3073.42	--	--	--	3070.82	--
3/16/1993	--	--	--	3072.80	--	3073.95	--	3076.92	--	--	--	3071.02	--
6/17/1993	--	--	--	3072.40	--	3073.25	--	3076.72	--	--	--	3071.42	--
9/9/1993	--	--	--	3068.50	--	3071.75	--	--	--	--	--	3071.52	--
11/18/1993	--	--	--	3066.40	--	3070.25	--	3072.62	--	--	--	3071.42	--
3/18/1994	--	--	--	3071.10	--	3069.95	--	--	--	--	--	3071.32	--
6/17/1994	--	--	--	3074.30	--	3071.95	--	--	--	--	--	3070.82	--
9/27/1994	--	--	--	3072.00	--	3073.25	--	--	--	--	--	3073.92	--
12/30/1994	--	--	--	3066.50	--	3069.25	--	3071.72	--	--	--	3070.42	--
3/21/1995	--	--	--	3071.30	--	3070.15	--	3072.92	--	--	--	3070.02	--
6/22/1995	--	--	--	3067.50	--	3070.25	--	3073.02	--	--	--	3070.02	--
9/14/1995	--	--	--	3062.30	--	3069.35	--	3071.52	--	--	--	3069.72	--
1/9/1996	--	--	--	3065.10	--	3068.65	--	3071.02	--	--	--	3069.32	--
7/5/1996	--	--	--	3064.80	--	3069.25	--	3071.22	--	--	--	3069.72	--
9/18/1996	--	--	--	3063.50	--	3068.95	--	3072.12	--	--	--	3069.42	--
9/29/1996	--	--	--	3067.60	--	3070.55	--	--	--	--	--	3069.92	--

Well Number	MW-8A	MW-9	MW-9A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Old Well Number	--	--	--	**10932**	--	**10731**	--	**10821**	--	--	--	**10842**	--
Well Elevation before 1/22/2005	3128.59	3106.32	3106.51	3106.00	3107.45	3118.95	3118.95	3113.92	3109.50	3129.35	3128.75	3127.42	3126.54
Well Elevation 1/22/2005 -	3129.06	3106.20	3106.60	3106.31	3107.62	3119.51	3119.07	3113.39	3109.54	3129.35	3128.83	3126.54	3126.62
Well Elevation 2/7/2007 -	3130.94	--	3108.76	--	3109.85	--	3121.12	--	3111.80	--	3130.88	--	3128.54
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/15/1997	--	--	--	3063.80	--	3069.05	--	3070.72	--	--	--	3069.02	--
6/30/1997	--	--	--	3076.50	--	3071.35	--	3071.62	--	--	--	3068.72	--
9/8/1997	--	--	--	3067.60	--	3073.45	--	3072.72	--	--	--	3069.42	--
12/15/1997	--	--	--	3066.20	--	3072.45	--	3071.72	--	--	--	3070.02	--
4/1/1998	--	--	--	3066.90	--	3071.35	--	3072.72	--	--	--	3070.42	--
6/24/1998	--	--	--	3064.50	--	3069.65	--	3072.12	--	--	--	3070.22	--
9/15/1998	--	--	--	3061.60	--	3068.25	--	3070.22	--	--	--	3069.92	--
12/30/1998	--	--	--	3061.90	--	3069.85	--	3069.02	--	--	--	3069.52	--
3/15/1999	--	--	--	3063.55	--	3070.46	--	3070.44	--	--	--	3069.31	--
4/26/1999	--	--	--	3061.70	--	3071.05	--	3070.44	--	--	--	3068.97	--
7/27/1999	--	3053.54	--	3065.93	--	3072.83	--	--	--	3070.28	--	3068.84	--
12/31/1999	--	--	--	3064.06	--	3071.93	--	3070.97	--	3070.73	--	3069.00	--
3/30/2000	--	--	--	3063.04	--	3070.08	--	3071.25	--	3070.87	--	3068.70	--
6/30/2000	--	3056.39	--	3066.13	--	3068.80	--	3070.10	--	3069.28	--	3068.60	--
9/30/2000	--	--	--	3063.78	--	3070.14	--	3071.09	--	3068.61	--	3068.31	--
12/31/2000	--	3059.76	--	3065.48	--	3069.84	--	3069.45	--	3069.48	--	3068.37	--
3/30/2001	--	3060.49	--	3064.20	--	3069.45	--	3070.97	--	3067.09	--	3068.54	--
6/30/2001	--	3062.27	--	3066.86	--	3071.26	--	3072.07	--	3069.66	--	3068.54	--
9/30/2001	--	3057.62	--	3065.45	--	3075.52	--	3072.29	--	3068.22	--	3069.14	--
12/31/2001	--	3060.34	--	3063.48	--	3070.48	--	3071.43	--	3070.47	--	3069.27	--
3/31/2002	--	3062.59	--	3066.26	--	3071.10	--	3071.54	--	3070.01	--	3068.81	--
4/30/2002	--	3060.92	--	3065.32	--	3070.79	--	3071.68	--	3069.58	--	3068.55	--
6/30/2002	--	3061.64	--	3066.22	--	3072.72	--	3070.76	--	3069.97	--	3068.36	--

Well Number	MW-8A	MW-9	MW-9A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Old Well Number	--	--	--	**10932**	--	**10731**	--	**10821**	--	--	--	**10842**	--
Well Elevation before 1/22/2005	3128.59	3106.32	3106.51	3106.00	3107.45	3118.95	3118.95	3113.92	3109.50	3129.35	3128.75	3127.42	3126.54
Well Elevation 1/22/2005 -	3129.06	3106.20	3106.60	3106.31	3107.62	3119.51	3119.07	3113.39	3109.54	3129.35	3128.83	3126.54	3126.62
Well Elevation 2/7/2007 -	3130.94	--	3108.76	--	3109.85	--	3121.12	--	3111.80	--	3130.88	--	3128.54
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/30/2002	--	3060.74	--	3063.48	--	3070.97	--	3069.11	--	3069.76	--	3068.19	--
1/31/2003	--	3061.42	--	3064.86	--	3071.06	--	3069.00	--	3069.58	--	3068.06	--
4/8/2003	--	3055.13	--	3063.85	--	3070.43	--	3069.96	--	3069.78	--	3068.23	--
7/1/2003	--	3060.03	--	3062.90	--	3069.96	--	3069.91	--	3069.05	--	3068.54	--
10/31/2003	--	3059.39	--	3062.29	--	3069.44	--	3068.65	--	3069.67	--	3068.24	--
3/31/2004	3060.53	3061.41	3061.16	3069.80	3069.26	3068.58	3068.28	3067.11	3067.86	3068.99	3069.02	3067.53	3067.49
6/28/2004	3060.43	3056.37	3055.65	3063.30	3063.25	3069.20	3069.11	3067.35	3068.10	3068.92	3068.96	3067.18	3067.15
9/13/2004	3060.03	3059.22	3059.07	3063.65	3063.60	3068.97	3068.73	3066.86	3067.54	3068.76	3068.79	3067.07	3067.03
10/15/2004	3060.02	3061.41	3061.12	3067.47	3067.29	3068.72	3068.52	3066.69	3067.29	3068.61	3068.63	3066.95	3066.92
1/22/2005	3060.00	3063.18	3062.86	3067.05	3066.97	3070.69	3070.20	3067.09	3068.21	3069.34	3069.30	3067.03	3066.97
1/31/2006	3060.54	--	3058.08	--	3061.68	--	3069.62	--	3067.55	--	3069.55	--	3067.44
2/7/2007	3059.43	--	3058.44	--	3061.48	--	3067.82	--	3066.23	--	3067.36	--	3065.79
2/6/2008	3059.65	--	3059.50	--	3062.62	--	3068.95	--	3068.22	--	3068.06	--	3066.34
8/1/2008	3058.95	--	3061.88	--	3083.36	--	3069.07	--	3068.87	--	3067.03	--	3065.79
3/4/2009	3060.12	--	3061.93	--	3064.89	--	3070.37	--	3069.20	--	3067.18	--	3067.33
10/1/2009	3059.36	--	3057.62	--	3062.53	--	3069.38	--	3067.90	--	3068.18	--	3066.78
1/1/2010	3059.35	--	3058.36	--	3060.93	--	3068.26	--	3065.92	--	3067.34	--	3066.12
6/1/2010	3059.48	--	3063.56	--	3067.52	--	3079.82	--	3070.28	--	3068.58	--	3066.09
1/1/2011	3060.51	--	3065.26	--	3068.83	--	3071.42	--	3074.24	--	3069.94	--	3068.14
8/1/2011	3061.08	--	3056.79	--	3062.20	--	3069.47	--	3070.08	--	3068.60	--	3067.98
1/11/2012	3061.10	--	3059.86	--	3062.82	--	3069.72	--	3068.68	--	3068.02	--	3067.22
8/1/2012	3060.10	--	3050.74	--	3060.42	--	3071.48	--	3068.25	--	3068.26	--	3066.66
1/29/2013	3059.80	--	3058.01	--	3060.75	--	3070.36	--	3066.89	--	3067.69	--	3066.34

Well Number	MW-8A	MW-9	MW-9A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Old Well Number	--	--	--	10932	--	10731	--	10821	--	--	--	10842	--
Well Elevation before 1/22/2005	3128.59	3106.32	3106.51	3106.00	3107.45	3118.95	3118.95	3113.92	3109.50	3129.35	3128.75	3127.42	3126.54
Well Elevation 1/22/2005 -	3129.06	3106.20	3106.60	3106.31	3107.62	3119.51	3119.07	3113.39	3109.54	3129.35	3128.83	3126.54	3126.62
Well Elevation 2/7/2007 -	3130.94	--	3108.76	--	3109.85	--	3121.12	--	3111.80	--	3130.88	--	3128.54
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
8/1/2013	3060.10	--	3050.74	--	3060.42	--	3071.48	--	3068.25	--	3068.26	--	3066.66
1/10/2014	3058.70	--	3057.10	--	3060.34	--	3068.68	--	3067.61	--	3066.36	--	3065.25
10/1/2014	3055.82	--	3058.41	--	3075.08	--	3070.47	--	3067.74	--	3065.92	--	3064.49
3/10/2015	3056.44	--	3059.12	--	3063.17	--	3073.85	--	3065.60	--	3068.15	--	3065.45
8/1/2015	3058.93	--	3059.81	--	3073.08	--	3079.07	--	3073.30	--	3069.20	--	3066.28
3/1/2016	3059.69	--	3060.95	--	3066.22	--	3074.01	--	3072.40	--	3069.71	--	3067.47
2/1/2017	3060.74	--	3061.76	--	3063.95	--	3070.82	--	3070.30	--	3066.28	--	3073.94
11/20/2017	3060.04	--	3041.26	--	3061.65	--	3068.92	--	3067.20	--	3062.58	--	3064.24
1/24/2018	3050.54	--	3059.56	--	3065.55	--	3071.22	--	3070.10	--	3068.88	--	3062.44
1/24/2019	3049.74	--	3058.76	--	3061.75	--	3073.52	--	3068.00	--	3067.48	--	3060.34
1/24/2020	3059.57	--	3060.12	--	3062.45	--	3073.25	--	3068.10	--	3068.41	--	3066.05
1/27/2021	3058.63	--	3057.25	--	--	--	3069.75	--	3066.33	--	3066.40	--	3064.68
1/25/2022	3058.39	--	3053.25	--	--	--	3069.97	--	3066.74	--	3066.01	--	3063.69
1/20/2023	3057.49	--	3057.67	--	--	--	3072.23	--	3065.76	--	3085.63	--	3082.17

Well Number	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Old Well Number	**10521**	--	**10542**	**10541**	--	**10413**	**10232**	**10211**	--	**10212**	--	**30312**	--
Well Elevation before 1/22/2005	3118.42	3118.79	3132.39	3131.47	3131.99	3134.14	3137.74	3130.52	3130.84	3122.91	3123.19	3141.82	3141.62
Well Elevation 1/22/2005 -	3118.43	3118.79	3132.38	3131.80	3131.99	3133.83	3137.50	3130.40	3130.83	3123.13	3123.18	3142.08	3141.77
Well Elevation 2/7/2007 -	--	3120.94	3135.80	--	3134.03	3134.70	3138.30	--	3132.84	--	3125.06	--	3143.82
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
12/22/1981	--	--	--	--	--	--	--	3008.22	--	--	--	--	--
2/19/1982	--	--	3026.39	--	--	--	--	3008.22	--	--	--	--	--
4/22/1982	--	--	3026.49	--	--	--	--	3008.72	--	--	--	--	--
6/23/1982	--	--	3024.59	--	--	--	--	3008.72	--	--	--	--	--
7/19/1982	--	--	3024.59	--	--	--	--	3006.72	--	--	--	--	--
11/12/1982	--	--	3050.29	--	--	--	--	3009.22	--	--	--	--	--
12/13/1982	--	--	3050.29	--	--	--	--	3009.22	--	--	--	--	--
1/1/1983	3038.32	--	--	--	--	--	--	--	--	3016.81	--	3037.92	--
2/11/1983	3041.22	--	--	--	--	--	--	--	--	3031.31	--	3037.92	--
3/11/1983	3041.42	--	--	--	--	--	--	--	--	3016.61	--	3038.02	--
4/7/1983	3041.42	--	--	--	--	--	--	--	--	3016.71	--	3038.12	--
5/5/1983	3041.92	--	--	--	--	--	--	--	--	3016.71	--	3038.12	--
6/6/1983	3042.02	--	--	--	--	--	--	--	--	3016.91	--	3038.32	--
7/6/1983	3042.22	--	--	--	--	--	--	--	--	3016.91	--	3038.02	--
8/4/1983	3042.42	--	--	--	--	--	--	--	--	3016.41	--	3037.82	--
9/12/1983	3042.52	--	--	--	--	--	--	--	--	3016.11	--	3038.42	--
9/14/1983	--	--	3027.39	--	--	--	--	3010.52	--	--	--	--	--
10/13/1983	3042.52	--	--	--	--	--	--		--	3016.61	--	3038.62	--
11/14/1983	3043.02	--	--	--	--	--	--		--	3016.01	--	3038.42	--
12/15/1983	3043.42	--	--	--	--	--	--		--	3016.11	--	3038.42	--
7/16/1984	3042.42	--	--	--	--	--	--		--	3016.91	--	3038.82	--
9/29/1984	3043.22	--	--	--	--	--	--		--	3016.71	--	3039.32	--
1/9/1985	3043.92	--	3028.29	3027.47	--	3020.84	3017.14	3011.52	--	3016.41	--	3039.82	--

Well Number	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Old Well Number	**10521**	--	**10542**	**10541**	--	**10413**	**10232**	**10211**	--	**10212**	--	**30312**	--
Well Elevation before 1/22/2005	3118.42	3118.79	3132.39	3131.47	3131.99	3134.14	3137.74	3130.52	3130.84	3122.91	3123.19	3141.82	3141.62
Well Elevation 1/22/2005 -	3118.43	3118.79	3132.38	3131.80	3131.99	3133.83	3137.50	3130.40	3130.83	3123.13	3123.18	3142.08	3141.77
Well Elevation 2/7/2007 -	--	3120.94	3135.80	--	3134.03	3134.70	3138.30	--	3132.84	--	3125.06	--	3143.82
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/2/1985	3044.42	--	3028.69	--	--	--	--	3011.52	--	3016.11	--	3040.02	--
7/9/1985	3044.92	--	3028.79	--	--	--	--	3011.72	--	3015.11	--	3040.32	--
9/23/1985	3044.92	--	3029.39	--	--	--	--	3011.72	--	3014.91	--	3041.12	--
1/14/1986	3046.22	--	3029.29	--	--	3021.74	--	3011.82	--	3014.91	--	3040.92	--
3/27/1986	3047.12	--	3029.39	--	--	3022.14	--	3011.82	--	3014.91	--	3041.52	--
7/14/1986	3047.42	--	3029.39	--	--	--	--	3012.52	--	3014.91	--	3041.72	--
9/8/1986	3050.42	--	3030.69	3029.67	--	3022.34	3018.74	3011.72	--	3015.61	--	3042.02	--
12/10/1986	3049.42	--	3029.59	3028.87	--	3022.74	3017.94	3011.92	--	3020.41	--	3043.02	--
3/16/1987	3053.92	--	3045.19	3034.67	--	3024.34	3018.24	3014.42	--	3023.61	--	3045.52	--
4/8/1987	--	--	--	--	--	--	--	--	--	--	--	--	--
6/23/1987	3055.62	--	3041.29	3037.47	--	3025.84	3020.04	3016.52	--	3022.61	--	3044.82	--
7/23/1987	--	--	--	--	--	--	--	--	--	--	--	--	--
9/24/1987	3059.32	--	3041.59	3037.57	--	3017.94	3020.94	3016.52	--	3026.71	--	3043.62	--
10/27/1987	--	--	--	--	--	--	--	--	--	--	--	--	--
11/11/1987	3058.42	--	3041.09	3037.17	--	3027.84	3021.14	3017.92	--	3026.61	--	3045.32	--
3/14/1988	3059.92	--	3045.89	3039.97	--	3028.84	3022.74	3019.02	--	3026.41	--	3046.52	--
6/27/1988	3060.32	--	3045.79	3041.67	--	3029.14	3023.84	3021.12	--	3025.31	--	3046.52	--
9/27/1988	3060.02	--	3046.19	3042.57	--	3028.94	3025.54	3021.42	--	3023.61	--	3047.82	--
12/13/1988	3060.42	--	3046.39	3042.87	--	3028.84	3026.14	3021.62	--	3023.91	--	3047.62	--
3/1/1989	3060.12	--	3044.99	3042.27	--	3028.94	3026.24	3021.72	--	3025.41	--	3048.32	--
6/15/1989	3060.12	--	3045.49	3042.97	--	3028.94	3027.24	3021.42	--	3022.81	--	3048.22	--
6/30/1989	--	--	--	--	--	--	--	--	--	--	--	--	--
9/15/1989	3060.72	--	3045.29	3043.87	--	3021.74	3029.64	3014.02	--	3025.11	--	3052.12	--

Well Number	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Old Well Number	10521	--	10542	10541	--	10413	10232	10211	--	10212	--	30312	--
Well Elevation before 1/22/2005	3118.42	3118.79	3132.39	3131.47	3131.99	3134.14	3137.74	3130.52	3130.84	3122.91	3123.19	3141.82	3141.62
Well Elevation 1/22/2005 -	3118.43	3118.79	3132.38	3131.80	3131.99	3133.83	3137.50	3130.40	3130.83	3123.13	3123.18	3142.08	3141.77
Well Elevation 2/7/2007 -	--	3120.94	3135.80	--	3134.03	3134.70	3138.30	--	3132.84	--	3125.06	--	3143.82
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/16/1989	3059.72	--	3046.29	3044.67	--	3030.64	3028.24	3012.72	--	3024.01	--	3051.42	--
3/13/1990	3059.82	--	3045.89	3043.57	--	3032.14	--	3021.92	--	3023.31	--	3051.42	--
5/31/1990	3059.32	--	3045.79	3044.27	--	3030.54	3028.34	3021.42	--	3022.71	--	3051.62	--
12/30/1991	3059.12	--	3045.69	--	--	3031.34	3029.24	3021.22	--	3020.71	--	3051.42	--
3/18/1992	3060.32	--	3045.59	--	--	3031.84	3029.04	3021.22	--	3020.71	--	3051.02	--
7/21/1992	3060.92	--	--	--	--	3032.64	3029.04	3021.42	--	3021.01	--	3051.42	--
9/21/1992	3061.82	--	--	--	--	3032.94	3029.54	3021.72	--	3023.51	--	3051.42	--
12/19/1992	3062.82	--	--	--	--	3033.04	3057.74	3029.32	--	3023.81	--	3051.72	--
3/16/1993	3063.12	--	--	--	--	3033.94	3030.24	3022.52	--	3024.41	--	3052.12	--
6/17/1993	3063.52	--	--	3045.07	--	3033.14	3030.14	3022.62	--	3023.01	--	3052.52	--
9/9/1993	3063.52	--	3046.59	3044.97	--	3033.04	3030.34	3022.42	--	3021.71	--	3052.82	--
11/18/1993	3063.22	--	3046.69	3045.07	--	3032.44	3030.24	3022.12	--	3021.81	--	3052.82	--
3/18/1994	3063.22	--	--	3045.37	--	3031.84	3030.54	3022.22	--	3022.21	--	3053.22	--
6/17/1994	3063.22	--	--	3045.57	--	3031.84	3030.24	3021.62	--	3020.61	--	3053.42	--
9/27/1994	3063.42	--	--	3045.37	--	3030.04	3029.14	3020.62	--	3019.61	--	3053.52	--
12/30/1994	3063.32	--	--	3045.77	--	3031.84	3029.94	3020.62	--	3020.01	--	3053.62	--
3/21/1995	3063.02	--	--	3045.97	--	3030.74	3029.84	3023.92	--	3020.51	--	3053.72	--
6/22/1995	3060.42	--	--	3046.67	--	3029.44	3030.74	3020.32	--	3019.71	--	3053.62	--
9/14/1995	3060.12	--	--	3045.77	--	3027.94	3029.34	3019.92	--	3018.91	--	3053.42	--
1/9/1996	3059.92	--	--	3045.67	--	3030.94	3029.34	3019.62	--	3019.01	--	3053.52	--
7/5/1996	3059.42	--	--	3045.57	--	3029.34	3029.04	3026.22	--	3018.61	--	3053.82	--
9/18/1996	3059.82	--	--	3045.17	--	3028.84	3029.24	3019.32	--	3017.91	--	3053.22	--
9/29/1996	3059.72	--	--	3045.77	--	3031.14	3029.44	3019.82	--	3019.01	--	3053.62	--

Well Number	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Old Well Number	**10521**	--	**10542**	**10541**	--	**10413**	**10232**	**10211**	--	**10212**	--	**30312**	--
Well Elevation before 1/22/2005	3118.42	3118.79	3132.39	3131.47	3131.99	3134.14	3137.74	3130.52	3130.84	3122.91	3123.19	3141.82	3141.62
Well Elevation 1/22/2005 -	3118.43	3118.79	3132.38	3131.80	3131.99	3133.83	3137.50	3130.40	3130.83	3123.13	3123.18	3142.08	3141.77
Well Elevation 2/7/2007 -	--	3120.94	3135.80	--	3134.03	3134.70	3138.30	--	3132.84	--	3125.06	--	3143.82
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/15/1997	3059.32	--	--	3045.67	--	3029.44	3029.24	3018.92	--	3018.91	--	3053.52	--
6/30/1997	3059.02	--	--	3045.47	--	3030.84	3028.94	3018.62	--	3018.71	--	3053.32	--
9/8/1997	3059.82	--	--	3045.47	--	3030.34	3028.64	3018.42	--	3018.11	--	3053.32	--
12/15/1997	3060.12	--	--	3045.67	--	3031.64	3028.64	3018.82	--	3018.91	--	3053.22	--
4/1/1998	3060.52	--	--	3045.87	--	3031.74	3028.64	3018.92	--	3019.41	--	3053.52	--
6/24/1998	3060.32	--	--	3046.17	--	3027.84	3028.64	3018.72	--	3018.61	--	3053.52	--
9/15/1998	3060.02	--	--	3046.57	--	3028.34	3028.34	3018.22	--	3017.51	--	3053.42	--
12/30/1998	3059.32	--	--	3045.97	--	3030.54	3028.14	3018.32	--	3017.61	--	3053.42	--
3/15/1999	3061.02	--	3048.00	3045.93	--	3028.39	3028.24	3018.23	--	3018.73	--	3053.62	--
4/26/1999	3061.11	--	3048.15	3046.10	--	3027.34	--	3018.23	--	3018.73	--	3053.50	--
7/27/1999	3061.15	--	3048.26	3047.19	--	3029.21	3027.81	3017.96	--	3018.45	--	3053.26	--
12/31/1999	3061.49	--	3047.74	3045.48	--	3030.01	3027.59	3017.68	--	3018.22	--	3052.96	--
3/30/2000	3061.44	--	3048.40	3046.67	--	3031.62	3027.99	3018.50	--	3018.45	--	3052.91	--
6/30/2000	3061.27	--	3047.53	3047.30	--	3030.19	3027.68	3017.39	--	3017.92	--	--	--
9/30/2000	3061.21	--	3047.63	3045.79	--	3029.39	3026.83	3017.60	--	3018.65	--	3052.77	--
12/31/2000	3060.74	--	3047.54	3046.43	--	3028.83	3026.89	3017.21	--	3018.36	--	3051.80	--
3/30/2001	3060.98	--	3047.66	3046.37	--	3029.72	3026.88	3017.09	--	3018.42	--	3052.77	--
6/30/2001	3060.79	--	3047.57	3046.51	--	3030.89	3026.81	3017.30	--	3018.66	--	3053.16	--
9/30/2001	3059.87	--	3047.45	3045.99	--	3028.79	3027.01	3017.19	--	3018.54	--	3051.16	--
12/31/2001	3061.11	--	3047.50	3046.07	--	3028.88	3027.75	3017.04	--	3018.22	--	3052.67	--
3/31/2002	3060.73	--	3047.51	3046.23	--	3031.68	3027.62	3016.91	--	3018.21	--	3053.50	--
4/30/2002	3060.60	--	3047.47	3046.27	--	3031.86	3027.60	3016.70	--	3017.74	--	3053.49	--
6/30/2002	3060.41	--	3047.25	3046.43	--	3031.47	3027.56	3016.37	--	3017.68	--	3053.42	--

Well Number	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Old Well Number	10521	--	10542	10541	--	10413	10232	10211	--	10212	--	30312	--
Well Elevation before 1/22/2005	3118.42	3118.79	3132.39	3131.47	3131.99	3134.14	3137.74	3130.52	3130.84	3122.91	3123.19	3141.82	3141.62
Well Elevation 1/22/2005 -	3118.43	3118.79	3132.38	3131.80	3131.99	3133.83	3137.50	3130.40	3130.83	3123.13	3123.18	3142.08	3141.77
Well Elevation 2/7/2007 -	--	3120.94	3135.80	--	3134.03	3134.70	3138.30	--	3132.84	--	3125.06	--	3143.82
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/30/2002	3060.09	--	3047.24	3046.00	--	3029.91	3027.36	3016.10	--	3017.05	--	3053.44	--
1/31/2003	3059.98	--	3047.16	3046.16	--	3030.55	3027.26	3015.98	--	3016.97	--	3053.34	--
4/8/2003	3059.79	--	3047.19	3046.24	--	3031.19	3027.38	3015.74	--	3016.94	--	3053.22	--
7/1/2003	3059.96	--	3047.26	3046.21	--	3029.76	3027.37	3015.71	--	3016.63	--	3053.13	--
10/31/2003	3059.72	--	3047.40	3046.34	--	3027.67	3027.61	3015.49	--	3016.19	--	3053.24	--
3/31/2004	3059.08	3059.33	3047.03	3045.99	3044.99	3030.09	3027.52	3014.97	3015.15	3015.99	3015.87	3053.09	3052.75
6/28/2004	3058.82	3059.02	3047.00	3045.90	3045.93	3031.09	3026.60	3015.19	3015.36	3016.33	3016.22	3052.87	3052.72
9/13/2004	3058.79	3058.99	3046.94	3045.89	3045.93	3028.34	3026.90	3015.21	3015.37	3016.05	3015.96	3052.94	3052.78
10/15/2004	3058.86	3059.05	3046.89	3045.84	3045.87	3030.00	3027.52	3015.17	3015.35	3016.11	3016.00	3052.92	3052.74
1/22/2005	3059.41	3059.52	3046.85	3045.81	3045.85	3031.28	3027.43	3015.26	3015.43	3016.56	3016.44	3052.67	3052.45
1/31/2006	--	3060.03	3046.69	--	3045.82	3031.70	3027.45	--	3015.54	--	3017.81	--	3053.07
2/7/2007	--	3058.73	3046.36	--	3045.52	3031.99	3027.07	--	3015.25	--	3017.08	--	3053.01
2/6/2008	--	3059.67	3046.11	--	3045.45	3031.83	3026.60	--	3015.18	--	3018.46	--	3053.31
8/1/2008	--	3059.54	3046.37	--	3045.34	3029.53	3022.51	--	3015.04	--	3018.11	--	3053.06
3/4/2009	--	3062.18	3046.26	--	3045.80	3030.49	3024.10	--	3015.50	--	3018.11	--	3053.17
10/1/2009	--	3061.79	3046.32	--	3047.01	3030.51	3023.78	--	3015.44	--	3020.57	--	3053.30
1/1/2010	--	3060.72	3046.42	--	3046.08	3031.24	3023.74	--	3015.42	--	3019.31	--	3053.41
6/1/2010	--	3065.97	3047.28	--	3045.95	3031.61	3023.38	--	3015.29	--	3020.61	--	3053.35
1/1/2011	--	3064.79	3046.60	--	3046.32	3031.39	3023.54	--	3018.12	--	3026.38	--	3053.47
8/1/2011	--	3064.29	3045.95	--	3046.76	3032.43	3023.45	--	3016.50	--	3022.62	--	3054.06
1/11/2012	--	3063.29	3047.14	--	3046.97	3033.22	3023.60	--	3016.66	--	3021.69	--	3054.03
8/1/2012	--	3061.84	3047.05	--	3046.92	3031.08	3023.35	--	3016.15	--	3020.52	--	3053.91
1/29/2013	--	3061.11	3046.89	--	3045.76	3032.45	3023.26	--	3015.69	--	3019.63	--	3053.56

Well Number	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Old Well Number	10521	--	10542	10541	--	10413	10232	10211	--	10212	--	30312	--
Well Elevation before 1/22/2005	3118.42	3118.79	3132.39	3131.47	3131.99	3134.14	3137.74	3130.52	3130.84	3122.91	3123.19	3141.82	3141.62
Well Elevation 1/22/2005 -	3118.43	3118.79	3132.38	3131.80	3131.99	3133.83	3137.50	3130.40	3130.83	3123.13	3123.18	3142.08	3141.77
Well Elevation 2/7/2007 -	--	3120.94	3135.80	--	3134.03	3134.70	3138.30	--	3132.84	--	3125.06	--	3143.82
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
8/1/2013	--	3061.84	3047.05	--	3046.92	3031.08	3023.35	--	3016.15	--	3020.52	--	3053.91
1/10/2014	--	3059.99	3046.77	--	3046.27	3034.82	3026.35	--	3014.91	--	3018.75	--	3052.90
10/1/2014	--	3059.26	3045.97	--	3045.72	3030.64	3022.17	--	3014.51	--	3017.45	--	3052.34
3/10/2015	--	3059.56	3047.05	--	3045.50	3030.69	3021.80	--	3014.33	--	3018.01	--	3052.36
8/1/2015	--	3060.31	3045.56	--	3045.40	3030.50	3021.55	--	3014.70	--	3018.95	--	3051.92
3/1/2016	--	3061.68	3045.48	--	3045.32	3030.90	3021.49	--	3014.45	--	3020.25	--	3052.02
2/1/2017	--	3062.24	3044.30	--	3043.73	3030.20	3021.00	--	3014.54	--	3018.66	--	3052.82
11/20/2017	--	3061.24	--	--	--	--	3019.90	--	3018.04	--	3019.66	--	3051.82
1/24/2018	--	3063.04	3044.20	--	3044.53	3032.40	3020.90	--	3015.24	--	3019.86	--	3053.22
1/24/2019	--	3061.64	3043.50	--	3043.63	3031.10	3020.30	--	3014.54	--	3018.66	--	3052.62
1/24/2020	--	3058.79	3044.48	--	3042.71	3031.00	3020.51	--	3013.32	--	3017.60	--	3052.42
1/27/2021	--	3058.93	3045.66	--	3041.89	3032.71	3023.84	--	3012.70	--	3016.49	--	3051.21
1/25/2022	--	3058.22	3046.26	--	3043.51	3032.73	3025.56	--	3012.52	--	3016.42	--	3051.91
1/20/2023	--	3057.82	3046.67	--	3043.17	3045.57	3020.75	--	3012.39	--	3016.09	--	3061.73

Well Number	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30	MW-31
Old Well Number	21323	--	21152	21141	20721	--	20842	--	20243	--	20112	--	--
Well Elevation before 1/22/2005	3135.96	3135.30	3125.20	3132.30	3130.79	3130.77	3131.99	3130.63	3147.81	3147.86	3126.53	3121.39	3121.38
Well Elevation 1/22/2005 -	3135.84	3135.69	3125.20	3132.19	3130.51	3130.99	3131.08	3130.63	3147.92	3147.83	3126.53	3121.4	3121.37
Well Elevation 2/7/2007 -	--	3137.75	3129.30	3134.30	--	3133.00	--	3132.57	--	3149.71	3127.00	3121.6	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
12/22/1981	3036.96	--	--	3043.20	3040.79	--	--	--	--	--	--	--	--
2/19/1982	3038.56	--	--	3042.70	3040.79	--	--	--	--	--	--	--	--
4/22/1982	3038.96	--	--	3042.90	3041.49	--	--	--	--	--	--	--	--
6/23/1982	3036.86	--	--	3043.90	3041.49	--	--	--	--	--	--	--	--
7/19/1982	3036.96	--	--	3041.40	3039.69	--	--	--	--	--	--	--	--
11/12/1982	3039.76	--	--	3046.00	3043.79	--	--	--	--	--	--	--	--
12/13/1982	3039.96	--	--	3046.80	3042.69	--	--	--	--	--	--	--	--
1/1/1983	--	--	3047.90	--	--	--	3040.19	--	3010.81	--	3014.53	--	--
2/11/1983	--	--	3050.20	--	--	--	3040.09	--	3010.41	--	3015.33	--	--
3/11/1983	--	--	3052.10	--	--	--	3040.39	--	3010.61	--	3015.33	--	--
4/7/1983	--	--	3053.10	--	--	--	3039.19	--	3010.91	--	3015.23	--	--
5/5/1983	3039.96	--	3052.80	3048.30	3046.79	--	3040.59	--	3011.61	--	3015.83	--	--
6/6/1983	--	--	3053.00	--	--	--	3040.69	--	3011.11	--	3015.13	--	--
7/6/1983	--	--	3051.80	--	--	--	3040.99	--	3011.31	--	3014.73	--	--
8/4/1983	--	--	3052.00	--	--	--	3040.79	--	3011.41	--	3015.33	--	--
9/12/1983	--	--	3050.90	--	--	--	3039.69	--	3011.41	--	3015.13	--	--
9/14/1983	3039.96	--	--	3052.30	3048.79	--	--	--	--	--	--	--	--
10/13/1983	--	--	3050.90	--	--	--	3039.69	--	3011.81	--	3015.23	--	--
11/14/1983	--	--	3051.30	--	--	--	3040.19	--	3011.81	--	3015.13	--	--
12/15/1983	--	--	3051.70	--	--	--	3039.99	--	3011.41	--	3014.33	--	--
7/16/1984	--	--	3055.20	--	--	--	3039.99	--	3011.81	--	3010.53	--	--
9/29/1984	--	--	3054.20	--	--	--	3039.99	--	3011.81	--	3012.33	--	--
1/9/1985	3043.46	--	3058.00	3051.00	3052.29	--	3041.09	--	3012.81	--	3012.53	--	--

Well Number	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30	MW-31
Old Well Number	21323	--	21152	21141	20721	--	20842	--	20243	--	20112	--	--
Well Elevation before 1/22/2005	3135.96	3135.30	3125.20	3132.30	3130.79	3130.77	3131.99	3130.63	3147.81	3147.86	3126.53	3121.39	3121.38
Well Elevation 1/22/2005 -	3135.84	3135.69	3125.20	3132.19	3130.51	3130.99	3131.08	3130.63	3147.92	3147.83	3126.53	3121.4	3121.37
Well Elevation 2/7/2007 -	--	3137.75	3129.30	3134.30	--	3133.00	--	3132.57	--	3149.71	3127.00	3121.6	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/2/1985	3044.26	--	3059.70	3050.50	3053.19	--	3041.29	--	3012.51	--	3011.43	--	--
7/9/1985	3044.86	--	3058.40	3051.90	3054.49	--	3040.99	--	3012.61	--	3011.33	--	--
9/23/1985	3045.16	--	3057.90	3051.50	3054.99	--	--	--	3011.81	--	3010.73	--	--
1/14/1986	3045.86	--	3058.10	3052.40	3055.99	--	3041.09	--	3012.51	--	3010.83	--	--
3/27/1986	3046.46	--	3058.90	3052.30	3056.79	--	3040.29	--	3012.81	--	3010.83	--	--
7/14/1986	3046.96	--	3062.20	3054.30	3057.79	--	3039.59	--	3012.81	--	3011.13	--	--
9/8/1986	3047.16	--	3060.40	3055.70	3059.59	--	3040.69	--	3013.01	--	3013.43	--	--
12/10/1986	3047.36	--	3065.20	3053.20	3058.49	--	3043.49	--	3013.71	--	3011.53	--	--
3/16/1987	3049.76	--	3065.70	3057.40	3062.79	--	3046.99	--	3013.51	--	3016.73	--	--
4/8/1987	--	--	--	--	--	--	--	--	--	--	--	--	--
6/23/1987	3050.46	--	3064.40	3058.50	3064.29	--	3046.99	--	3013.61	--	3017.03	--	--
7/23/1987	--	--	--	--	--	--	--	--	--	--	--	--	--
9/24/1987	--	--	3063.70	--	--	--	3046.09	--	3013.81	--	3015.23	--	--
10/27/1987	3050.66	--	--	3059.10	3064.39	--	--	--	--	--	--	--	--
11/11/1987	3050.66	--	3063.70	3059.00	3065.39	--	3046.99	--	3013.21	--	3017.93	--	--
3/14/1988	3052.86	--	3065.70	3055.10	3067.29	--	3045.69	--	3015.31	--	3019.53	--	--
6/27/1988	3051.36	--	3063.70	3059.80	3067.29	--	3047.89	--	3016.31	--	3020.53	--	--
9/27/1988	3053.66	--	3063.40	3058.90	3066.99	--	3047.49	--	3016.71	--	3030.13	--	--
12/13/1988	3053.96	--	3062.90	3059.90	3066.99	--	3049.09	--	3016.71	--	3019.23	--	--
3/1/1989	3054.16	--	3063.70	3059.70	3067.09	--	3048.39	--	3017.01	--	3019.43	--	--
6/15/1989	3054.46	--	--	3059.30	3067.59	--	3047.59	--	3017.41	--	3019.13	--	--
6/30/1989	--	--	3062.20	--	--	--	--	--	--	--	--	--	--
9/15/1989	3047.06	--	3062.60	3060.50	3068.59	--	3049.59	--	3017.51	--	3022.33	--	--

Well Number	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30	MW-31
Old Well Number	21323	--	21152	21141	20721	--	20842	--	20243	--	20112	--	--
Well Elevation before 1/22/2005	3135.96	3135.30	3125.20	3132.30	3130.79	3130.77	3131.99	3130.63	3147.81	3147.86	3126.53	3121.39	3121.38
Well Elevation 1/22/2005 -	3135.84	3135.69	3125.20	3132.19	3130.51	3130.99	3131.08	3130.63	3147.92	3147.83	3126.53	3121.4	3121.37
Well Elevation 2/7/2007 -	--	3137.75	3129.30	3134.30	--	3133.00	--	3132.57	--	3149.71	3127.00	3121.6	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/16/1989	3046.56	--	3063.60	--	3069.09	--	3050.39	--	3018.61	--	3020.73	--	--
3/13/1990	3055.96	--	3062.60	3058.80	3067.59	--	3049.69	--	3017.81	--	3020.23	--	--
5/31/1990	3055.56	--	3061.20	3059.80	3067.69	--	3050.49	--	3017.81	--	3020.03	--	--
12/30/1991	3056.26	--	3061.80	3059.30	3065.69	--	3045.29	--	3017.81	--	3017.83	--	--
3/18/1992	3056.56	--	3062.40	3059.50	3051.59	--	3048.49	--	3018.11	--	3018.53	--	--
7/21/1992	3056.96	--	--	3060.00	3068.29	--	3049.39	--	3018.31	--	3018.03	--	--
9/21/1992	3057.46	--	3064.70	3060.70	3069.19	--	3049.39	--	3018.51	--	3018.73	--	--
12/19/1992	3057.06	--	3063.60	3061.00	3069.49	--	3050.19	--	3018.81	--	3018.63	--	--
3/16/1993	3058.56	--	3063.30	3061.20	3069.29	--	3050.79	--	3019.41	--	3020.03	--	--
6/17/1993	3058.56	--	3061.60	3061.10	3069.39	--	3050.59	--	3019.31	--	3019.63	--	--
9/9/1993	3058.96	--	3063.00	3061.10	3068.99	--	3049.89	--	3019.11	--	3019.33	--	--
11/18/1993	3058.36	--	3061.70	3060.70	3068.49	--	3050.29	--	3018.91	--	3019.03	--	--
3/18/1994	3059.06	--	3062.20	3060.90	3067.99	--	3050.39	--	3019.51	--	3019.33	--	--
6/17/1994	3059.06	--	--	3060.70	3068.39	--	3049.59	--	3019.21	--	3018.33	--	--
9/27/1994	3058.86	--	3061.80	3060.60	3068.09	--	3048.99	--	3018.21	--	3018.03	--	--
12/30/1994	3064.16	--	--	3060.60	3067.59	--	3049.29	--	3017.81	--	3017.73	--	--
3/21/1995	3059.36	--	3061.80	3057.40	3067.39	--	3053.79	--	3017.91	--	3017.93	--	--
6/22/1995	3058.96	--	3061.20	3060.10	3067.29	--	3048.99	--	3017.41	--	3017.23	--	--
9/14/1995	3058.66	--	3060.80	3058.10	3066.99	--	3047.89	--	3016.61	--	3016.73	--	--
1/9/1996	3058.76	--	3060.90	3057.90	3066.69	--	3048.69	--	3016.01	--	3016.43	--	--
7/5/1996	3059.16	--	3061.20	3057.80	3067.19	--	3046.99	--	3015.61	--	3016.03	--	--
9/18/1996	3058.36	--	3061.00	3057.90	3067.09	--	3047.99	--	3014.41	--	3015.43	--	--
9/29/1996	3058.06	--	3061.60	3059.90	3068.09	--	3047.39	--	3016.11	--	3016.83	--	--

Well Number	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30	MW-31
Old Well Number	21323	--	21152	21141	20721	--	20842	--	20243	--	20112	--	--
Well Elevation before 1/22/2005	3135.96	3135.30	3125.20	3132.30	3130.79	3130.77	3131.99	3130.63	3147.81	3147.86	3126.53	3121.39	3121.38
Well Elevation 1/22/2005 -	3135.84	3135.69	3125.20	3132.19	3130.51	3130.99	3131.08	3130.63	3147.92	3147.83	3126.53	3121.4	3121.37
Well Elevation 2/7/2007 -	--	3137.75	3129.30	3134.30	--	3133.00	--	3132.57	--	3149.71	3127.00	3121.6	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/15/1997	3058.96	--	3062.00	3058.20	3066.49	--	3048.79	--	3014.61	--	3015.53	--	--
6/30/1997	3059.06	--	3062.50	3057.90	3066.79	--	3049.09	--	3014.51	--	3015.13	--	--
9/8/1997	3058.76	--	3063.10	3060.30	3067.69	--	3048.49	--	3014.31	--	3015.03	--	--
12/15/1997	3058.96	--	3062.60	3058.60	3068.29	--	3049.29	--	3014.51	--	3015.03	--	--
4/1/1998	3059.06	--	3062.30	3058.50	3067.79	--	3049.09	--	3014.51	--	3015.33	--	--
6/24/1998	3058.96	--	3062.10	3058.30	3081.49	--	3047.19	--	3014.11	--	3014.63	--	--
9/15/1998	3058.66	--	3061.60	3058.20	3067.19	--	3047.49	--	3013.41	--	3014.63	--	--
12/30/1998	3058.76	--	3060.90	3058.00	3065.79	--	3048.19	--	3012.81	--	3014.13	--	--
3/15/1999	3058.64	--	3061.55	3059.94	3068.81	--	3048.49	--	3012.68	--	3016.26	--	--
4/26/1999	3058.58	--	3061.51	3059.81	3068.14	--	3047.62	--	3012.91	--	3016.30	--	--
7/27/1999	3058.57	--	3062.22	3059.78	3069.14	--	3046.45	--	3012.63	--	3015.84	--	--
12/31/1999	3060.38	--	3061.74	3059.71	3069.42	--	3047.49	--	3011.68	--	3015.19	--	--
3/30/2000	3059.42	--	3061.34	3060.58	3069.77	--	3047.75	--	3011.47	--	3015.12	--	--
6/30/2000	3058.74	--	3060.82	3059.54	3068.33	--	3047.95	--	3010.99	--	3014.81	--	--
9/30/2000	3058.62	--	3060.63	3059.46	3068.29	--	3045.89	--	3010.73	--	3014.64	--	--
12/31/2000	3058.28	--	3060.34	3059.29	3068.37	--	3046.70	--	3010.60	--	3014.44	--	--
3/30/2001	3058.66	--	3060.23	3059.11	3068.30	--	3047.05	--	3010.40	--	3014.71	--	--
6/30/2001	3059.55	--	3060.74	3059.58	3068.22	--	3047.54	--	3010.38	--	3014.25	--	--
9/30/2001	3058.31	--	3064.32	3058.40	3069.01	--	3046.26	--	3010.14	--	3013.66	--	--
12/31/2001	3057.79	--	3061.11	3058.95	3068.48	--	3047.24	--	3009.97	--	3012.23	--	--
3/31/2002	3059.08	--	3066.68	3058.99	3068.36	--	3048.56	--	3010.03	--	3014.10	--	--
4/30/2002	3058.98	--	3063.52	3058.84	3068.09	--	3046.84	--	3009.74	--	3013.23	3071.27	3068.60
6/30/2002	3058.68	--	3064.50	3058.76	3068.23	--	3047.01	--	3009.61	--	3013.69	3070.77	3069.26

Well Number	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30	MW-31
Old Well Number	21323	--	21152	21141	20721	--	20842	--	20243	--	20112	--	--
Well Elevation before 1/22/2005	3135.96	3135.30	3125.20	3132.30	3130.79	3130.77	3131.99	3130.63	3147.81	3147.86	3126.53	3121.39	3121.38
Well Elevation 1/22/2005 -	3135.84	3135.69	3125.20	3132.19	3130.51	3130.99	3131.08	3130.63	3147.92	3147.83	3126.53	3121.4	3121.37
Well Elevation 2/7/2007 -	--	3137.75	3129.30	3134.30	--	3133.00	--	3132.57	--	3149.71	3127.00	3121.6	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/30/2002	3058.63	--	3063.97	3058.62	3068.03	--	3046.58	--	3009.15	--	3013.31	3070.02	3068.34
1/31/2003	3058.55	--	3063.80	3058.46	3067.89	--	3046.64	--	3008.92	--	3013.11	3069.91	3068.28
4/8/2003	3058.64	--	3064.16	3058.45	3067.92	--	3046.43	--	3008.62	--	3012.71	3070.24	3068.16
7/1/2003	3058.05	--	3063.82	3058.42	3066.96	--	3046.41	--	3008.62	--	3013.09	3069.35	3067.88
10/31/2003	3058.29	--	3063.37	3058.26	3068.21	--	3045.37	--	3008.10	--	3013.00	3069.56	3067.48
3/31/2004	3058.26	3058.19	3063.05	3058.00	3067.45	3068.59	3045.95	3046.37	3007.36	3007.43	3012.25	3068.36	3067.04
6/28/2004	3058.08	3058.15	3062.68	3057.70	3067.40	3067.57	3044.48	3045.14	3005.71	3007.80	3012.60	3068.30	3067.40
9/13/2004	3057.96	3057.98	3062.60	3057.67	3067.26	3067.46	3045.27	3045.74	3007.61	3007.67	3012.79	3067.99	3067.39
10/15/2004	3057.88	3057.92	3063.04	3057.59	3067.14	3067.29	3045.49	3045.94	3007.58	3007.59	3012.84	3067.93	3067.61
1/22/2005	3057.80	3057.85	3063.98	3057.82	3067.98	3068.12	3046.08	3046.46	3007.61	3007.66	3012.89	3068.34	3068.89
1/31/2006	--	3058.57	3063.69	3058.37	--	3068.39	--	3047.72	--	3007.74	3012.91	3068.42	--
2/7/2007	--	3058.06	3062.58	3057.70	--	3066.35	--	3047.49	--	3007.25	3012.59	3066.67	--
2/6/2008	--	3058.15	3063.08	3058.04	--	3067.01	--	3047.52	--	3006.98	3012.15	3068.32	--
8/1/2008	--	3057.65	3062.79	3056.51	--	3067.01	--	3045.16	--	3007.59	3010.30	3068.28	--
3/4/2009	--	3058.18	3064.30	3058.29	--	3067.76	--	3047.41	--	3006.80	3010.49	3069.07	--
10/1/2009	--	3058.14	3063.48	3058.26	--	3066.75	--	3044.61	--	3006.08	3010.31	3068.60	--
1/1/2010	--	3058.08	3062.62	3057.76	--	3065.94	--	3046.00	--	3008.71	3010.43	3067.30	--
6/1/2010	--	3058.12	3064.34	3057.83	--	3067.57	--	3046.65	--	3005.26	3009.63	3068.98	--
1/1/2011	--	3058.61	3065.50	3059.79	--	3068.71	--	3045.64	--	3005.23	3010.50	3072.10	--
8/1/2011	--	3059.15	3064.65	3059.82	--	3067.19	--	3046.23	--	3004.92	3010.76	3070.27	--
1/11/2012	--	3059.24	3063.68	3059.47	--	3066.51	--	3047.65	--	3004.98	3010.68	3068.99	--
8/1/2012	--	3058.74	3064.05	3059.00	--	3066.42	--	3045.45	--	3004.49	3009.56	3068.05	--
1/29/2013	--	3058.51	3063.07	3059.04	--	3066.04	--	3047.07	--	3004.27	3009.59	3067.57	--

Well Number	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30	MW-31
Old Well Number	21323	--	21152	21141	20721	--	20842	--	20243	--	20112	--	--
Well Elevation before 1/22/2005	3135.96	3135.30	3125.20	3132.30	3130.79	3130.77	3131.99	3130.63	3147.81	3147.86	3126.53	3121.39	3121.38
Well Elevation 1/22/2005 -	3135.84	3135.69	3125.20	3132.19	3130.51	3130.99	3131.08	3130.63	3147.92	3147.83	3126.53	3121.4	3121.37
Well Elevation 2/7/2007 -	--	3137.75	3129.30	3134.30	--	3133.00	--	3132.57	--	3149.71	3127.00	3121.6	--
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
8/1/2013	--	3058.74	3064.05	3059.00	--	3066.42	--	3045.45	--	3004.49	3009.56	3068.05	--
1/10/2014	--	3057.73	3061.94	3057.59	--	3064.74	--	3045.81	--	3003.83	3010.38	3066.98	--
10/1/2014	--	3057.00	3064.05	3056.75	--	3064.33	--	3044.15	--	3002.84	3006.00	3066.80	--
3/10/2015	--	3057.08	3062.99	3057.03	--	3066.23	--	3045.25	--	3002.61	3007.88	3067.81	--
8/1/2015	--	3057.22	--	3057.28	--	3067.10	--	3044.84	--	3002.55	3007.79	3069.90	--
3/1/2016	--	3057.66	3064.92	3058.29	--	3067.87	--	3046.90	--	3002.34	3008.08	3070.70	--
2/1/2017	--	3057.95	3063.80	3058.40	--	3067.40	--	3047.67	--	3002.71	3007.50	3069.30	--
11/20/2017	--	3055.45	3064.00	3058.00	--	3068.30	--	3048.27	--	3002.21	3006.40	3062.00	--
1/24/2018	--	3066.85	3063.00	3057.90	--	3067.20	--	3047.77	--	3003.11	3007.10	3069.90	--
1/24/2019	--	3066.45	3061.90	3057.20	--	3065.90	--	3045.67	--	3002.41	3006.90	3069.20	--
1/24/2020	--	3057.60	3063.83	3057.77	--	3066.60	--	3045.67	--	3001.79	3006.28	3065.50	--
1/27/2021	--	3057.31	3062.92	3053.01	--	3069.90	--	3045.26	--	3001.01	3007.52	3036.36	--
1/25/2022	--	3056.71	3062.43	3057.17	--	3066.65	--	3044.93	--	3000.94	3009.66	3068.63	--
1/20/2023	--	3056.42	3060.98	3053.93	--	3018.75	--	3044.48	--	2999.75	3006.53	3043.64	--

Well Number	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36
Old Well Number	--	--	--	--	--	--	--
Well Elevation before 1/22/2005	3120.71	3131.97	3131.40	3130.46	3124.14	3123.50	3127.3
Well Elevation 1/22/2005 -	3120.72	--	--	3130.52	3124.47	3123.62	3127.37
Well Elevation 2/7/2007 -	3122.85	--	--	3132.42	3126.39	3125.58	3129.32
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
12/22/1981	--	--	--	--	--	--	--
2/19/1982	--	--	--	--	--	--	--
4/22/1982	--	--	--	--	--	--	--
6/23/1982	--	--	--	--	--	--	--
7/19/1982	--	--	--	--	--	--	--
11/12/1982	--	--	--	--	--	--	--
12/13/1982	--	--	--	--	--	--	--
1/1/1983	--	--	--	--	--	--	--
2/11/1983	--	--	--	--	--	--	--
3/11/1983	--	--	--	--	--	--	--
4/7/1983	--	--	--	--	--	--	--
5/5/1983	--	--	--	--	--	--	--
6/6/1983	--	--	--	--	--	--	--
7/6/1983	--	--	--	--	--	--	--
8/4/1983	--	--	--	--	--	--	--
9/12/1983	--	--	--	--	--	--	--
9/14/1983	--	--	--	--	--	--	--
10/13/1983	--	--	--	--	--	--	--
11/14/1983	--	--	--	--	--	--	--
12/15/1983	--	--	--	--	--	--	--
7/16/1984	--	--	--	--	--	--	--
9/29/1984	--	--	--	--	--	--	--
1/9/1985	--	--	--	--	--	--	--

Well Number	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36
Old Well Number	--	--	--	--	--	--	--
Well Elevation before 1/22/2005	3120.71	3131.97	3131.40	3130.46	3124.14	3123.50	3127.3
Well Elevation 1/22/2005 -	3120.72	--	--	3130.52	3124.47	3123.62	3127.37
Well Elevation 2/7/2007 -	3122.85	--	--	3132.42	3126.39	3125.58	3129.32
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/2/1985	--	--	--	--	--	--	--
7/9/1985	--	--	--	--	--	--	--
9/23/1985	--	--	--	--	--	--	--
1/14/1986	--	--	--	--	--	--	--
3/27/1986	--	--	--	--	--	--	--
7/14/1986	--	--	--	--	--	--	--
9/8/1986	--	--	--	--	--	--	--
12/10/1986	--	--	--	--	--	--	--
3/16/1987	--	--	--	--	--	--	--
4/8/1987	--	--	--	--	--	--	--
6/23/1987	--	--	--	--	--	--	--
7/23/1987	--	--	--	--	--	--	--
9/24/1987	--	--	--	--	--	--	--
10/27/1987	--	--	--	--	--	--	--
11/11/1987	--	--	--	--	--	--	--
3/14/1988	--	--	--	--	--	--	--
6/27/1988	--	--	--	--	--	--	--
9/27/1988	--	--	--	--	--	--	--
12/13/1988	--	--	--	--	--	--	--
3/1/1989	--	--	--	--	--	--	--
6/15/1989	--	--	--	--	--	--	--
6/30/1989	--	--	--	--	--	--	--
9/15/1989	--	--	--	--	--	--	--

Well Number	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36
Old Well Number	--	--	--	--	--	--	--
Well Elevation before 1/22/2005	3120.71	3131.97	3131.40	3130.46	3124.14	3123.50	3127.3
Well Elevation 1/22/2005 -	3120.72	--	--	3130.52	3124.47	3123.62	3127.37
Well Elevation 2/7/2007 -	3122.85	--	--	3132.42	3126.39	3125.58	3129.32
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/16/1989	--	--	--	--	--	--	--
3/13/1990	--	--	--	--	--	--	--
5/31/1990	--	--	--	--	--	--	--
12/30/1991	--	--	--	--	--	--	--
3/18/1992	--	--	--	--	--	--	--
7/21/1992	--	--	--	--	--	--	--
9/21/1992	--	--	--	--	--	--	--
12/19/1992	--	--	--	--	--	--	--
3/16/1993	--	--	--	--	--	--	--
6/17/1993	--	--	--	--	--	--	--
9/9/1993	--	--	--	--	--	--	--
11/18/1993	--	--	--	--	--	--	--
3/18/1994	--	--	--	--	--	--	--
6/17/1994	--	--	--	--	--	--	--
9/27/1994	--	--	--	--	--	--	--
12/30/1994	--	--	--	--	--	--	--
3/21/1995	--	--	--	--	--	--	--
6/22/1995	--	--	--	--	--	--	--
9/14/1995	--	--	--	--	--	--	--
1/9/1996	--	--	--	--	--	--	--
7/5/1996	--	--	--	--	--	--	--
9/18/1996	--	--	--	--	--	--	--
9/29/1996	--	--	--	--	--	--	--

Well Number	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36
Old Well Number	--	--	--	--	--	--	--
Well Elevation before 1/22/2005	3120.71	3131.97	3131.40	3130.46	3124.14	3123.50	3127.3
Well Elevation 1/22/2005 -	3120.72	--	--	3130.52	3124.47	3123.62	3127.37
Well Elevation 2/7/2007 -	3122.85	--	--	3132.42	3126.39	3125.58	3129.32
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
4/15/1997	--	--	--	--	--	--	--
6/30/1997	--	--	--	--	--	--	--
9/8/1997	--	--	--	--	--	--	--
12/15/1997	--	--	--	--	--	--	--
4/1/1998	--	--	--	--	--	--	--
6/24/1998	--	--	--	--	--	--	--
9/15/1998	--	--	--	--	--	--	--
12/30/1998	--	--	--	--	--	--	--
3/15/1999	--	--	--	--	--	--	--
4/26/1999	--	--	--	--	--	--	--
7/27/1999	--	--	--	--	--	--	--
12/31/1999	--	--	--	--	--	--	--
3/30/2000	--	--	--	--	--	--	--
6/30/2000	--	--	--	--	--	--	--
9/30/2000	--	--	--	--	--	--	--
12/31/2000	--	--	--	--	--	--	--
3/30/2001	--	--	--	--	--	--	--
6/30/2001	--	--	--	--	--	--	--
9/30/2001	--	--	--	--	--	--	--
12/31/2001	--	--	--	--	--	--	--
3/31/2002	--	--	--	--	--	--	--
4/30/2002	--	3057.47	--	--	--	--	--
6/30/2002	--	3058.39	3070.87	--	--	--	--

Well Number	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36
Old Well Number	--	--	--	--	--	--	--
Well Elevation before 1/22/2005	3120.71	3131.97	3131.40	3130.46	3124.14	3123.50	3127.3
Well Elevation 1/22/2005 -	3120.72	--	--	3130.52	3124.47	3123.62	3127.37
Well Elevation 2/7/2007 -	3122.85	--	--	3132.42	3126.39	3125.58	3129.32
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
11/30/2002	--	3056.81	3068.57	--	--	--	--
1/31/2003	--	3057.93	3071.37	--	--	--	--
4/8/2003	--	3057.99	3069.22	--	--	--	--
7/1/2003	--	3058.02	3067.29	--	--	--	--
10/31/2003	--	3057.57	3068.29	--	--	--	--
3/31/2004	3066.94	3057.68	3068.38	3068.82	3052.38	3047.13	3048.37
6/28/2004	3067.53	--	--	3068.85	3052.96	3047.03	3048.22
9/13/2004	3067.65	--	--	3068.68	3052.51	3047.01	3048.21
10/15/2004	3067.61	--	--	3068.49	3052.46	3046.97	3048.18
1/22/2005	3068.87	--	--	3069.22	3052.65	3046.78	3048.03
1/31/2006	3068.24	--	--	3069.38	3052.99	3047.24	3048.47
2/7/2007	3066.54	--	--	3067.23	3052.24	3047.01	3048.31
2/6/2008	3067.34	--	--	3067.87	3052.63	3047.07	3048.49
8/1/2008	3067.54	--	--	3068.41	3051.64	3046.70	3048.20
3/4/2009	3068.67	--	--	3072.50	3053.34	3047.16	3048.74
10/1/2009	3067.70	--	--	3069.94	3052.46	3047.30	3048.61
1/1/2010	3066.56	--	--	3069.11	3052.46	3047.02	3048.44
6/1/2010	3070.13	--	--	3070.51	3052.80	3047.08	3048.52
1/1/2011	3079.54	--	--	3071.80	3054.77	3047.68	3048.92
8/1/2011	3067.98	--	--	3070.38	3053.10	3047.93	3049.20
1/11/2012	3067.53	--	--	3069.77	3053.75	3048.08	3049.27
8/1/2012	3068.28	--	--	3070.10	3052.37	3047.99	3049.02
1/29/2013	3067.59	--	--	3067.44	3052.76	3047.74	3048.77

Well Number	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36
Old Well Number	--	--	--	--	--	--	--
Well Elevation before 1/22/2005	3120.71	3131.97	3131.40	3130.46	3124.14	3123.50	3127.3
Well Elevation 1/22/2005 -	3120.72	--	--	3130.52	3124.47	3123.62	3127.37
Well Elevation 2/7/2007 -	3122.85	--	--	3132.42	3126.39	3125.58	3129.32
Date	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.	GW Elev.
8/1/2013	3068.28	--	--	3070.10	3052.37	3047.99	3049.02
1/10/2014	3066.22	--	--	3066.13	3051.87	3047.16	3048.14
10/1/2014	3067.96	--	--	3067.75	3050.00	3046.51	3047.64
3/10/2015	3068.90	--	--	3070.02	3051.71	3046.54	3047.68
8/1/2015	3073.79	--	--	3070.96	3052.30	3046.83	3048.03
3/1/2016	3070.27	--	--	3071.45	3052.78	3047.18	3048.32
2/1/2017	3068.55	--	--	3073.12	3045.19	3048.28	3048.32
11/20/2017	3066.55	--	--	3063.42	3049.99	3048.48	3049.52
1/24/2018	3068.75	--	--	3070.02	3053.89	3048.68	3050.12
1/24/2019	3066.75	--	--	3059.92	3061.19	3047.68	3049.02
1/24/2020	3069.51	--	--	3070.27	3048.48	3051.76	3048.91
1/27/2021	3066.98	--	--	3066.14	3052.03	3049.30	3049.04
1/25/2022	3066.50	--	--	3065.86	3051.45	3046.89	3048.08
1/20/2023	3065.71	--	--	3065.10	3051.33	3046.45	3047.70

Table 2. State Wells Groundwater Elevations

County	State Well Number	Latitude	Longitude	Land Surface Elevation	2007	2008	2009	2010	2011	2012	2013	2014	2015
Lubbock	2334502	33.42165	-101.80411	3,177	3023.70	3024.29	3027.12	3024.41	3026.06	3023.33	3022.51	3022.08	3021.27
Lubbock	2334604	33.41843	-101.75898	3,154	--	--	--	3035.73	3035.71	3035.80	3035.39	3036.70	3035.75
Lubbock	2334801	33.39943	-101.81106	3,177	3017.15	3017.83	3017.32	3016.06	3016.74	3015.07	3012.51	3013.36	3012.10
Lubbock	2334805	33.40178	-101.81657	3,179	3020.06	3020.88	3022.14	3020.07	3021.55	3018.77	3018.76	3017.57	3016.79
Lubbock	2334902	33.41462	-101.75542	3,156	3025.83	3025.43	3024.59	3022.16	3023.41	3022.90	3021.17	3021.75	3021.78
Lubbock	2335503	33.42516	-101.70173	3,120	3025.14	3027.22	3025.71	3019.78	3020.22	3016.09	3014.90	3011.39	3008.64
Lubbock	2335707	33.40044	-101.72266	3,127	3023.70	3025.01	3023.20	3018.13	3020.15	3014.32	3010.93	3005.85	3002.37
Lubbock	2335710	33.41297	-101.71402	3,121	3022.50	3024.29	3023.34	3016.77	3019.58	3011.59	3010.37	3006.42	3003.15
Lubbock	2335810	33.40652	-101.69073	3,110	3051.86	3051.65	3051.51	3051.13	3051.33	3051.38	3051.61	3051.66	3051.39
Lubbock	2335902	33.41055	-101.63826	3,081	3022.45	3022.77	3022.05	3019.76	3019.30	3023.58	--	3025.62	3022.21
Lubbock	2335907	33.41073	-101.66038	3,088	--	--	--	--	--	2987.96	2984.56	2981.71	2979.59
Lynn	2334903	33.38967	-101.77959	3,170	--	3007.90	3007.48	3005.77	3005.60	3004.42	3003.70	3003.48	3002.79
Lynn	2335704	33.38160	-101.74017	3,139	3026.15	3026.85	3027.39	3022.42	3024.12	3022.22	3019.15	3017.68	3014.76
Lynn	2335801	33.37696	-101.68789	3,104	--	3088.23	3088.56	3088.04	3089.05	3089.96	3090.33	3090.55	3090.40
Lynn	2335901	33.38894	-101.64279	3,070	3082.14	3081.59	3082.14	3077.93	3082.17	3082.35	3082.79	3082.29	3082.18
Lynn	2342101	33.36559	-101.84171	3,196	3057.25	3058.21	3057.56	3057.37	3057.27	3056.91	3056.90	3056.75	3057.00
Lynn	2342207	33.33376	-101.80343	3,170	3086.30	3083.90	--	3083.95	3088.36	--	3089.20	3089.40	3088.21
Lynn	2342301	33.35752	-101.77874	3,162	3072.37	3068.60	3072.82	3072.50	3073.08	3073.08	3073.53	3073.38	3073.20
Lynn	2342309	33.37408	-101.76881	3,159	--	3014.25	3016.98	3010.53	3011.46	3017.47	3016.28	3010.87	3010.88
Lynn	2342401	33.32861	-101.85045	3,191	3067.24	3067.08	3065.43	3064.16	3065.76	3064.15	3064.45	3064.04	3063.75
Lynn	2342502	33.30800	-101.82415	3,155	3086.85	3090.71	3089.37	3086.90	3089.95	3086.54	3086.16	3085.34	3085.72
Lynn	2342601	33.29778	-101.75341	3,100	3129.41	3130.82	3135.07	3132.46	3142.55	3135.50	3131.85	3130.54	3130.63
Lynn	2342602	33.32344	-101.75884	3,124	3092.90	3093.90	3094.85	3093.58	3095.85	3093.46	3091.39	3090.06	3089.18
Lynn	2342801	33.28308	-101.80774	3,140	3111.58	3111.80	3112.20	3110.90	3113.60	--	3109.45	3104.91	3105.75
Lynn	2342803	33.25954	-101.80564	3,128	3131.28	3133.30	3136.96	3135.70	3144.40	3132.89	3127.71	3123.03	3128.80
Lynn	2342902	33.26917	-101.76150	3,103	--	--	--	3131.58	3135.24	3135.15	3134.04	3132.94	3133.20
Lynn	2343201	33.33840	-101.68783	3,099	3120.61	3121.05	3120.86	3120.62	3123.67	3124.17	3123.86	3123.27	3122.65
Lynn	2343301	33.35999	-101.62949	3,047	3141.28	3143.00	3148.48	3143.97	3156.69	3149.94	3149.15	3145.89	3148.30
Lynn	2343502	33.30859	-101.70336	3,100	3108.03	3110.84	3111.75	3110.45	3112.91	3111.60	3111.78	3111.08	3110.40
Lynn	2343504	33.30167	-101.67051	3,084	3108.60	3109.60	3109.52	3109.07	3111.31	3110.32	3109.73	3107.65	3106.41
Lynn	2343601	33.31669	-101.63443	3,048	3137.06	3138.30	3141.21	3137.75	3149.68	3145.66	3146.28	3177.00	3141.50
Lynn	2343901	33.28737	-101.65311	3,062	3120.71	3121.25	3122.37	3120.16	3128.90	3123.60	3121.28	3117.95	3119.12
Lynn	2343902	33.26592	-101.63319	3,025	3140.11	3140.25	3141.10	3140.38	3143.27	3142.61	3142.26	3141.92	3142.36

County	State Well Number	Latitude	Longitude	Land Surface Elevation	2016	2017	2018	2019	2020	2021	2022	2023	HPWD Well ID
Lubbock	2334502	33.42165	-101.80411	3,177	3021.41	3021.29	3021.71	3020.83	3,020.83	3,019.98	3,020.40	3,021.08	58996
Lubbock	2334604	33.41843	-101.75898	3,154	3035.82	3036.76	3037.24	3037.94	3,015.14	3,013.62	3,014.40	3,014.58	64017
Lubbock	2334801	33.39943	-101.81106	3,177	3010.14	3011.86	3011.90	3011.08	3,010.76	3,010.18	3,010.00	3,009.90	68851
Lubbock	2334805	33.40178	-101.81657	3,179	3018.30	--	--	--	--	--	--	--	--
Lubbock	2334902	33.41462	-101.75542	3,156	3022.42	--	--	--	--	--	--	--	--
Lubbock	2335503	33.42516	-101.70173	3,120	--	--	--	--	--	--	--	--	--
Lubbock	2335707	33.40044	-101.72266	3,127	3010.00	3008.40	3010.60	3009.51	2,959.45	2,954.97	2,957.50	2,957.60	60938
Lubbock	2335710	33.41297	-101.71402	3,121	3010.70	3009.79	3012.41	3009.75	2,955.02	2,950.97	2,951.60	2,951.72	62230
Lubbock	2335810	33.40652	-101.69073	3,110	3052.08	3052.55	3052.48	3052.25	2,985.32	2,984.96	2,984.56	2,984.33	69199
Lubbock	2335902	33.41055	-101.63826	3,081	3023.79	3025.80	3026.81	3023.67	2,927.80	2,927.68	2,928.47	2,929.77	62215
Lubbock	2335907	33.41073	-101.66038	3,088	2989.14	2985.22	2979.29	2974.19	2,888.34	2,885.98	2,886.88	2,882.02	64778
Lynn	2334903	33.38967	-101.77959	3,170	3004.50	3002.26	3002.53	3001.88	2,994.96	2,994.18	2,994.25	2,994.20	72858
Lynn	2335704	33.38160	-101.74017	3,139	3015.30	3014.37	3015.59	3012.83	2,973.40	2,972.16	2,972.22	--	70950
Lynn	2335801	33.37696	-101.68789	3,104	3091.15	3091.47	3092.34	3092.15	3,019.20	3,018.91	3,018.88	3,018.60	69539
Lynn	2335901	33.38894	-101.64279	3,070	3083.20	3083.48	3084.18	3084.32	2,977.15	2,976.79	2,976.47	2,976.60	72968
Lynn	2342101	33.36559	-101.84171	3,196	3058.20	3057.58	3058.19	3057.70	3,076.37	3,076.35	3,076.42	3,076.68	73216
Lynn	2342207	33.33376	-101.80343	3,170	3087.00	--	--	--	--	--	--	--	--
Lynn	2342301	33.35752	-101.77874	3,162	3075.60	3073.98	3074.22	3073.90	3,058.73	3,058.40	3,058.54	3,058.46	73342
Lynn	2342309	33.37408	-101.76881	3,159	3012.90	3012.88	3014.36	3013.88	2,997.13	2,993.75	2,997.92	3,000.78	71167
Lynn	2342401	33.32861	-101.85045	3,191	3067.90	3068.63	3070.88	3069.54	3,083.70	3,083.18	3,084.09	3,084.87	73272
Lynn	2342502	33.30800	-101.82415	3,155	3090.85	3092.19	3093.41	3091.42	3,066.88	3,064.28	3,064.89	3,067.00	70522
Lynn	2342601	33.29778	-101.75341	3,100	3137.40	3137.70	3137.74	3134.52	3,056.45	3,054.22	3,052.88	3,051.84	73329
Lynn	2342602	33.32344	-101.75884	3,124	3092.80	3093.50	3095.16	3093.57	3,040.65	3,040.12	3,038.95	3,040.16	73373
Lynn	2342801	33.28308	-101.80774	3,140	3114.40	3114.82	3116.48	3113.63	--	3,072.90	3,071.79	3,070.66	73322
Lynn	2342803	33.25954	-101.80564	3,128	3138.20	3140.71	3139.06	3132.89	3,081.90	3,077.79	3,074.39	3,073.78	74837
Lynn	2342902	33.26917	-101.76150	3,103	3134.80	3135.28	3135.57	3134.15	3,059.87	3,059.05	3,058.69	3,057.37	75024
Lynn	2343201	33.33840	-101.68783	3,099	3123.75	3124.56	3125.26	3124.56	3,046.77	3,046.00	3,045.66	3,044.90	70063
Lynn	2343301	33.35999	-101.62949	3,047	3153.85	3152.78	3152.08	3148.82	3,018.30	3,015.67	3,015.22	3,013.47	73523
Lynn	2343502	33.30859	-101.70336	3,100	3112.70	3112.75	3112.77	3111.65	3,034.97	3,034.61	3,034.18	3,033.86	69740
Lynn	2343504	33.30167	-101.67051	3,084	3107.30	3108.35	3108.85	3106.77	3,013.16	3,012.26	3,012.27	3,010.47	73621
Lynn	2343601	33.31669	-101.63443	3,048	3148.05	3146.58	3144.39	3141.77	3,012.33	3,010.19	3,008.42	3,008.53	73591
Lynn	2343901	33.28737	-101.65311	3,062	3125.60	3124.51	3123.72	3121.34	3,006.20	3,004.35	3,004.03	3,003.10	73656
Lynn	2343902	33.26592	-101.63319	3,025	3145.80	3144.83	3144.64	3143.86	2,991.40	2,988.48	2,989.98	2,989.40	75931

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 1A	5/19/2011	12:08	7.21	19.2	2478	8.94	51
MW 1A	8/16/2011	13:09	7.22	19.35	2516	9.79	52
MW 1A	11/16/2011	13:03	7.14	18.9	2520	9.14	42
MW 1A	2/28/2012	12:18	7.22	18.97	2492	9.62	45
MW 1A	5/8/2012	11:45	7.16	18.80	2480	9.69	164
MW 1A	8/21/2012	14:16	7.10	19.14	2492	9.80	253
MW 1A	11/19/2012	14:59	7.16	19.06	2464	9.78	223
MW 1A	3/11/2013	12:41	7.07	18.99	2545	9.35	157
MW 1A	5/23/2013	12:47	7.07	19.34	2575	9.42	92
MW 1A	9/25/2013	13:16	7.01	19.54	2515	9.51	134
MW 1A	11/21/2013	11:30	7.19	19.21	2550	8.54	144
MW 1A	1/27/2014	11:58	7.18	18.79	2561	7.75	152
MW 1A	6/2/2014	13:28	7.08	19.41	2529	8.16	105
MW 1A	12/8/2014	11:22	7.22	19.28	2661	8.77	87
MW 1A	3/16/2015	13:15	7.22	19.28	2891	8.94	91
MW 1A	4/6/2017	10:45	7.28	19.37	2635	8.70	78
MW 1A	11/28/2017	14:00	7.68	19.18	2247	9.06	90
MW 1A	3/22/2018	9:45	7.23	19.33	1640	8.47	7
MW 1A	8/22/2018	10:30	7.43	19.66	2936	8.97	247
MW 1A	11/14/2018	12:15	7.44	19.10	2625	4.78	130
MW 1A	3/26/2019	9:30	7.89	18.17	3218	8.80	96
MW 1A	8/13/2019	8:21	7.35	20.76	3045	6.06	55
MW 1A	12/17/2019	13:10	7.46	18.93	2271	4.23	304
MW 1A	3/9/2020	13:48	7.91	19.19	2890	8.41	179
MW 1A	6/29/2020	12:15	8.62	21.26	2558	8.66	309
MW 1A	3/29/2021	14:00	7.17	21.06	2851	8.11	478
MW 1A	8/30/2021	13:40	7.84	19.83	3147	8.02	46.0
MW 1A	3/23/2022	11:00	7.51	19.03	2967	8.01	78.9
MW 1A	8/15/2022	8:30	7.61	20.40	2721	7.69	78.1
MW 1A	4/10/2023	12:00	7.62	19.34	2692	7.91	68.7
MW 2A	5/19/2011	10:19	7.09	19.16	2799	6.23	62
MW 2A	8/16/2011	11:02	7.09	19.22	2917	6.93	51
MW 2A	11/16/2011	11:25	7.04	18.96	2983	6.67	48
MW 2A	3/1/2012	12:59	7.02	19.06	2816	7.30	236
MW 2A	5/7/2012	14:17	6.99	19.08	2766	6.74	158
MW 2A	8/16/2012	13:28	7.26	19.86	3041	6.15	223
MW 2A	11/19/2012	13:22	6.83	19.06	3606	6.75	226
MW 2A	3/10/2013	12:20	6.73	18.71	4830	6.4	172
MW 2A	5/23/2013	11:45	6.73	19.3	5483	6.63	110
MW 2A	9/23/2013	13:49	6.83	19.51	5902	6.58	113
MW 2A	11/21/2013	12:17	6.94	19.20	6040	6.00	186
MW 2A	2/13/2014	10:28	6.95	19.24	4968	5.53	129

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 2A	6/2/2014	11:46	6.80	19.45	5601	5.50	111
MW 2A	12/8/2014	12:35	6.93	19.23	5506	5.79	94
MW 2A	3/17/2015	10:05	7.00	19.06	5967	5.86	94
MW 2A	4/6/2017	10:00	7.07	19.28	4020	6.26	108
MW 2A	11/21/2017	11:15	7.22	19.33	3203	6.23	57
MW 2A	3/20/2018	10:10	7.11	19.07	1625	3.66	-35.5*
MW 2A	8/20/2018	10:38	7.25	19.46	3607	6.12	176
MW 2A	11/14/2018	11:25	7.40	18.81	2935	7.51	140
MW 2A	3/19/2019	11:30	7.82	19.39	2774	6.85	120
MW 2A	8/6/2019	10:15	7.89	19.85	3121	6.08	56
MW 2A	12/17/2019	14:10	7.47	19.06	2550	7.17	80
MW 2A	3/8/2020	10:30	7.85	18.90	3383	6.06	111
MW 2A	6/1/2020	9:00	8.21	19.25	3255	5.91	192
MW 2A	6/29/2020	7:30	7.40	20.22	2313	7.11	171
MW 2A	11/3/2020	10:30	7.08	19.30	2804	5.99	400
MW 2A	3/29/2021	12:00	7.14	19.93	2820	7.31	538
MW 2A	5/24/2021	11:47	7.40	30.82	3106	6.39	59.7
MW 2A	8/31/2021	10:00	7.50	19.57	3881	6.69	59.9
MW 2A	3/21/2022	10:15	7.45	19.24	3696	5.85	84.5
MW 2A	8/3/2022	7:40	7.60	19.94	3086	6.38	95.2
MW 2A	11/29/2022	10:45	6.95	19.55	3868	5.94	108
MW 2A	4/2/2023	9:20	7.86	19.19	2989	6.43	73.3
MW 3A	8/16/2011	12:46	7.02	19.21	2721	4.92	31
MW 3A	2/28/2012	11:59	7.01	18.77	2714	4.05	38
MW 3A	8/22/2012	12:41	6.94	18.93	2707	4.93	242
MW 3A	3/11/2013	13:03	6.89	18.78	2758	4.29	157
MW 3A	9/25/2013	13:47	6.84	19.40	2718	5.03	127
MW 3A	1/27/2014	11:11	6.97	18.51	2703	3.84	145
MW 3A	3/16/2015	12:56	7.03	19.06	3084	4.48	88
MW 3A	4/27/2017	10:30	7.30	18.99	2485	2.68	73
MW 3A	11/28/2017	14:30	7.50	19.06	2280	4.98	89
MW 3A	3/22/2018	10:00	7.04	19.14	1622	2.06	-9.9*
MW 3A	8/22/2018	10:15	7.29	20.38	2735	4.69	227
MW 3A	3/26/2019	10:15	8.11	18.39	2789	5.10	118
MW 3A	8/13/2019	8:39	7.44	20.06	2375	2.29	112
MW 3A	3/9/2020	13:15	7.78	19.49	2444	7.39	299
MW 3A	6/29/2020	11:20	8.63	22.70	2413	6.82	269
MW 3A	3/29/2021	14:25	7.18	19.29	2548	5.47	465
MW 3A	8/30/2021	13:00	7.54	19.23	232	5.68	58.8
MW 3A	3/23/2022	12:00	7.61	17.98	2778	7.45	74.2
MW 3A	8/15/2022	9:30	6.96	19.64	2442	5.67	85.1
MW 3A	4/10/2023	12:30	7.54	19.38	2447	5.93	64.9

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 4	8/16/2011	12:25	6.95	19.09	2629	3.92	26
MW 4	2/28/2012	11:40	6.96	18.71	2616	4.27	53
MW 4	8/22/2012	13:19	6.86	18.84	2652	4.22	201
MW 4	3/11/2013	13:33	6.76	18.8	2691	3.97	138
MW 4	9/25/2013	14:31	6.73	19.21	2687	4.19	102
MW 4	1/27/2014	10:48	6.86	18.23	2661	3.13	120
MW 4	3/16/2014	12:36	6.95	19.02	3017	3.90	84
MW 4	4/3/2017	11:30	6.98	18.96	3159	7.34	93
MW 4	11/20/2017	10:30	7.96	18.21	1848	6.73	219
MW 4	4/10/2018	9:00	5.89	17.25	1604	26%	22
MW 4	8/22/2018	11:30	7.18	19.10	2671	1.83	257
MW 4	3/19/2019	12:15	7.73	18.83	2039	3.93	60
MW 4	8/6/2019	9:30	7.52	20.83	2064	5.19	172
MW 4	3/9/2020	12:35	7.86	19.13	2381	3.17	193
MW 4	6/29/2020	10:15	8.72	22.29	2085	2.44	23
MW 4	3/29/2021	14:40	7.07	19.15	2384	2.09	468
MW 4	8/30/2021	10:30	7.51	20.38	2803	5.29	66.3
MW 4	3/23/2022	12:15	7.35	18.70	2523	2.19	6.8
MW 4	8/15/2022	10:00	6.83	19.15	2240	2.41	88.1
MW 4	4/10/2023	13:00	7.48	19.21	2220	2.42	51.6
MW 5A	8/16/2011	11:49	6.97	19.11	2425	4.65	27
MW 5A	3/1/2012	13:34	6.89	18.92	2449	4.75	232
MW 5A	8/16/2012	13:52	7.12	19.83	2515	4.50	224
MW 5A	3/11/2013	10:56	6.69	18.43	2502	4.13	197
MW 5A	9/23/2013	15:15	6.80	1974.00	2515	3.78	98
MW 5A	2/13/2014	13:15	6.92	18.85	2215	3.40	81
MW 5A	3/17/2015	10:26	6.93	18.61	2775	3.28	86
MW 5A	4/3/2017	11:11	7.04	18.94	3260	7.16	90
MW 5A	11/20/2017	10:45	7.64	18.32	1834	6.25	189
MW 5A	3/21/2018	11:30	7.19	19.24	1645	4.22	-8.8*
MW 5A	8/20/2018	11:20	7.29	20.17	2036	4.00	158
MW 5A	3/19/2019	13:00	7.71	18.81	2005	3.44	110
MW 5A	3/26/2019	10:33	8.02	18.35	2688	1.20	116
MW 5A	8/6/2019	9:45	7.41	20.79	2067	5.17	172
MW 5A	3/8/2020	11:30	7.92	16.45	2592	6.56	88
MW 5A	6/1/2020	10:00	8.36	19.36	1774	4.09	430
MW 5A	6/29/2020	8:30	7.65	20.84	2357	6.54	47
MW 5A	11/3/2020	11:30	7.08	20.06	1948	10.62	373
MW 5A	3/29/2021	13:00	7.16	20.21	1735	6.56	377
MW 5A	5/24/2021	13:00	7.56	32.31	1650	1.82	39.3
MW 5A	8/31/2021	11:30	7.43	19.26	2153	1.39	49.8
MW 5A	3/21/2022	11:20	7.41	18.91	1950	1.85	61.4
MW 5A	8/3/2022	9:10	7.23	20.00	1691	2.64	45.7

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 5A	11/29/2022	11:52	6.58	19.20	1617	2.88	79.7
MW 5A	4/2/2023	10:00	7.57	18.97	1745	2.05	63.5
MW 6	5/19/2011	10:52	7.06	18.84	2936	5.76	40
MW 6	8/16/2011	11:28	7.07	19.07	3035	6.82	32
MW 6	11/16/2011	11:53	6.99	18.77	2994	6.04	31
MW 6	3/5/2012	10:28	6.90	18.76	3011	6.91	138
MW 6	5/8/2012	10:38	6.95	18.60	3009	6.69	97
MW 6	8/16/2012	11:53	6.93	19.48	3029	6.05	211
MW 6	11/19/2012	13:55	6.88	18.9	2908	6.48	127
MW 6	3/10/2013	12:55	6.84	18.56	2993	6.2	83
MW 6	5/23/2013	12:20	6.86	19.18	3053	6.46	58
MW 6	9/23/2013	14:38	6.92	19.38	2997	6.17	56
MW 6	11/21/2013	11:58	7.04	19.17	2948	5.56	86
MW 6	2/13/2014	10:57	7.05	19.15	2380	5.38	57
MW 6	6/2/2014	12:20	6.86	19.25	2930	5.33	70
MW 6	12/8/2014	13:02	7.08	19.06	3048	5.78	51
MW 6	3/16/2015	14:11	7.06	19.22	3357	6.06	53
MW 6	4/6/2017	10:10	7.12	19.50	3014	6.61	37
MW 6	11/28/2017	15:05	7.59	20.95	2346	0.95	90
MW 6	3/20/2018	9:40	0.29375*	19.26	1671	5.58	9
MW 6	8/20/2018	11:35	7.18	19.99	2024	3.56	185
MW 6	11/14/2018	11:47	7.44	19.62	1961	6.62	143
MW 6	3/19/2019	11:48	7.77	18.88	3177	5.54	57
MW 6	8/6/2019	9:57	7.53	19.40	3075	2.32	119
MW 6	12/17/2019	13:45	7.40	19.04	2726	4.40	54
MW 6	3/8/2020	11:00	7.94	18.52	2752	4.22	101
MW 6	6/1/2020	9:20	8.25	20.48	3512	7.39	377
MW 6	6/29/2020	8:00	7.39	20.26	2404	8.96	181
MW 6	11/3/2020	11:00	7.22	19.77	2718	3.76	228
MW 6	3/29/2021	12:30	7.18	20.35	2753	3.48	527
MW 6	5/24/2021	12:20	7.49	30.03	2428	4.94	35.9
MW 6	8/31/2021	12:30	7.49	19.29	3048	4.91	12.3
MW 6	3/21/2022	11:00	7.40	18.97	2907	4.12	35.1
MW 6	8/3/2022	8:25	7.26	19.56	2575	3.65	52.2
MW 6	11/29/2022	11:15	6.67	19.60	2540	2.98	109
MW 6	4/10/2023	10:00	7.56	18.07	2479	3.77	38.2
MW 7A	8/16/2011	13:35	7.05	19.21	3301	7.60	46
MW 7A	2/28/2012	10:13	7.05	18.73	3172	7.63	50
MW 7A	8/21/2012	13:51	6.93	18.90	3176	7.91	231
MW 7A	3/11/2013	12:20	6.84	18.72	3225	7.18	162
MW 7A	9/30/2013	9:58	6.80	18.93	3207	7.73	138
MW 7A	1/27/2014	9:58	6.92	18.34	3215	5.54	136

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 7A	10/30/2014	11:45	7.01	19.06	3550	6.45	85
MW 7A	3/16/2015	13:38	7.04	19.15	3499	5.77	84
MW 7A	4/6/2017	11:10	7.07	19.28	3174	6.07	92
MW 7A	11/28/2017	13:30	7.48	18.96	2635	7.05	72
MW 7A	3/22/2018	9:20	7.08	18.93	1647	5.83	-8*
MW 7A	8/22/2018	11:00	7.45	23.94	2784	9.96	317
MW 7A	3/26/2019	10:00	8.03	18.57	3373	5.50	120
MW 7A	8/13/2019	8:00	7.53	20.76	3045	6.06	55
MW 7A	3/9/2020	14:15	7.83	19.01	3061	5.12	241
MW 7A	6/29/2020	11:43	7.66	24.24	2701	6.74	265
MW 7A	3/29/2021	13:45	7.13	19.99	3129	5.08	513
MW 7A	3/23/2022	11:30	7.43	18.95	3354	5.10	75.4
MW 7A	8/15/2022	9:00	7.16	19.86	3005	5.58	99.7
MW 7A	4/10/2023	11:30	7.41	19.10	2952	6.43	64.3
MW 8A	8/25/2011	11:00	6.90	18.34	3570	--	33
MW 8A	2/28/2012	10:13	6.89	17.84	3782	5.47	79
MW 8A	8/23/2012	11:07	6.84	18.10	3880	6.25	235
MW 8A	3/12/2013	10:42	6.68	17.9	3886	5.77	187
MW 8A	9/30/2013	9:45	6.67	18.49	3986	5.75	142
MW 8A	2/13/2014	13:36	6.92	18.48	3635	5.29	79
MW 8A	10/30/2014	12:24	6.83	18.57	4445	5.51	91
MW 8A	3/18/2015	9:05	6.91	17.92	4107	5.34	92
MW 8A	4/5/2017	11:25	7.33	20.53	3162	3.84	99
MW 8A	11/28/2017	13:10	7.52	18.17	2794	3.63	40
MW 8A	4/3/2018	10:00	7.12	18.94	1715	5.41	26
MW 8A	8/27/2018	11:00	7.22	19.46	3715	8.06	218
MW 8A	3/26/2019	10:55	7.97	19.56	3520	2.23	105
MW 8A	8/13/2019	8:59	7.57	23.80	3216	4.60	127
MW 8A	3/10/2020	10:00	7.78	17.81	3062	3.81	134
MW 8A	7/1/2020	10:00	9.16	19.92	2629	4.14	289
MW 8A	3/30/2021	15:00	7.15	19.05	3026	3.06	456
MW 8A	8/30/2021	9:30	7.28	18.81	3484	3.34	64.3
MW 8A	3/27/2022	10:00	7.45	17.84	2121	0.07	69.2
MW 8A	9/6/2022	10:00	6.74	18.43	2792	2.56	79.5
MW 8A	5/8/2023	10:00	6.48	19.16	3171	4.35	-3.9
MW 9A	8/25/2011	9:34	7.52	17.70	880	--	-16
MW 9A	2/28/2012	10:35	7.63	17.45	823	2.66	10
MW 9A	8/23/2012	10:31	7.38	17.53	1128	3.20	209
MW 9A	3/11/2013	11:51	7.29	17.55	1007	2.94	140
MW 9A	9/25/2013	15:57	7.27	18.04	1240	4.12	87
MW 9A	2/13/2014	12:08	7.57	17.86	883	3.24	60
MW 9A	3/17/2015	11:18	7.62	17.56	976	3.07	65

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 9A	4/5/2017	11:10	7.96	20.80	5682	4.91	87
MW 9A	11/20/2017	11:20	8.48	17.02	530	2.69	106
MW 9A	3/21/2018	10:20	7.46	17.95	1713	4.25	-25.5*
MW 9A	8/22/2018	12:30	7.63	21.55	1299	1.78	323
MW 9A	3/19/2019	13:40	8.07	19.86	1262	0.77	104
MW 9A	8/7/2019	10:00	7.45	23.80	2582	4.81	415
MW 9A	3/9/2020	11:50	8.44	17.98	689	2.18	125
MW 9A	6/30/2020	7:30	8.92	19.81	1753	7.26	83
MW 9A	3/29/2021	13:30	7.31	18.87	830	2.83	425
MW 9A	8/25/2021	10:30	8.12	23.45	934	3.95	31.1
MW 9A	3/21/2022	14:00	7.56	19.18	958	3.27	57.50
MW 9A	8/15/2022	11:15	6.91	19.78	924	3.16	92.7
MW 9A	4/18/2023	11:30	7.18	18.52	1232	2.17	80.2
MW 10A	8/31/2011	12:53	7.44	17.48	1299	0.06	-184
MW 10A	3/7/2012	14:49	7.12	17.22	2086	0.00	230
MW 10A	8/27/2012	12:04	7.16	17.29	2452	-0.03	189
MW 10A	3/11/2013	14:35	6.98	17.18	2615	0.02	143
MW 10A	9/30/2013	11:07	6.91	17.45	2737	-0.02	97
MW 10A	2/13/2014	12:43	7.15	17.27	2603	0.00	55
MW 10A	11/3/2014	15:15	7.15	17.36	2500	0.13	60
MW 10A	3/17/2015	11:50	7.15	17.02	3021	0.00	68
MW 10A	4/5/2017	10:40	7.92	19.88	5725	4.89	80
MW 10A	11/20/2017	10:58	8.55	16.80	1532	7.56	117
MW 10A	4/5/2018	11:15	7.19	18.26	1632	0.18	-118.3*
MW 10A	8/27/2018	11:30	7.49	20.36	2433	0.14	229
MW 10A	3/20/2019	10:30	7.87	15.97	2569	0.08	94
MW 10A	8/7/2019	11:00	7.40	19.68	2150	0.16	168
MW 10A	3/9/2020	15:10	7.95	17.41	2140	0.05	391
MW 10A	6/30/2020	9:15	9.04	19.11	1888	0.22	233
MW 10A	3/30/2021	11:45	7.27	20.12	2203	1.43	436
MW 10A	8/25/2021	10:00	7.59	17.50	2428	0.0	32
MW 10A	3/21/2022	13:30	7.40	17.38	2194	0.0	60.1
MW 10A	8/15/2022	12:30	7.15	19.01	1918	0.04	47.9
MW 10A	4/18/2023	13:00	7.67	19.71	1932	8.50	25.9
MW 11A	8/25/2011	10:04	7.23	17.44	2643	--	-97
MW 11A	3/5/2012	11:14	7.17	17.39	2616	0.29	173
MW 11A	8/23/2012	11:38	7.26	17.52	2445	0.16	196
MW 11A	3/12/2013	11:17	7.11	17.15	2325	0.26	133
MW 11A	9/30/2013	10:28	7.13	17.64	2287	0.35	93
MW 11A	2/13/2014	14:03	7.40	17.76	2298	0.61	53
MW 11A	10/30/2014	12:55	7.26	18.14	2371	0.50	58
MW 11A	3/18/2015	9:35	7.48	17.09	2092	0.66	62

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 11A	4/11/2017	9:20	7.28	17.47	2014	0.53	98
MW 11A	11/28/2017	11:58	7.83	17.97	1663	0.71	64
MW 11A	4/3/2018	10:30	7.06	18.08	1621	0.50	-24.6*
MW 11A	8/27/2018	10:32	7.64	18.12	2058	1.02	270
MW 11A	3/26/2019	11:30	8.41	17.81	2213	1.08	76
MW 11A	8/13/2019	9:07	7.66	20.48	1841	2.65	137
MW 11A	3/10/2020	10:30	8.06	19.02	2003	0.45	222
MW 11A	6/30/2020	10:30	9.33	21.25	1742	1.34	270
MW 11A	3/30/2021	15:30	7.28	19.27	1958	0.45	500
MW 11A	8/25/2021	12:40	7.88	18.66	2219	0.82	31.5
MW 11A	2/28/2022	11:00	7.40	18.26	2160	0.50	70.5
MW 11A	9/6/2022	9:30	7.24	18.28	1866	1.23	75.5
MW 11A	5/8/2023	9:30	6.45	18.05	2131	1.44	52.9
MW 12A	8/25/2011	10:34	7.06	18.30	2040	--	6
MW 12A	3/5/2012	11:35	7.06	18.06	2056	2.47	211
MW 12A	8/23/2012	12:09	7.13	18.14	2049	2.37	212
MW 12A	3/11/2013	14:08	7.06	18.3	2007	2.66	138
MW 12A	9/30/2013	12:00	6.99	18.71	2100	2.24	102
MW 12A	2/13/2014	13:09	7.23	18.35	1873	1.86	60
MW 12A	3/18/2015	10:11	7.24	18.08	2056	1.80	67
MW 12A	4/3/2017	12:00	7.21	22.74	2245	2.67	163
MW 12A	11/28/2017	9:45	7.65	18.00	1782	2.90	102
MW 12A	3/21/2018	9:45	7.27	18.18	1588	2.07	-47.7*
MW 12A	8/27/2018	9:45	7.39	24.51	2150	3.25	242
MW 12A	3/20/2019	11:00	7.99	17.81	1945	1.40	9
MW 12A	8/7/2019	10:50	7.64	21.30	1489	3.73	334
MW 12A	3/9/2020	15:30	8.09	18.30	1511	2.66	382
MW 12A	6/30/2020	9:45	9.20	19.79	1487	1.76	276
MW 12A	3/30/2021	12:30	7.47	18.97	1351	3.89	404
MW 12A	8/31/2021	13:30	7.63	18.78	1699	2.44	42.7
MW 12A	2/28/2022	10:30	7.81	21.91	1997	1.93	53.5
MW 12A	8/16/2022	8:30	7.55	18.49	1385	2.62	67.6
MW 12A	4/18/2023	13:30	8.19	19.43	345.2	6.73	51.2
MW 13A	8/25/2011	11:48	7.15	18.54	2959	--	13
MW 13A	3/5/2012	12:43	7.09	18.29	2931	3.05	222
MW 13A	8/22/2012	14:31	7.11	18.39	3182	3.57	235
MW 13A	3/12/2013	11:47	6.94	17.91	3280	4.03	151
MW 13A	9/24/2013	14:45	6.99	18.75	3184	3.48	90
MW 13A	2/13/2014	14:46	7.18	18.48	2979	4.27	67
MW 13A	11/20/2014	12:29	7.35	18.66	3424	2.44	63
MW 13A	3/18/2015	10:58	7.20	18.23	3277	3.16	72
MW 13A	4/4/2017	10:30	7.54	17.37	2115	3.95	135

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 13A	11/21/2017	11:28	8.38	19.06	1807	4.82	116
MW 13A	4/3/2018	11:15	7.18	18.84	1725	1.10	-16.2*
MW 13A	8/29/2018	10:30	7.45	19.38	3946	7.10	218
MW 13A	3/20/2019	13:00	7.84	18.70	3347	3.99	212
MW 13A	8/7/2019	11:33	7.48	18.79	2890	4.54	480
MW 13A	3/10/2020	12:00	8.04	19.04	3038	5.37	267
MW 13A	6/30/2020	11:30	9.16	20.57	3000	7.00	286
MW 13A	3/30/2021	13:30	7.27	19.21	3345	9.27	365
MW 13A	8/31/2021		7.67	18.79	3095	3.19	42.6
MW 13A	3/29/2022	11:00	7.44	19.84	3086	7.56	75.6
MW 13A	8/16/2022	13:30	7.02	18.69	2469	2.18	79.4
MW 13A	4/25/2023	9:00	7.31	18.17	2177	0.27	76.8
MW 14A	8/25/2011	11:30	7.08	19.07	3320	--	35
MW 14A	3/5/2012	12:21	7.00	18.76	3181	5.31	224
MW 14A	8/22/2012	14:08	7.05	18.90	3196	4.37	236
MW 14A	3/12/2013	12:15	6.87	18.72	3256	5.12	152
MW 14A	9/24/2013	15:18	6.92	19.34	3309	4.98	104
MW 14A	2/13/2014	14:27	7.13	19.07	3104	4.62	72
MW 14A	11/20/2014	12:11	7.27	19.24	3749	3.57	70
MW 14A	3/18/2015	10:37	7.12	18.79	3288	4.65	80
MW 14A	4/4/2017	10:00	7.54	17.12	2141	4.07	137
MW 14A	11/28/2017	10:15	7.74	18.70	2018	0.75	51
MW 14A	4/3/2018	11:00	7.03	18.62	1718	4.13	-18.3*
MW 14A	8/29/2018	10:00	7.71	23.21	3250	7.67	67
MW 14A	3/20/2019	12:30	7.99	19.00	2169	15.09	212
MW 14A	8/6/2019	11:20	7.39	19.88	2942	5.44	212
MW 14A	3/10/2020	11:30	8.02	19.29	2944	8.13	299
MW 14A	6/30/2020	11:00	9.21	21.73	2572	7.75	355
MW 14A	3/30/2021	13:15	7.22	19.27	2917	8.88	378
MW 14A	8/31/2021	14:15	7.78	19.89	3158	4.48	53.4
MW 14A	3/29/2022	10:30	7.49	18.38	2505	1.14	77.0
MW 14A	8/16/2022	14:00	6.85	19.46	2639	5.29	80.7
MW 14A	4/25/2023	8:45	7.13	18.96	2694	1.99	65.7
MW 15A	8/25/2011	12:27	7.23	19.33	1747	--	41
MW 15A	3/5/2012	13:12	7.15	19.23	1784	7.86	228
MW 15A	8/23/2012	12:41	7.18	19.00	1839	7.88	229
MW 15A	3/21/2013	9:54	7.28	18.77	1655	5.81	151
MW 15A	9/24/2013	14:08	7.04	19.45	1855	6.66	86
MW 15A	2/16/2014	9:36	6.98	19.02	1795	5.39	137
MW 15A	11/20/2014	10:27	7.38	19.10	2063	6.00	96
MW 15A	3/18/2015	11:27	7.24	19.07	1872	6.64	80
MW 15A	4/12/2017	9:30	7.36	19.33	1890	7.80	101

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 15A	11/28/2017	10:00	7.71	19.08	1774	8.51	110
MW 15A	4/10/2018	10:30	7.30	18.79	1630	0.21	104
MW 15A	8/29/2018	11:25	7.48	20.95	2114	7.38	237
MW 15A	3/20/2019	12:00	7.93	18.73	2207	7.92	165
MW 15A	8/14/2019	9:00	7.68	18.53	2653	--	164
MW 15A	3/10/2020	11:00	8.14	19.54	1777	7.71	472
MW 15A	6/30/2020	7:57	9.04	21.31	1366	1.49	124
MW 15A	3/30/2021	13:00	7.24	19.97	2154	5.77	408
MW 15A	9/1/2021	10:00	7.67	20.01	2328	6.78	122.4
MW 15A	2/28/2022	12:00	7.42	20.30	2062	6.78	116.8
MW 15A	8/16/2022	8:30	7.35	23.56	1970	6.42	96.7
MW 15A	4/25/2023	10:30	7.25	19.17	2242	6.81	28.4
MW 16	3/5/2012	14:21	7.24	18.54	1660	8.89	141
MW 16	8/23/2012	13:58	7.30	18.48	1673	8.58	134
MW 16	3/21/2013	11:03	7.46	18.46	1685	6.8	69
MW 16	9/24/2013	12:34	7.17	18.92	1731	7.69	36
MW 16	2/16/2014	10:27	7.07	18.39	1733	6.57	14
MW 16	11/20/2014	11:45	--	--	--	--	--
MW 16	3/18/2015	12:25	7.29	18.66	1836	6.56	17
MW 16	4/5/2017	10:00	8.15	20.66	2300	8.15	80
MW 16	11/27/2017	12:33	7.77	25.30	2321	5.60	90
MW 16	4/10/2018	11:00	7.35	19.50	1650	22%	130
MW 16	8/29/2018	13:00	7.55	26.45	1927	5.35	289
MW 16	3/21/2019	10:30	8.03	17.23	1828	0.49	136
MW 16	8/14/2019	10:00	7.13	18.85	1927	4.59	142
MW 16	3/11/2020	11:00	7.86	18.72	1702	3.07	143
MW 16	7/1/2020	11:30	9.21	19.19	1836	4.09	471
MW 16	3/31/2021	11:30	7.04	18.68	1772	3.53	380
MW 16	9/1/2021	14:15	7.13	19.63	1917	0.7	60.9
MW 16	2/28/2022	12:15	7.13	19.25	2243	3.74	93.9
MW 16	8/16/2022	13:00	6.95	19.60	1966	3.38	99.6
MW 16	4/25/2023	10:00	6.88	18.79	1836	1.25	6.7
MW 17A	8/29/2011	11:21	7.24	18.79	1826	*-2.50*	29
MW 17A	3/5/2012	13:39	7.15	18.84	1858	8.43	232
MW 17A	8/23/2012	13:17	7.19	18.71	1906	7.96	227
MW 17A	3/21/2013	10:20	7.32	18.49	1915	6.28	138
MW 17A	9/24/2013	13:30	7.04	19.11	1977	7.27	82
MW 17A	2/16/2014	9:57	6.98	18.53	2004	6.04	125
MW 17A	11/20/2014	11:15	7.43	18.90	2305	5.84	80
MW 17A	3/18/2015	11:15	7.20	18.88	2079	5.82	77
MW 17A	4/5/2017	10:20	7.56	19.43	2107	6.64	46
MW 17A	11/27/2017	13:00	7.21	23.70	2120	5.59	88

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 17A	4/10/2018	11:15	6.58	18.81	1623	22%	95
MW 17A	8/29/2018	13:40	7.52	25.49	1987	5.20	343
MW 17A	3/21/2019	11:00	7.96	18.70	1949	4.95	76
MW 17A	8/14/2019	9:40	7.52	18.63	2443	1.59	116
MW 17A	3/11/2020	10:30	7.99	19.06	1168	6.97	205
MW 17A	7/1/2020	11:00	9.45	23.36	1849	5.48	443
MW 17A	3/31/2021	11:00	6.97	18.70	1736	2.63	408
MW 17A	8/30/2021	14:07	7.82	19.48	3505	5.74	56.3
MW 17A	9/1/2021	14:00	7.40	19.77	2351	8.86	54.4
MW 17A	2/28/2022	12:30	7.20	19.29	2245	3.77	95.1
MW 17A	8/16/2022	12:30	7.03	20.30	1967	4.23	100.3
MW 17A	4/25/2023	9:30	7.23	18.70	2132	3.86	64.7
MW 18	8/30/2011	13:22	7.43	18.48	1765	9.25	-14
MW 18	2/22/2012	15:05	7.32	18.33	1768	8.79	44
MW 18	8/14/2012	12:30	7.31	18.61	1797	8.78	243
MW 18	3/21/2013	11:15	7.47	18.46	1847	8.00	110
MW 18	9/27/2013	10:13	6.94	18.60	1895	8.35	189
MW 18	1/30/2014	13:23	7.31	18.46	1927	7.40	120
MW 18	11/20/2014	14:07	7.58	18.52	2258	7.43	82
MW 18	3/19/2015	12:15	7.30	18.26	2069	8.64	89
MW 18	4/5/2017	9:30	7.27	16.93	1989	8.47	162
MW 18	11/27/2017	11:35	7.94	20.06	1605	7.35	109
MW 18	4/10/2018	12:50	7.30	18.93	1625	7.86	133
MW 18	8/29/2018	13:15	7.65	21.38	3182	7.21	76
MW 18	3/21/2019	11:30	8.05	24.06	1814	6.46	97
MW 18	8/14/2019	10:25	7.59	18.72	2441	2.60	116
MW 18	3/11/2020	11:30	8.15	19.86	1772	7.72	230
MW 18	7/1/2020	11:50	9.11	19.01	1783	3.98	482
MW 18	3/31/2021	13:15	7.43	19.46	1733	7.64	337
MW 18	9/6/2021	10:00	8.52	19.93	9	5.90	50.52
MW 18	3/30/2022	11:00	7.85	18.08	1857	8.00	75.2
MW 18	9/8/2022	11:00	6.98	19.78	1888	7.19	105.8
MW 19	8/24/2011	13:20	7.55	19.92	1771	8.16	9
MW 19	2/22/2012	12:40	7.31	18.82	1848	7.86	35
MW 19	8/14/2012	13:10	7.53	19.95	1929	7.36	221
MW 19	3/21/2013	12:07	7.53	19.39	1994	6.69	124
MW 19	9/27/2013	11:11	7.34	18.58	1090	8.29	149
MW 19	1/30/2014	13:58	7.27	19.13	2161	6.85	104
MW 19	11/20/2014	14:42	7.49	19.37	2707	6.06	60
MW 19	4/12/2017	12:10	7.55	20.25	2338	7.00	87
MW 19	11/27/2017	10:15	7.97	18.01	2102	7.87	132
MW 19	4/5/2018	10:40	7.46	20.61	1679	--	-2*

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 19	9/4/2018	10:54	7.60	22.10	1518	6.55	150
MW 19	3/21/2019	13:30	8.27	18.92	2537	7.09	132
MW 19	8/14/2019	15:07	7.63	18.91	2634	0.08	114
MW 19	3/11/2020	12:00	8.18	19.83	1815	7.67	243
MW 19	7/1/2020	12:43	9.53	29.32	2272	5.82	392
MW 19	3/31/2021	15:30	7.35	20.16	2470	5.62	427
MW 19	9/6/2021	11:00	8.10	21.97	2725	7.65	23.0
MW 19	3/30/2022	12:30	7.93	18.48	2640	5.67	33.4
MW 19	9/8/2022	12:00	6.99	20.40	1958	7.73	139.7
MW 19	5/9/2023	10:15	7.36	19.74	2600	4.80	-51.1
MW 20A	8/24/2011	12:02	7.38	18.74	1602	7.22	19
MW 20A	3/6/2012	13:36	7.17	18.59	1641	7.79	227
MW 20A	8/20/2012	12:37	7.16	18.80	1721	7.58	264
MW 20A	3/27/2013	11:31	7.28	18.38	1675	6.98	127
MW 20A	9/26/2013	10:28	7.04	18.81	1729	7.74	117
MW 20A	2/16/2014	12:05	7.21	18.64	1385	9.29	105
MW 20A	11/3/2014	11:01	7.29	18.36	1843	11.12	69
MW 20A	3/17/2015	14:03	7.32	18.30	13*	11.89	86
MW 20A	4/12/2017	11:45	7.80	21.83	1028	7.54	128
MW 20A	11/27/2017	10:35	7.79	18.75	1170	12.85	91
MW 20A	4/10/2018	12:00	7.24	18.82	1632	7.37	111
MW 20A	8/29/2018	14:10	7.57	22.25	1578	8.47	443
MW 20A	3/21/2019	12:30	8.05	18.64	1563	13.65	142
MW 20A	8/14/2019	11:15	7.63	18.96	2659	2.41	163
MW 20A	3/11/2020	13:00	8.20	19.03	1331	7.60	537
MW 20A	7/1/2020	12:15	9.54	26.82	713	6.64	414
MW 20A	3/31/2021	14:30	7.48	19.11	1248	11.89	343
MW 20A	9/6/2021	13:45	8.12	19.86	1448	8.92	41
MW 20A	3/30/2022	12:00	8.03	18.12	1307	7.56	67
MW 20A	9/8/2022	11:45	6.86	19.41	1162	7.53	106.6
MW 20A	5/9/2023	12:15	7.45	18.67	1310	7.64	-25.4
MW 21A	8/24/2011	11:31	7.31	19.18	1832	8.64	26
MW 21A	3/6/2012	14:13	7.12	18.97	1712	9.30	259
MW 21A	8/20/2012	12:03	7.12	19.16	1745	8.74	268
MW 21A	3/21/2013	12:20	7.45	19.15	1825	8.43	129
MW 21A	9/26/2013	11:23	7.00	19.43	1929	9.02	113
MW 21A	2/16/2014	11:39	7.13	18.95	1958	8.15	109
MW 21A	11/3/2014	10:32	7.18	18.93	2129	8.41	84
MW 21A	3/17/2015	13:38	7.23	18.61	2374	8.12	84
MW 21A	4/12/2017	12:30	7.36	19.13	1738	8.38	96
MW 21A	11/27/2017	11:17	7.67	19.07	1600	8.77	107
MW 21A	4/10/2018	12:15	7.25	19.15	1686	8.02	172

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 21A	8/29/2018	13:40	7.55	26.70	1775	10.28	323
MW 21A	3/21/2019	12:00	8.25	19.50	1908	11.93	131
MW 21A	8/14/2019	10:53	7.59	17.98	2483	2.14	106
MW 21A	3/11/2020	12:30	8.33	21.20	1370	7.67	235
MW 21A	7/1/2020	12:15	9.67	22.00	1106	7.51	417
MW 21A	3/31/2021	15:00	7.38	19.24	1472	7.87	406
MW 21A	9/6/2021	12:00	7.92	19.58	1891	9.97	53.6
MW 21A	3/30/2022	11:30	7.84	16.75	1400	8.10	70.0
MW 21A	9/8/2022	11:30	6.79	20.10	1138	6.80	113.6
MW 21A	5/9/2023	11:30	7.26	19.47	1287	8.03	-14.7
MW 22A	8/29/2011	14:21	7.10	19.10	2440	*-2.50*	48
MW 22A	3/7/2012	14:15	7.01	18.93	2594	7.75	209
MW 22A	8/21/2012	12:50	7.04	18.99	2487	10.01	216
MW 22A	3/27/2013	13:55	7.15	18.89	2600	7.02	111
MW 22A	2/16/2014	15:06	7.11	19.25	2488	10.00	99
MW 22A	11/3/2014	14:36	7.16	19.06	2088	6.82	79
MW 22A	3/19/2015	9:58	7.16	18.82	2428	10.88	82
MW 22A	4/10/2017	10:50	7.83	19.33	2240	7.93	235
MW 22A	11/28/2017	12:45	8.11	17.51	1864	7.69	89
MW 22A	3/22/2018	10:30	7.11	19.90	1656	5.51	-3.4*
MW 22A	8/27/2018	10:10	7.29	23.21	2087	2.17	183
MW 22A	3/24/2019	9:31	8.45	16.06	2531	7.28	75
MW 22A	8/6/2019	8:30	7.48	23.94	2484	2.69	111
MW 22A	3/8/2020	9:45	8.01	18.71	2125	12.57	185
MW 22A	6/29/2020	9:30	7.96	20.75	1911	8.39	173
MW 22A	3/30/2021	10:30	7.25	18.03	2147	5.51	427
MW 22A	3/21/2022	12:40	7.54	19.15	2254	5.23	71.0
MW 22A	9/8/2022	9:00	7.08	19.18	1320	6.14	83.0
MW 22A	4/10/2023	11:00	7.65	19.06	1868	4.24	51.7
MW 23A	8/29/2011	13:50	6.94	18.79	2093	*-2.50*	5
MW 23A	3/7/2012	13:48	6.85	18.66	2119	2.98	252
MW 23A	8/21/2012	13:18	6.88	18.60	2085	3.55	241
MW 23A	9/30/2013	13:48	6.77	19.16	2085	3.62	111
MW 23A	2/16/2014	14:39	6.94	18.79	2096	2.79	96
MW 23A	11/3/2014	14:11	6.97	18.79	2140	2.88	78
MW 23A	3/19/2015	9:31	6.97	18.74	2222	2.85	74
MW 23A	4/10/2017	11:15	7.28	18.74	2018	5.14	142
MW 23A	11/28/2017	12:32	7.76	20.49	1740	5.69	115
MW 23A	4/4/2018	11:15	7.42	14.63	1392	7.44	72
MW 23A	8/30/2018	10:10	7.62	18.98	2163	0.87	57
MW 23A	3/24/2019	10:00	8.22	15.98	1984	5.46	97
MW 23A	8/13/2019	9:24	7.58	21.74	1804	4.34	93

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 23A	3/10/2020	13:30	8.17	25.01	1687	2.95	401
MW 23A	7/1/2020	10:30	9.36	23.10	1559	3.48	256
MW 23A	3/30/2021	11:00	7.28	19.19	1745	4.96	390
MW 23A	9/2/2021	11:00	7.63	17.80	2287	0.00	33.2
MW 23A	9/8/2022	9:30	6.78	18.94	1699	3.70	111.7
MW 23A	5/8/2023	11:30	6.93	18.53	1898	4.69	10.9
MW 24	8/31/2011	13:32	7.16	18.63	1606	6.16	24
MW 24	3/7/2012	12:54	7.12	18.13	1709	6.20	270
MW 24	8/21/2012	11:43	7.12	17.98	1572	5.50	257
MW 24	3/27/2013	12:31	7.24	18.01	1653	5.06	130
MW 24	9/26/2013	14:36	7.11	19.01	1780	5.34	109
MW 24	2/16/2014	13:43	7.17	18.26	1808	5.19	104
MW 24	11/3/2014	12:57	7.25	18.26	1323	5.95	80
MW 24	3/17/2015	12:59	7.24	17.69	1942	4.97	91
MW 24	4/11/2017	10:00	7.27	17.96	1584	4.34	93
MW 24	11/28/2017	10:45	7.67	18.30	1844	5.94	68
MW 24	4/4/2018	11:30	7.19	17.36	1633	6.91	97
MW 24	9/4/2018	10:15	7.81	21.58	1496	6.44	139
MW 24	3/26/2019	12:30	8.35	18.22	1538	4.82	112
MW 24	8/13/2019	9:51	7.72	20.17	1481	4.08	242
MW 24	3/10/2020	13:00	8.03	18.47	1812	4.11	253
MW 24	3/30/2021	15:50	7.42	19.42	1608	4.12	469
MW 24	9/2/2021	9:45	7.74	18.77	2208	3.00	32.4
MW 24	3/29/2022	11:30	7.28	18.21	2205	2.54	78.1
MW 25	8/29/2011	12:35	6.95	18.64	2713	*-2.50*	27
MW 25	3/6/2012	12:13	7.13	18.54	2619	3.70	242
MW 25	8/14/2012	14:06	7.17	19.12	2632	2.42	236
MW 25	3/21/2013	14:23	7.17	18.69	2598	2.63	109
MW 25	9/27/2013	12:01	6.94	18.71	2656	2.12	151
MW 25	2/17/2014	12:23	6.91	18.63	2615	1.79	121
MW 25	11/21/2014	10:19	6.82	18.56	2756	1.30	103
MW 25	3/19/2015	13:07	6.97	18.48	2784	1.36	94
MW 25	4/4/2017	11:20	7.55	19.64	1118	7.25	63
MW 25	11/27/2017	13:20	7.61	22.66	2316	3.71	122
MW 25	9/4/2018	11:08	7.48	21.59	1487	6.20	131
MW 25	7/1/2020	9:41	9.41	18.63	1783	5.63	153
MW 25	9/2/2021	10:00	7.62	19.23	2347	6.63	40.7
MW 25	3/30/2022	12:15	7.98	18.43	1040	12.78	67.0
MW 25	9/6/2022	11:30	7.02	19.89	1812	4.24	107
MW 25	5/9/2023	12:30	7.37	19.01	1393	7.59	-38.7
MW 26A	8/30/2011	11:18	7.02	18.48	2622	1.82	143

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 26A	3/6/2012	10:47	7.05	18.41	2636	2.07	220
MW 26A	8/14/2012	14:27	7.40	18.65	2675	2.43	231
MW 26A	3/21/2013	14:53	7.23	18.5	2639	1.59	90
MW 26A	9/30/2013	13:05	6.96	18.70	2683	2.01	118
MW 26A	2/17/2014	11:45	7.08	18.55	2654	1.89	111
MW 26A	11/21/2014	11:06	7.00	18.57	2830	1.62	79
MW 26A	3/19/2015	12:36	7.13	18.62	2810	1.69	87
MW 26A	4/4/2017	10:45	7.09	18.28	2383	3.34	102
MW 26A	11/28/2017	10:30	7.83	18.88	1862	0.16	73
MW 26A	4/10/2018	10:00	2.29	17.90	1667	24%	108
MW 26A	8/30/2018	10:24	7.58	25.77	2133	2.47	173
MW 26A	3/24/2019	10:30	8.19	17.64	2381	0.29	101
MW 26A	8/7/2019	12:05	7.63	21.48	2753	4.21	460
MW 26A	3/10/2020	14:10	8.10	17.77	1959	0.44	247
MW 26A	6/30/2020	12:30	9.14	18.81	1757	0.59	433
MW 26A	3/30/2021	14:18	7.16	19.26	1859	4.16	287
MW 26A	9/2/2021	11:10	7.94	19.90	2248	1.11	35.6
MW 26A	3/29/2022	12:00	7.65	22.00	2148	0.74	72.1
MW 26A	9/6/2022	11:00	6.89	18.84	1878	2.1	88.5
MW 26A	5/8/2023	11:00	6.92	19.12	2085	3.07	26.1
MW 27A	8/29/2011	13:16	7.09	18.49	2143	*-2.50*	29
MW 27A	3/7/2012	12:30	6.98	18.46	2231	6.30	273
MW 27A	8/20/2012	14:15	6.99	18.59	2209	6.70	283
MW 27A	3/21/2013	14:10	7.22	18.51	2211	5.71	101
MW 27A	9/26/2013	13:52	6.99	18.92	2281	6.41	112
MW 27A	2/16/2014	13:15	7.03	18.56	2271	5.61	110
MW 27A	11/3/2014	12:23	7.07	18.52	2367	5.76	82
MW 27A	3/18/2015	13:34	7.09	18.66	2375	5.67	81
MW 27A	4/12/2017	10:30	7.30	19.28	8.5*	7.87	94
MW 27A	11/27/2017	13:40	7.52	1878.00	1808	5.13	88
MW 27A	4/4/2018	10:30	7.39	14.13	1365	7.55	67
MW 27A	8/30/2018	10:55	7.43	23.48	2071	4.63	228
MW 27A	3/26/2019	13:00	8.27	18.83	1690	8.93	181
MW 27A	8/13/2019	10:21	7.36	23.81	2457	2.89	164
MW 27A	3/11/2020	10:00	7.84	18.33	1880	9.11	204
MW 27A	7/1/2020	9:30	9.51	25.19	1860	6.14	174
MW 27A	3/31/2021	12:48	7.30	18.61	1909	4.77	340
MW 27A	9/6/2021	9:00	7.56	18.79	2688	4.47	40.7
MW 27A	3/29/2022	13:00	7.29	22.70	2130	4.43	77.8
MW 27A	9/6/2022	12:00	6.86	19.96	2081	0.03	68.8
MW 27A	5/8/2023	12:00	6.92	18.97	2031	4.46	27.2
MW 28A	8/24/2011	12:53	7.54	21.54	1174	7.10	22

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 28A	3/7/2012	11:45	7.34	19.46	1238	6.73	221
MW 28A	8/20/2012	13:21	7.45	22.47	1117	7.17	257
MW 28A	3/27/2013	12:01	7.45	19.06	1129	7.19	119
MW 28A	9/26/2013	12:46	7.30	20.27	1166	7.30	110
MW 28A	2/16/2014	12:45	7.41	19.28	1159	7.09	94
MW 28A	11/3/2014	11:38	7.59	18.85	0*	7.23	72
MW 28A	3/18/2015	14:13	7.59	19.68	8*	7.14	66
MW 28A	4/12/2017	11:00	7.78	23.88	1.1*	7.48	99
MW 28A	11/27/2017	9:50	8.05	16.96	3449	8.57	98
MW 28A	4/5/2018	10:00	7.43	19.15	1739		67
MW 28A	9/4/2018	11:18	7.68	21.76	1234	7.56	161
MW 28A	3/26/2019	13:30	8.49	19.59	1187	7.04	231
MW 28A	8/14/2019	12:05	7.14	19.02	2432	0.24	148
MW 28A	3/11/2020	13:35	8.38	20.10	1098	7.02	441
MW 28A	7/1/2020	13:30	9.97	25.45	960	6.50	441
MW 28A	3/31/2021	16:00	7.58	19.61	1098	7.12	343
MW 28A	9/6/2021	15:00	7.87	19.97	1683	8.91	2.27
MW 28A	3/30/2022	12:45	8.23	18.06	948.84	9.82	49.5
MW 28A	9/8/2022	13:15	6.84	22.43	971	6.50	108.3
MW 28A	5/9/2023	14:00	7.60	20.09	1112	6.98	-30.1
MW 29	8/24/2011	13:48	7.45	18.43	1105	7.96	20
MW 29	3/6/2012	10:55	7.30	18.34	1085	8.75	224
MW 29	8/14/2012	13:21	7.60	18.55	1076	8.49	220
MW 29	3/21/2013	12:33	7.79	18.71	1142	8.05	104
MW 29	9/27/2013	11:04	7.03	19.38	2092	7.78	146
MW 29	1/30/2014	14:21	7.62	18.45	1107	7.65	113
MW 29	11/20/2014	14:54	7.84	18.88	1274	7.55	73
MW 29	3/19/2015	11:41	7.59	18.26	1190	7.74	85
MW 29	4/4/2017	11:10	7.20	18.93	2425	4.50	70
MW 29	4/12/2017	11:30	7.82	20.87	1044	7.72	118
MW 29	11/27/2017	10:00	7.99	20.96	983	8.51	112
MW 29	4/5/2018	10:30	7.18	18.65	1628		58
MW 29	8/30/2018	10:44	7.40	24.80	2082	7.02	166
MW 29	3/24/2019	11:00	7.88	18.18	2682	2.58	99
MW 29	8/13/2019	10:07	7.77	21.82	1688	4.76	62
MW 29	8/14/2019	11:32	7.43	18.71	2137	2.10	153
MW 29	3/10/2020	13:15	7.99	19.26	2214	4.01	408
MW 29	3/21/2019	13:00	8.36	19.99	1038	7.45	192
MW 29	3/11/2020	13:15	8.17	19.23	1440	10.72	531
MW 29	7/1/2020	12:55	9.85	29.05	1255	6.46	439
MW 29	3/31/2021	15:45	7.36	19.51	2561	6.01	386
MW 29	9/6/2021	14:00	7.67	19.21	1553	7.89	28
MW 29	3/29/2022	12:30	7.35	21.06	7379	0.65	81.9

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 29	9/8/2022	12:15	7.05	20.62	973	6.42	113.6
MW 29	5/8/2023	13:00	6.89	19.71	2279	0.34	13.4
MW 30	8/30/2011	11:46	6.97	18.95	2543	3.43	57
MW 30	3/6/2012	10:00	6.84	18.70	2504	4.59	180
MW 30	8/14/2012	14:38	7.27	19.09	2444	5.18	222
MW 30	3/21/2013	14:38	7.31	18.91	2421	5.92	97
MW 30	9/27/2013	12:08	7.08	20.55	2311	5.83	124
MW 30	2/17/2014	11:23	7.13	18.97	2338	4.94	96
MW 30	11/21/2014	10:47	6.58	18.97	2598	4.98	70
MW 30	3/19/2015	13:38	7.11	18.96	2665	5.56	74
MW 30	4/3/2017	11:45	7.04	19.8	2268	3.21	109
MW 30	11/20/2017	11:35	7.88	17.39	2039	5.18	111
MW 30	3/21/2018	10:00	7.16	19.25	1738	1.08	-36.2*
MW 30	8/27/2018	9:30	7.39	25.02	2152	2.80	147
MW 30	3/20/2019	11:30	8.05	19.4	1760	7.74	135
MW 30	8/7/2019	10:30	7.71	22.36	1553	3.40	279
MW 30	6/30/2020	10:00	9.18	18.52	1293	2.71	435
MW 30	3/30/2021	12:15	7.39	18.25	1491	2.68	402
MW 30	8/31/2021	14:00	7.58	18.41	1685	2.64	41.4
MW 31A	8/31/2011	14:19	6.88	18.06	2870	0.17	-136
MW 31A	3/7/2012	13:22	6.79	17.64	2870	0.26	283
MW 31A	8/21/2012	12:15	6.83	17.58	2810	0.31	237
MW 31A	3/27/2013	13:03	7.02	17.6	2684	0.24	116
MW 31A	9/26/2013	15:30	6.89	18.14	2750	0.14	96
MW 31A	2/16/2014	14:11	7.05	17.82	2743	0.28	68
MW 31A	11/3/2014	13:46	6.99	17.72	2647	0.11	71
MW 31A	3/19/2015	10:30	7.11	17.72	2587	0.48	70
MW 31A	4/10/2017	10:00	7.48	17.91	1572	6.84	125
MW 31A	11/28/2017	11:15	7.72	22.00	2049	3.81	120
MW 31A	4/4/2018	11:45	7.21	16.58	1525	6.94	98
MW 31A	8/30/2018	9:45	7.64	19.81	2083	0.31	58
MW 31A	3/26/2019	12:00	8.12	17.81	2068	4.55	40
MW 31A	8/13/2019	9:39	7.87	27.76	47	6.40	135
MW 31A	3/10/2020	12:35	8.14	19.32	1978	1.24	309
MW 31A	7/1/2020	8:30	9.23	17.83	1675	0.32	109
MW 31A	3/30/2021	14:30	7.43	18.17	1958	0.25	407
MW 31A	9/2/2021	10:30	8.03	19.89	22	4.40	7
MW 31A	2/28/2022	11:30	7.17	18.83	3580	5.44	75
MW 31A	9/6/2022	11:15	7.08	17.99	1914	0.08	75.2
MW 31A	5/8/2023	10:30	6.84	18.08	2173	0.47	15.8
MW 32	4/4/2017	11:00	7.23	21.55	2929	4.69	92

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 32	11/27/2017	13:09	7.64	23.29	2672	4.79	85
MW 32	4/4/2018	11:00	7.28	13.76	1425	6.83	69
MW 32	8/30/2018	11:11	7.41	24.36	198.2*	2.86	163
MW 32	8/13/2019	10:36	7.34	23.65	2461	2.70	192
MW 33A	8/25/2011	12:55	7.14	18.84	2700	--	-42
MW 33A	3/7/2012	15:16	7.07	18.64	2751	1.12	248
MW 33A	8/27/2012	12:36	7.15	18.78	2688	1.12	197
MW 33A	3/21/2013	11:32	7.34	18.62	2647	1.09	119
MW 33A	9/26/2013	9:32	6.90	18.83	2686	1.14	128
MW 33A	2/16/2014	10:51	6.98	18.54	2692	1.29	68
MW 33A	11/3/2014	12:52	7.38	18.73	3084	1.29	58
MW 33A	3/18/2015	12:59	7.21	18.61	2720	1.36	62
MW 33A	4/11/2017	10:20	7.40	18.61	2274	0.81	99
MW 33A	11/21/2017	11:47	8.32	18.91	1808	4.76	102
MW 33A	4/3/2018	11:30	7.14	18.56	16470*	0.52	43
MW 33A	8/29/2018	10:45	7.63	20.20	2247	0.13	236
MW 33A	3/20/2019	13:30	8.11	18.52	2168	0.11	181
MW 33A	8/7/2019	11:46	7.54	22.89	2924	3.77	441
MW 33A	3/10/2020	12:15	8.26	18.81	1926	0.57	298
MW 33A	6/30/2020	12:10	9.42	20.94	1659	0.23	409
MW 33A	3/30/2021	14:00	7.53	19.81	1909	3.25	354
MW 33A	9/1/2021	14:30	7.80	19.78	2104	0.07	11.2
MW 33A	3/27/2022	11:30	7.36	18.76	2176	0.32	44.0
MW 33A	8/16/2022	14:30	7.28	19.91	1797	0.16	61.2
MW 33A	4/25/2023	11:00	7.46	18.56	2010	0.14	65.0
MW 34	5/19/2011	11:30	6.94	19.17	2977	3.99	33
MW 34	8/25/2011	9:08	6.92	19.05	2991	--	27
MW 34	11/16/2011	12:32	6.92	18.89	2935	3.44	18
MW 34	2/28/2012	11:01	6.96	18.85	2928	4.27	59
MW 34	5/8/2012	11:14	6.89	18.64	2922	4.32	155
MW 34	8/23/2012	10:08	6.86	18.89	2916	3.95	204
MW 34	11/19/2012	14:30	6.85	19	2837	3.93	186
MW 34	3/11/2013	11:25	6.73	18.79	2905	3.57	165
MW 34	5/23/2013	13:21	6.82	19.28	2915	3.88	94
MW 34	9/25/2013	15:20	6.78	19.47	2905	4.02	106
MW 34	11/21/2013	11:06	6.97	19.12	2822	3.45	136
MW 34	2/13/2014	11:42	6.96	19.19	2236	2.92	73
MW 34	6/2/2014	13:00	6.82	19.39	2789	3.32	107
MW 34	12/8/2014	10:51	6.96	19.01	2830	3.49	90
MW 34	3/17/2015	10:54	7.00	18.82	3187	3.30	80
MW 34	4/3/2017	10:50	7.12	19.12	2860	7.62	104
MW 34	11/28/2017	15:25	7.48	19.15	2399	0.59	90

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 34	3/20/2018	9:20	7.12	18.92	1649	7.32	69
MW 34	8/22/2018	12:00	7.29	21.06	2598	2.57	254
MW 34	11/14/2018	11:59	7.42	19.28	2002	3.51	136
MW 34	3/19/2019	13:15	7.72	20.27	2715	3.45	138
MW 34	8/7/2019	9:30	7.49	22.69	2677	2.57	145
MW 34	12/17/2019	12:30	7.41	18.34	2500	7.28	99
MW 34	3/9/2020	12:15	7.96	18.88	2642	4.01	179
MW 34	6/1/2020	11:00	8.27	20.21	2777	6.56	451
MW 34	6/30/2020	8:20	9.05	20.15	2411	3.69	206
MW 34	11/3/2020	12:50	7.09	19.55	2510	7.51	480
MW 34	3/29/2021	10:30	7.15	18.75	2695	7.51	472
MW 34	8/25/2021	11:50	7.71	21.68	2992	3.91	59.4
MW 34	3/21/2022	14:40	7.23	19.39	2928	3.39	76.6
MW 34	8/15/2022	10:45	7.00	20.35	2569	2.83	85.8
MW 34	4/18/2023	11:00	7.58	19.46	25555	8.65	88.7
MW 35	5/19/2011	9:28	7.06	18.9	3142	7.25	89
MW 35	8/16/2011	10:11	7.13	19.11	3120	7.90	60
MW 35	11/16/2011	10:30	7.02	18.78	3114	7.16	64
MW 35	3/1/2012	12:34	7.02	18.92	2978	8.22	231
MW 35	5/7/2012	13:51	7.07	19.19	2920	7.55	155
MW 35	8/16/2012	12:27	7.30	19.45	2878	6.81	223
MW 35	11/19/2012	12:58	6.93	18.98	2755	7.63	227
MW 35	3/10/2013	11:27	6.94	18.58	2753	7.31	178
MW 35	5/23/2013	10:56	6.93	19.09	2801	7.37	88
MW 35	9/23/2013	13:09	7.02	19.29	2762	7.41	103
MW 35	11/21/2013	12:40	7.1	19.15	2711	6.28	145
MW 35	2/13/2014	9:51	7.04	18.93	2025	6.37	94
MW 35	6/2/2014	10:11	6.92	19.24	2718	5.95	100
MW 35	12/8/2014	12:13	7.09	19.37	2887	6.80	84
MW 35	3/17/2015	9:20	7.10	18.92	3229	7.21	91
MW 35	4/27/2017	11:15	7.46	19.37	2601	7.78	92
MW 35	11/21/2017	9:30	7.55	18.91	2409	7.87	99
MW 35	3/21/2018	10:45	7.07	19.42	1641	3.97	-12.8*
MW 35	8/20/2018	11:48	7.37	19.80	2674	8.04	198
MW 35	11/14/2018	11:05	7.36	18.17	2935	7.51	140
MW 35	3/19/2019	11:00	7.83	19.82	2987	7.75	114
MW 35	8/6/2019	10:30	7.31	20.68	3621	9.82	117
MW 35	12/17/2019	14:55	7.53	18.97	2436	5.50	108
MW 35	3/8/2020	12:15	7.89	18.53	2501	7.59	118
MW 35	6/1/2020	10:30	8.15	19.23	2188	7.08	451
MW 35	6/29/2020	7:00	7.01	19.41	2324	7.18	219
MW 35	11/3/2020	12:15	7.04	18.97	1785	2.26	466
MW 35	3/29/2021	11:30	7.23	20.32	2744	3.25	467

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L	Millivolts
MW 35	5/24/2021	13:30	7.69	20.30	2367	7.03	44.8
MW 35	8/25/2021		7.60	19.55	7.23	5.68	88.5
MW 35	3/21/2022	9:30	7.48	19.02	2912	6.98	81.4
MW 35	8/3/2022	10:15	7.28	19.36	2596	7.07	78.3
MW 35	11/29/2022	12:40	6.53	19.31	2660	6.21	111.1
MW 35	4/2/2023	8:40	7.67	19.01	2508	6.89	67.8
MW 36	5/19/2011	9:42	7.06	19.13	2513	5.35	72
MW 36	8/16/2011	10:36	7.08	19.13	2551	6.22	48
MW 36	11/16/2011	11:02	7.04	18.61	2544	5.81	48
MW 36	3/1/2012	11:57	6.97	18.96	2500	6.59	223
MW 36	5/7/2012	13:21	6.96	19.19	2526	6.27	156
MW 36	8/16/2012	12:59	7.22	19.66	2538	5.96	220
MW 36	11/19/2012	12:27	6.92	18.98	2455	6.03	232
MW 36	3/10/2013	11:54	6.9	18.64	2510	5.69	166
MW 36	5/23/2013	11:22	6.92	19.12	2561	5.63	91
MW 36	9/23/2013	12:24	6.97	19.52	2272	5.48	100
MW 36	11/21/2013	12:40	7.07	19.15	2432	4.58	138
MW 36	2/13/2014	9:20	7.00	18.43	2022	3.87	109
MW 36	6/2/2014	10:53	6.86	19.27	2451	3.97	106
MW 36	12/8/2014	11:47	7.07	19.09	2585	4.36	85
MW 36	3/17/2015	9:45	7.06	18.92	2898	4.40	85
MW 36	4/6/2017	9:30	7.11	19.15	2529	4.65	83
MW 36	11/21/2017	10:41	7.50	19.01	2135	4.77	113
MW 36	3/20/2018	10:30	7.08	18.88	1617	3.65	-30.6*
MW 36	8/20/2018	10:20	7.29	19.86	2572	4.57	157
MW 36	11/14/2018	11:38	7.49	19.00	2621	3.56	127
MW 36	3/19/2019	10:30	7.82	16.87	2608	5.06	86
MW 36	8/6/2019	9:00	7.63	21.06	2571	7.35	116
MW 36	12/17/2019	12:51	7.50	18.78	2253	4.30	111
MW 36	3/8/2020	10:15	7.93	18.61	2253	4.60	117
MW 36	6/1/2020	7:21	8.37	19.14	2284	4.28	152
MW 36	6/29/2020	9:00	7.59	21.55	1866	4.10	143
MW 36	11/3/2020	10:00	7.37	18.83	2246	4.20	167
MW 36	3/29/2021	11:00	7.23	19.50	2267	4.46	577
MW 36	5/24/2021	11:18	7.40	28.26	1779	3.96	45.2
MW 36	8/25/2021	13:40	7.62	20.50	2517	4.03	46.9
MW 36	3/21/2022	12:00	7.42	19.21	2429	4.02	72.5
MW 36	8/3/2022	7:00	7.34	20.00	2176	3.98	122.5
MW 36	11/29/2022	10:00	7.15	19.05	2116	3.45	98.5
MW 36	4/10/2023	10:30	7.57	19.15	2158	3.91	51.2

* Denotes potentially suspect value

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-01	MW-01A	MW-02	MW-02A	MW-03	MW-03A	MW-04	MW-05	MW-05A	MW-06	MW-07	MW-07A	MW-08
Jan-82	--	--	--	--	--	--	--	--	--	--	--	--	--
Jun-82	0.68	--	--	--	--	--	--	--	--	--	--	--	0.79
Oct-82	0.09	--	--	--	--	--	--	--	--	--	--	--	1.62
Feb-83	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar-83	4.13	--	--	--	--	--	--	--	--	--	--	--	3.23
May-83	3.59	--	--	--	--	--	--	--	--	--	--	--	4.13
Jun-83	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul-83	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep-83	--	--	--	--	--	--	--	--	--	--	--	--	2.63
Oct-83	5.00	--	--	--	--	--	--	--	--	--	--	--	--
Jul-84	3.80	--	--	--	--	--	--	--	--	--	--	--	0.35
Jan-85	3.62	--	--	--	--	--	--	--	--	--	--	--	4.26
Jul-85	4.11	--	--	--	--	--	--	--	--	--	--	--	3.45
Jan-86	3.96	--	--	--	--	--	--	--	--	--	--	--	4.95
Jul-86	2.57	--	--	--	--	--	--	--	--	--	--	--	5.56
Aug-86	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec-86	3.22	--	--	--	--	--	--	--	--	--	--	--	3.53
Feb-87	--	--	--	--	--	--	--	--	--	--	--	--	--
Jun-87	6.60	--	--	--	--	--	--	--	--	--	--	--	--
Jul-87	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov-87	4.70	--	--	--	--	--	--	--	--	--	--	--	--
Jan-88	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan-88	--	--	--	--	--	--	--	--	--	--	--	--	--
May-88	1.10	--	--	--	--	--	--	--	--	--	--	--	--
Oct-88	4.93	--	--	--	--	--	--	--	--	--	--	--	3.94
Nov-88	3.63	--	--	--	--	--	--	--	--	--	--	--	5.46
Jun-89	4.50	--	--	--	--	--	--	--	--	--	--	--	7.90
Dec-89	1.80	--	--	--	--	--	--	--	--	--	--	--	8.52
Jun-90	7.06	--	--	--	--	--	--	--	--	--	--	--	7.72
Jan-92	3.55	--	--	--	--	--	--	--	--	--	--	--	5.82
Mar-92	6.01	--	--	--	--	--	--	--	--	--	--	--	10.16
Jul-92	7.10	--	--	--	--	--	--	--	--	--	--	--	9.40

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-01	MW-01A	MW-02	MW-02A	MW-03	MW-03A	MW-04	MW-05	MW-05A	MW-06	MW-07	MW-07A	MW-08
Sep-92	9.40	--	--	--	--	--	--	--	--	--	--	--	7.80
Dec-92	6.20	--	--	--	--	--	--	--	--	--	--	--	9.50
Mar-93	7.00	--	--	--	--	--	--	--	--	--	--	--	8.00
Sep-93	7.20	--	--	--	--	--	--	--	--	--	--	--	9.00
Sep-96	8.7	--	--	--	--	--	--	--	--	--	--	--	4.6
Mar-97	0.2	--	--	--	--	--	--	--	--	--	--	--	0.8
Sep-97	8.1	--	--	--	--	--	--	--	--	--	--	--	5.9
Mar-98	8.0	--	--	--	--	--	--	--	--	--	--	--	10.5
Sep-98	9.4	--	--	--	--	--	--	--	--	--	--	--	14.6
Mar-99	9.5	--	--	--	--	--	--	--	--	--	--	--	13.1
Sep-99	3.5	--	*4.64	--	--	--	--	--	--	--	--	--	4.1
Mar-00	7.8	--	5.1	--	--	--	--	--	--	--	--	--	10.8
Sep-00	8.6	--	7.3	--	--	--	--	--	--	--	--	--	14.0
Mar-01	8.1	--	5.2	--	--	--	--	--	--	--	--	--	12.8
Sep-01	7.7	--	4.8	--	--	--	--	--	--	--	--	--	13.1
Mar-02	7.9	--	5.4	--	--	--	--	--	--	--	--	--	13.0
Jun-02	8.4	--	5.5	--	4.9	--	6.1	3.5	--	5.3	10.7	--	13.3
Sep-02	8.3	--	6.5	--	5.0	--	6.1	4.3	--	6.3	10.9	--	12.7
Jan-03	9.5	--	7.1	--	5.7	--	6.6	3.7	--	6.7	11.6	--	10.5
Jul-03	9.1	--	5.7	--	5.9	--	6.3	4.5	--	5.5	12.8	--	11.7
Mar-04	9.4	8.2	6.4	4.1	5.5	5.4	6.1	6.0	5.8	6.1	13.2	11.2	10.8
May-04	8.8	8.4	5.9	3.3	--	--	--	--	--	--	--	--	--
Jul-04	9.0	9.1	5.8	3.6	5.2	5.2	5.9	6.6	6.1	5.5	12.8	11.3	12.1
Oct-04	8.3	8.0	4.9	2.8	--	--	--	--	--	--	--	--	--
Jan-05	9.1	9.1	5.9	3.5	5.8	5.9	6.4	7.6	8.3	6.6	12.8	11.7	11.8
May-05	10.2	10.1	6.7	4.1	--	--	--	--	--	--	--	--	--
Jul-05	9.0	9.0	6.0	3.6	5.4	5.7	6.5	8.5	8.4	7.3	13.1	12.5	11.9
Oct-05	--	9.3	--	3.6	--	--	--	--	--	--	--	--	--
Feb-06	--	9.4	--	4.6	--	5.6	6.7	--	9.3	8.3	--	12.6	--
May-06	--	8.8	--	4.6	--	--	--	--	--	--	--	--	--
Aug-06	--	10.1	--	4.3	--	6.2	7.0	--	9.8	10.1	--	13.9	--
Nov-06	--	10.1	--	4.6	--	--	--	--	--	--	--	--	--
Feb-07	--	10.1	--	4.5	--	5.2	6.8	--	8.8	10.7	--	12.9	--

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-01	MW-01A	MW-02	MW-02A	MW-03	MW-03A	MW-04	MW-05	MW-05A	MW-06	MW-07	MW-07A	MW-08
Aug-07	--	10.5	--	4.4	--	4.6	6.9	--	9.1	12.5	--	13.1	--
Oct-07	--	9.5	--	4.1	--	--	--	--	--	--	--	--	--
Feb-08	--	11.9	--	4.8	--	4.4	6.3	--	8.7	11.2	--	14.5	--
Jun-08	--	11.175	--	5.716	--	--	--	--	--	--	--	--	--
Aug-08	--	10.200	--	5.490	--	4.010	6.250	--	8.030	10.600	--	12.300	--
Nov-08	--	8.970	--	5.170	--	--	--	--	--	--	--	--	--
Mar-09	--	11.900	--	6.300	--	4.000	6.500	--	9.000	11.100	--	15.200	--
May-09	--	9.670	--	5.130	--	--	--	--	--	--	--	--	--
Sep-09	--	11.100	--	6.570	--	4.410	5.900	--	7.870	12.600	--	14.000	--
Dec-09	--	10.500	--	6.180	--	--	--	--	--	--	--	--	--
3/1/10	--	11.7	--	7.1	--	3.9	5.4	--	7.8	11.9	--	15.6	--
5/1/10	--	11.616	--	7.156	--	--	--	--	--	--	--	--	--
9/1/10	--	10.952	--	7.473	--	3.448	5.001	--	7.993	11.203	--	9.297	--
11/1/10	--	11.574	--	7.267	--	--	--	--	--	10.024	--	--	--
3/1/11	--	12.300	--	7.500	--	4.000	4.200	--	7.800	13.400	--	15.300	--
5/19/11	--	11.800	--	7.170	--	--	--	--	--	12.200	--	--	--
8/1/11	--	12.262	--	7.550	--	4.031	4.020	--	8.197	13.105	--	15.354	--
11/16/11	--	12.974	--	7.807	--	--	--	--	--	13.527	--	--	--
3/1/12	--	12.9	--	7.8	--	4.8	4.4	--	9.5	13.6	--	14.9	--
5/1/12	--	12.993	--	7.764	--	--	--	--	--	13.272	--	--	--
8/1/12	--	14.216	--	8.410	--	5.261	5.097	--	11.064	13.682	--	15.666	--
11/19/12	--	14.06	--	8.174	--	--	--	--	--	12.287	--	--	--
3/1/13	--	14.1	--	8.4	--	5.2	5.2	--	11.0	12.0	--	14.8	--
5/23/13	--	13.56	--	8.673	--	--	--	--	--	12.601	--	--	--
9/30/13	--	10.40	--	7.03	--	4.05	4.03	--	7.85	9.04	--	11.20	--
11/21/13	--	13.722	--	9.501	--	--	--	--	--	12.643	--	--	--
2/1/14	--	14.4	--	10.0	--	6.2	5.6	--	11.3	13.2	--	14.7	--
6/3/14	--	14.337	--	9.072	--	--	--	--	--	12.288	--	--	--
10/20/14	--	13.0	--	7.90	--	5.91	5.36	--	9.05	11.20	--	14.11	--
12/8/14	--	14.51	--	9.114	--	--	--	--	--	12.682	--	--	--
3/19/15	--	14.3	--	8.9	--	8.0	6.9	--	10.8	12.6	--	13.2	--
8/6/15	--	13.60	--	8.15	--	7.36	5.82	--	9.66	11.80	--	11.60	--
10/15/15	--	13.1	--	8.6	--	--	--	--	--	11.6	--	--	--

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-01	MW-01A	MW-02	MW-02A	MW-03	MW-03A	MW-04	MW-05	MW-05A	MW-06	MW-07	MW-07A	MW-08
3/31/16	--	14.5	--	9.5	--	8.2	5.5	--	11.9	12.4	--	12.8	--
4/26/16	--	13.40	--	8.99	--	--	--	--	--	11.70	--	--	--
4/11/17	--	14.10	--	9.64	--	3.74	8.98	--	9.25	12.20	--	11.80	--
11/20/17	--	13.10	--	9.60	--	7.71	7.80	--	7.83	7.76	--	10.90	--
3/20/18	--	13.80	--	8.02	--	3.62	7.80	--	9.76	10.9	--	10.9	--
5/14/18	--	13.8	--	10.4	--	--	--	--	--	9.2	--	--	--
8/20/18	--	12.80	--	9.45	--	7.49	2.91	--	8.33	8.33	--	9.58	--
11/14/18	--	5.13	--	8.96	--	--	--	--	--	7.36	--	--	--
3/19/19	--	--	--	9.44	--	--	6.94	--	6.93	10.90	--	--	--
8/6/19	--	13.20	--	9.60	--	3.08	6.45	--	6.47	12.80	--	10.40	--
12/17/19	--	6.74	--	9.3	--	9.26	--	--	--	10.3	--	--	--
3/8/20	--	13.20	--	8.62	--	7.70	2.90	--	6.02	10.22	--	9.06	--
6/1/20	--	--	--	9.03	--	--	--	--	6.02	10.90	--	--	--
6/29/20	--	13.4	--	8.97	--	6.87	2.90	--	5.86	10.7	--	9.18	--
11/3/20	--	--	--	9.42	--	--	--	--	5.75	10.6	--	--	--
3/30/21	--	13.8	--	9.37	--	8.70	3.05	--	4.96	10.6	--	9.38	--
5/24/21	--	--	--	8.89	--	--	--	--	4.73	10.2	--	--	--
8/25/21	--	12.6	--	7.90	--	8.32	6.48	--	4.49	9.6	--	9.56	--
3/21/22	--	13.9	--	9.77	--	9.47	3.61	--	5.03	8.97	--	9.30	--
8/15/22	--	13.8	--	9.65	--	9.46	3.90	--	4.89	8.63	--	9.73	--
11/29/22	--	--	--	9.34	--	--	--	--	4.38	7.02	--	--	--
4/2/23	--	13.3	--	9.70	--	9.19	3.75	--	4.41	6.98	--	7.96	--
Average	**6.16**	**11.72**	**5.89**	**7.28**	**5.44**	**5.94**	**5.63**	**5.58**	**7.81**	**10.41**	**12.23**	**12.21**	**7.90**

Remarks:

-- = Not Sampled

Some of the older historical data were reported as Nitrite/Nitrate (mg/L). These data are treated as being 100% Nitrate.

* Well 2 was inoperable at the time of this sampling event. A sample from Well 5 was substituted.

**This well, SE of the HLAS is not on city property. Beginning with the 1Q00 sampling event Well 2 has been substituted.

***For data management convenience, all data collected during any day within a particular month are assigned to the last day of that month, with the exception of two samples collected during January 1988 for Well 40421.

"0.0" indicates a result that was either rounded off to zero, or was below the detection limit.

Wells 7, 8, 12, 22, 27 and 29 are wells of concern.

Values in red are potential outliers.

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW08A	MW-09	MW09A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Jan-82	--	--	--	0.83	--	0.79	--	--	--	--	--	--	--
Jun-82	--	--	--	0.60	--	0.48	--	--	--	--	--	--	--
Oct-82	--	--	--	12.50	--	12.57	--	--	--	--	--	--	--
Feb-83	--	--	--	10.94	--	24.47	--	--	--	--	--	--	--
Mar-83	--	--	--	6.64	--	13.70	--	--	--	--	--	--	--
May-83	--	--	--	6.31	--	15.12	--	--	--	--	--	--	--
Jun-83	--	--	--	5.63	--	8.65	--	--	--	--	--	--	--
Jul-83	--	--	--	5.44	--	--	--	--	--	--	--	--	--
Sep-83	--	--	--	4.94	--	6.69	--	--	--	--	--	--	--
Oct-83	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul-84	--	--	--	5.49	--	0.86	--	--	--	--	--	--	--
Jan-85	--	--	--	0.66	--	2.00	--	--	--	--	--	--	--
Jul-85	--	--	--	2.87	--	1.74	--	--	--	--	--	--	--
Jan-86	--	--	--	0.54	--	1.64	--	--	--	--	--	--	--
Jul-86	--	--	--	0.53	--	--	--	--	--	--	--	--	--
Aug-86	--	--	--	--	--	4.30	--	--	--	--	--	--	--
Dec-86	--	--	--	1.46	--	4.21	--	--	--	--	--	--	--
Feb-87	--	--	--	--	--	--	--	--	--	--	--	--	--
Jun-87	--	--	--	8.50	--	<0.15	--	--	--	--	--	--	--
Jul-87	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov-87	--	--	--	4.70	--	1.50	--	--	--	--	--	--	--
Jan-88	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan-88	--	--	--	--	--	--	--	--	--	--	--	--	--
May-88	--	--	--	<0.15	--	<0.15	--	--	--	--	--	--	--
Oct-88	--	--	--	9.04	--	1.38	--	--	--	--	--	--	--
Nov-88	--	--	--	1.64	--	0.48	--	--	--	--	--	--	--
Jun-89	--	--	--	0.40	--	0.30	--	--	--	--	--	--	--
Dec-89	--	--	--	0.95	--	2.26	--	--	--	--	--	--	--
Jun-90	--	--	--	0.45	--	1.34	--	--	--	--	--	--	--
Jan-92	--	--	--	<0.10	--	0.59	--	--	--	--	--	--	--
Mar-92	--	--	--	<0.10	--	0.27	--	--	--	--	--	--	--
Jul-92	--	--	--	0.40	--	0.20	--	--	--	--	--	--	--

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW08A	MW-09	MW09A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Sep-92	--	--	--	1.00	--	0.70	--	--	--	--	--	--	--
Dec-92	--	--	--	0.20	--	0.40	--	--	--	--	--	--	--
Mar-93	--	--	--	0.90	--	0.80	--	--	--	--	--	--	--
Sep-93	--	--	--	0.30	--	0.70	--	--	--	--	--	--	--
Sep-96	--	--	--	3.1	--	0.8	--	--	--	--	--	--	--
Mar-97	--	--	--	0.2	--	0.1	--	--	--	--	--	--	--
Sep-97	--	--	--	0.4	--	0.4	--	--	--	--	--	--	--
Mar-98	--	--	--	0.4	--	0.8	--	--	--	--	--	--	--
Sep-98	--	--	--	0.1	--	0.6	--	--	--	--	--	--	--
Mar-99	--	--	--	0.1	--	0.9	--	--	--	--	--	--	--
Sep-99	--	--	--	0.1	--	0.2	--	--	--	--	--	--	--
Mar-00	--	--	--	0.1	--	0.7	--	--	--	--	--	--	--
Sep-00	--	--	--	0.0	--	4.5	--	--	--	--	--	--	--
Mar-01	--	--	--	0.0	--	0.6	--	--	--	--	--	--	--
Sep-01	--	--	--	0.1	--	0.2	--	--	--	--	--	--	--
Mar-02	--	--	--	0.0	--	0.1	--	--	--	--	--	--	--
Jun-02	--	4.0	--	0.1	--	0.4	--	7.7	--	0.9	--	4.4	--
Sep-02	--	4.8	--	0.6	--	1.5	--	11.7	--	1.6	--	4.9	--
Jan-03	--	4.9	--	0.1	--	0.3	--	7.9	--	0.8	--	4.4	--
Jul-03	--	5.5	--	<0.055	--	0.5	--	8.3	--	1.0	--	3.6	--
Mar-04	10.7	4.4	5.7	0.1	<0.055	1.3	3.1	9.0	2.0	0.5	2.4	3.5	7.7
May-04	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul-04	10.7	5.0	7.5	<0.055	<0.055	1.4	3.1	9.3	2.3	1.2	2.5	2.9	9.0
Oct-04	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan-05	10.6	4.0	6.2	3.2	2.5	1.0	1.4	10.9	3.4	1.8	2.5	2.7	8.1
May-05	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul-05	10.6	6.7	5.5	1.2	0.9	0.7	0.6	10.3	3.2	2.4	3.3	2.1	8.0
Oct-05	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb-06	12.5	--	3.2	--	0.7	--	0.7	--	3.8	--	2.5	--	10.9
May-06	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug-06	12.2	--	2.9	--	0.7	--	1.4	--	4.0	--	2.4	--	10.5
Nov-06	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb-07	9.8	--	3.9	--	0.4	--	3.0	--	3.2	--	2.3	--	10.8

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW08A	MW-09	MW09A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
Aug-07	9.8	--	3.6	--	2.6	--	0.7	--	5.1	--	1.9	--	5.3
Oct-07	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb-08	10.1	--	3.5	--	1.1	--	0.8	--	4.8	--	2.5	--	12.6
Jun-08	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug-08	11.800	--	3.930	--	1.760	--	3.030	--	4.700	--	2.280	--	9.870
Nov-08	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar-09	15.200	--	1.900	--	1.600	--	0.800	--	4.700	--	2.400	--	11.300
May-09	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep-09	10.100	--	3.430	--	<2.5	--	2.720	--	4.340	--	3.760	--	12.200
Dec-09	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1/10	12.7	--	3.9	--	1.4	--	1.3	--	3.9	--	3.3	--	12.2
5/1/10	--	--	--	--	--	--	--	--	--	--	--	--	--
9/1/10	7.623	--	2.206	--	1.488	--	0.610	--	3.897	--	0.513	--	3.415
11/1/10	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1/11	9.000	--	3.300	--	1.200	--	1.300	--	4.200	--	2.900	--	9.900
5/19/11	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1/11	9.061	--	2.205	--	0.737	--	2.870	--	4.864	--	2.796	--	13.407
11/16/11	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1/12	10.9	--	3.1	--	0.3	--	3.4	--	3.6	--	2.7	--	12.9
5/1/12	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1/12	11.776	--	2.796	--	0.073	--	1.872	--	4.365	--	4.072	--	13.189
11/19/12	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1/13	10.7	--	2.6	--	0.05	--	1.0	--	3.5	--	3.9	--	14.7
5/23/13	--	--	--	--	--	--	--	--	--	--	--	--	--
9/30/13	8.51	--	1.67	--	<0.013	--	0.71	--	2.73	--	2.77	--	11.30
11/21/13	--	--	--	--	--	--	--	--	--	--	--	--	--
2/1/14	12.7	--	2.5	--	0.03	--	1.4	--	4.0	--	4.9	--	18.0
6/3/14	--	--	--	--	--	--	--	--	--	--	--	--	--
10/20/14	11.281	--	1.5	--	--	--	1.041	--	3.0	--	3.11	--	10.6
12/8/14	--	--	--	--	--	--	--	--	--	--	--	--	--
3/19/15	10.3	--	1.0	--	0.05	--	0.6	--	3.8	--	3.0	--	12.8
8/6/15	8.40	--	1.29	--	0.417	--	4.03	--	2.61	--	2.25	--	11.70
10/15/15	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW08A	MW-09	MW09A	MW-10	MW-10A	MW-11	MW-11A	MW-12	MW-12A	MW-13	MW-13A	MW-14	MW-14A
3/31/16	8.4	--	2.6	--	<0.002	--	0.4	--	3.9	--	2.8	--	13.4
4/26/16	--	--	--	--	--	--	--	--	--	--	--	--	--
4/11/17	4.98	--	1.49	--	1.49	--	1.56	--	3.21	--	1.16	--	1.17
11/20/17	5.01	--	1.21	--	1.18	--	3.37	--	5.70	--	1.20	--	2.34
3/20/18	7.34	--	1.91	--	0.19	--	2.05	--	4.18	--	1.57	--	1.54
5/14/18	--	--	--	--	--	--	--	--	--	--	--	--	--
8/20/18	8.81	--	1.59	--	<0.002	--	1.70	--	3.38	--	14.70	--	11.70
11/14/18	--	--	--	--	--	--	--	--	--	--	--	--	--
3/19/19	--	--	1.15	--	<0.002	--	--	--	3.90	--	2.76	--	9.16
8/6/19	5.60	--	2.46	--	0.14	--	0.22	--	4.13	--	9.27	--	12.80
12/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
3/8/20	6.36	--	1.11	--	0.151	--	1.06	--	4.78	--	4.36	--	13.40
6/1/20	--	--	--	--	--	--	--	--	--	--	--	--	--
6/29/20	4.93	--	1.05	--	0.152	--	1.02	--	5.42	--	3.89	--	10.7
11/3/20	--	--	--	--	--	--	--	--	--	--	--	--	--
3/30/21	6.39	--	0.904	--	0.059	--	0.289	--	7.37	--	4.18	--	11.8
5/24/21	--	--	--	--	--	--	--	--	--	--	--	--	--
8/25/21	6.76	--	0.694	--	<0.002	--	1.55	--	5.06	--	3.55	--	7.57
3/21/22	0.846	--	1.94	--	<0.002	--	0.532	--	5.12	--	--	--	--
8/15/22	6.40	--	2.67	--	0.019	--	0.373	--	4.24	--	3.87	--	9.65
11/29/22	--	--	--	--	--	--	--	--	--	--	--	--	--
4/2/23	4.83	--	2.09	--	0.058	--	0.554	--	4.27	--	2.52	--	6.08
Average	**9.02**	**4.92**	**2.69**	**2.31**	**0.76**	**2.66**	**1.52**	**9.38**	**4.07**	**1.29**	**3.32**	**3.56**	**10.05**

Remarks:

-- = Not Sampled

Some of the older historical data were reported as Nitrite/Nitrate (mg/L). These data are treated as being 100% Nitrate.

* Well 2 was inoperable at the time of this sampling event. A sample from Well 5 was substituted.

**This well, SE of the HLAS is not on city property. Beginning with the 1Q00 sampling event Well 2 has been substituted.

***For data management convenience, all data collected during any day within a particular month are assigned to the last day of that month, with the exception of two samples collected during January 1988 for Well 40421.

"0.0" indicates a result that was either rounded off to zero, or was below the detection limit.

Wells 7, 8, 12, 22, 27 and 29 are wells of concern.

Values in red are potential outliers.

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Jan-82	--	--	--	--	--	--	--	--	--	--	--	--	--
Jun-82	1.46	--	--	--	--	--	--	--	--	1.72	--	<0.01	--
Oct-82	<0.01	--	--	--	--	--	--	--	--	12.06	--	<0.01	--
Feb-83	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar-83	0.39	--	--	--	--	--	--	--	--	5.41	--	0.06	--
May-83	0.34	--	--	--	--	--	--	--	--	4.86	--	0.28	--
Jun-83	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul-83	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep-83	0.41	--	--	--	--	--	--	--	--	3.80	--	0.12	--
Oct-83	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul-84	1.93	--	--	--	--	--	--	--	--	3.84	--	0.06	--
Jan-85	1.39	--	--	--	--	--	--	--	--	4.63	--	0.27	--
Jul-85	1.34	--	--	--	--	--	--	--	--	4.11	--	0.43	--
Jan-86	0.58	--	--	--	--	--	--	--	--	5.20	--	1.34	--
Jul-86	1.11	--	--	--	--	--	--	--	--	4.93	--	7.85	--
Aug-86	--	--	--	--	--	--	--	--	--	--	--	--	--
Dec-86	0.48	--	--	--	--	--	--	--	--	6.81	--	13.09	--
Feb-87	--	--	--	--	--	--	--	--	--	--	--	--	--
Jun-87	5.20	--	--	--	--	--	--	--	--	7.50	--	14.50	--
Jul-87	--	--	--	--	--	--	--	--	--	--	--	--	--
Nov-87	1.10	--	--	--	--	--	--	--	--	8.50	--	15.20	--
Jan-88	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan-88	--	--	--	--	--	--	--	--	--	--	--	--	--
May-88	2.20	--	--	--	--	--	--	--	--	<0.15	--	0.80	--
Oct-88	<0.15	--	--	--	--	--	--	--	--	6.10	--	21.96	--
Nov-88	4.35	--	--	--	--	--	--	--	--	4.93	--	13.12	--
Jun-89	2.10	--	--	--	--	--	--	--	--	5.20	--	14.60	--
Dec-89	5.26	--	--	--	--	--	--	--	--	13.76	--	16.03	--
Jun-90	5.06	--	--	--	--	--	--	--	--	5.06	--	14.36	--
Jan-92	2.25	--	--	--	--	--	--	--	--	2.91	--	10.59	--
Mar-92	2.16	--	--	--	--	--	--	--	--	4.53	--	10.75	--
Jul-92	1.90	--	--	--	--	--	--	--	--	5.92	--	10.40	--

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Sep-92	1.80	--	--	--	--	--	--	--	--	4.90	--	12.00	--
Dec-92	2.70	--	--	--	--	--	--	--	--	3.80	--	9.40	--
Mar-93	2.80	--	--	--	--	--	--	--	--	4.20	--	11.60	--
Sep-93	1.30	--	--	--	--	--	--	--	--	4.30	--	7.70	--
Sep-96	3.1	--	--	--	--	--	--	--	--	3.3	--	0.1	--
Mar-97	1.7	--	--	--	--	--	--	--	--	2.5	--	0.7	--
Sep-97	2.2	--	--	--	--	--	--	--	--	3.2	--	2.0	--
Mar-98	2.6	--	--	--	--	--	--	--	--	3.4	--	7.2	--
Sep-98	3.9	--	--	--	--	--	--	--	--	3.2	--	9.4	--
Mar-99	4.3	--	--	--	--	--	--	--	--	4.5	--	14.8	--
Sep-99	4.1	--	--	--	--	--	--	--	--	1.1	--	4.3	--
Mar-00	3.0	--	--	--	--	--	--	--	--	3.6	--	12.5	--
Sep-00	3.6	--	--	--	--	--	--	--	--	3.6	--	13.7	--
Mar-01	3.1	--	--	--	--	--	--	--	--	3.5	--	13.6	--
Sep-01	3.3	--	--	--	--	--	--	--	--	3.3	--	13.3	--
Mar-02	3.4	--	--	--	--	--	--	--	--	3.1	--	12.9	--
Jun-02	3.8	--	2.8	2.6	--	6.1	3.3	4.4	--	3.2	--	13.4	--
Sep-02	4.6	--	3.9	3.3	--	6.5	4.0	4.7	--	4.1	--	13.5	--
Jan-03	3.8	--	3.4	2.8	--	6.3	3.5	4.4	--	3.5	--	14.6	--
Jul-03	4.0	--	3.4	2.7	--	6.1	5.3	4.5	--	3.6	--	13.9	--
Mar-04	4.7	5.1	4.2	3.1	4.6	6.8	4.3	4.8	4.2	4.0	3.4	13.7	9.0
May-04	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul-04	4.4	5.4	4.0	2.9	4.6	6.6	4.1	4.5	4.3	4.1	3.4	11.8	9.6
Oct-04	--	--	--	--	--	--	--	--	--	--	--	--	--
Jan-05	4.4	5.0	3.9	2.7	4.3	5.8	5.1	4.0	3.9	3.5	3.3	11.5	8.9
May-05	--	--	--	--	--	--	--	--	--	--	--	--	--
Jul-05	4.6	4.4	4.5	3.4	5.3	6.8	5.1	5.4	4.8	4.5	4.5	12.8	9.6
Oct-05	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb-06	--	4.5	4.3	--	4.7	6.3	4.5	--	4.2	--	3.6	--	10.0
May-06	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug-06	--	4.3	4.5	--	4.6	7.0	4.6	--	4.6	--	4.7	--	11.2
Nov-06	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb-07	--	4.0	4.4	--	4.4	6.9	5.1	--	4.6	--	4.9	--	9.7

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
Aug-07	--	4.0	4.5	--	3.8	6.5	4.6	--	4.3	--	5.3	--	10.1
Oct-07	--	--	--	--	--	--	--	--	--	--	--	--	--
Feb-08	--	4.0	5.2	--	3.8	6.2	4.8	--	4.9	--	6.5	--	11.7
Jun-08	--	--	--	--	--	--	--	--	--	--	--	--	--
Aug-08	--	3.580	4.780	--	3.320	6.210	4.699	--	4.420	--	3.720	--	10.500
Nov-08	--	--	--	--	--	--	--	--	--	--	--	--	--
Mar-09	--	3.900	5.000	--	3.100	6.700	4.800	--	4.900	--	4.000	--	12.300
May-09	--	--	--	--	--	--	--	--	--	--	--	--	--
Sep-09	--	4.500	5.240	--	<2.5	7.151	5.306	--	5.380	--	4.240	--	11.989
Dec-09	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1/10	--	4.5	5.1	--	3.6	6.9	5.2	--	5.2	--	3.4	--	13.3
5/1/10	--	--	--	--	--	--	--	--	--	--	--	--	--
9/1/10	--	3.588	3.973	--	3.200	5.863	4.934	--	5.127	--	2.363	--	7.333
11/1/10	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1/11	--	4.100	5.000	--	3.700	7.300	5.400	--	4.900	--	5.400	--	13.400
5/19/11	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1/11	--	4.325	4.926	--	3.462	7.458	5.671	--	4.921	--	4.372	--	14.012
11/16/11	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1/12	--	4.6	5.1	--	3.3	7.9	6.5	--	5.4	--	4.5	--	15.0
5/1/12	--	--	--	--	--	--	--	--	--	--	--	--	--
8/1/12	--	5.155	5.433	--	3.755	9.142	7.485	--	6.446	--	5.082	--	16.191
11/19/12	--	--	--	--	--	--	--	--	--	--	--	--	--
3/1/13	--	4.5	4.9	--	3.4	8.4	8.1	--	6.0	--	5.5	--	15.2
5/23/13	--	--	--	--	--	--	--	--	--	--	--	--	--
9/30/13	--	3.51	3.78	--	2.44	7.99	8.05	--	4.93	--	3.94	--	11.40
11/21/13	--	--	--	--	--	--	--	--	--	--	--	--	--
2/1/14	--	5.4	5.5	--	3.6	8.9	9.9	--	7.2	--	5.9	--	16.4
6/3/14	--	--	--	--	--	--	--	--	--	--	--	--	--
10/20/14	--	4.96	4.21	--	2.96	7.88	10.09	--	6.7	--	4.8	--	14.4
12/8/14	--	--	--	--	--	--	--	--	--	--	--	--	--
3/19/15	--	5.2	4.7	--	3.3	8.5	11.3	--	6.6	--	5.2	--	13.5
8/6/15	--	4.60	3.92	--	2.85	7.80	10.40	--	5.77	--	3.75	--	12.60
10/15/15	--	--	--	--	--	--	--	--	--	--	--	--	--

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-15	MW-15A	MW-16	MW-17	MW-17A	MW-18	MW-19	MW-20	MW-20A	MW-21	MW-21A	MW-22	MW-22A
3/31/16	--	6.5	4.2	--	3.6	9.1	12.8	--	6.2	--	4.4	--	13.0
4/26/16	--	--	--	--	--	--	--	--	--	--	--	--	--
4/11/17	--	6.90	6.05	--	6.04	8.02	12.20	--	10.20	--	4.13	--	4.40
11/20/17	--	6.18	6.29	--	6.28	8.48	12.60	--	5.26	--	4.57	--	13.30
3/20/18	--	7.13	3.78	--	2.76	9.29	13.20	--	5.34	--	5.84	--	14.40
5/14/18	--	--	--	--	--	--	--	--	--	--	--	--	--
8/20/18	--	6.49	3.86	--	3.91	8.38	9.82	--	4.63	--	3.82	--	12.10
11/14/18	--	--	--	--	--	--	--	--	--	--	--	--	--
3/19/19	--	6.19	2.99	--	3.01	9.29	12.90	--	4.72	--	3.48	--	12.40
8/6/19	--	6.96	2.31	--	3.62	8.55	6.92	--	4.54	--	3.58	--	9.00
12/17/19	--	--	--	--	--	--	--	--	--	--	--	--	--
3/8/20	--	7.31	2.78	--	3.66	9.22	13.20	--	4.33	--	3.56	--	12.80
6/1/20	--	--	--	--	--	--	--	--	--	--	--	--	--
6/29/20	--	7.04	3.43	--	3.51	8.95	11.6	--	3.40	--	3.38	--	13.3
11/3/20	--	--	--	--	--	--	--	--	--	--	--	--	--
3/30/21	--	7.77	2.58	--	3.59	8.79	12.90	--	3.89	--	3.42	--	13.7
5/24/21	--	--	--	--	--	--	--	--	--	--	--	--	--
8/25/21	--	7.64	2.05	--	3.87	10.30	12.70	--	3.99	--	3.08	--	--
3/21/22	--	8.99	4.66	--	4.76	--	--	--	--	--	--	--	12.8
8/15/22	--	9.03	4.82	--	4.82	9.78	14.0	--	4.22	--	4.10	--	11.4
11/29/22	--	--	--	--	--	--	--	--	--	--	--	--	--
4/2/23	--	8.67	2.86	--	4.77	--	13.0	--	4.13	--	2.91	--	10.1
Average	**2.77**	**5.52**	**4.22**	**2.93**	**3.90**	**7.65**	**7.90**	**4.58**	**5.09**	**4.62**	**4.22**	**9.46**	**11.89**

Remarks:

-- = Not Sampled

Some of the older historical data were reported as Nitrite/Nitrate (mg/L). These data are treated as being 100% Nitrate.

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Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30
Jan-82	--	--	1.57	--	--	--	--	--	--	--	--	--
Jun-82	--	--	19.68	--	--	--	10.70	--	0.62	--	1.86	--
Oct-82	--	--	24.27	--	--	--	7.45	--	2.26	--	0.58	--
Feb-83	--	--	6.42	--	--	--	--	--	--	--	--	--
Mar-83	--	--	5.25	--	--	--	8.05	--	1.16	--	6.99	--
May-83	--	--	30.44	--	--	--	12.23	--	1.27	--	6.60	--
Jun-83	--	--	7.48	--	--	--	--	--	--	--	--	--
Jul-83	--	--	--	--	--	--	--	--	--	--	--	--
Sep-83	--	--	11.42	--	--	--	11.90	--	1.63	--	--	--
Oct-83	--	--	--	--	--	--	--	--	--	--	5.00	--
Jul-84	--	--	4.78	--	--	--	6.60	--	2.01	--	6.76	--
Jan-85	--	--	5.80	--	--	--	6.87	--	1.87	--	6.69	--
Jul-85	--	--	1.85	--	--	--	11.72	--	1.97	--	5.60	--
Jan-86	--	--	5.85	--	--	--	13.60	--	2.14	--	7.71	--
Jul-86	--	--	6.56	--	--	--	14.99	--	3.51	--	11.96	--
Aug-86	--	--	--	--	--	--	--	--	--	--	--	--
Dec-86	--	--	2.44	--	--	--	0.92	--	1.83	--	9.36	--
Feb-87	--	--	--	--	--	--	--	--	--	--	--	--
Jun-87	--	--	0.48	--	--	--	3.50	--	6.50	--	5.80	--
Jul-87	--	--	--	--	--	--	--	--	--	--	--	--
Nov-87	--	--	2.50	--	--	--	2.60	--	2.50	--	16.10	--
Jan-88	--	--	--	--	--	--	--	--	--	--	--	--
Jan-88	--	--	--	--	--	--	--	--	--	--	--	--
May-88	--	--	0.20	--	--	--	5.60	--	<0.15	--	0.20	--
Oct-88	--	--	11.37	--	--	--	<0.15	--	2.29	--	8.67	--
Nov-88	--	--	2.25	--	--	--	8.34	--	2.64	--	7.36	--
Jun-89	--	--	5.80	--	--	--	7.59	--	2.10	--	9.10	--
Dec-89	--	--	5.00	--	--	--	9.79	--	2.30	--	12.20	--
Jun-90	--	--	3.47	--	--	--	10.20	--	1.95	--	10.67	--
Jan-92	--	--	3.16	--	--	--	7.83	--	1.90	--	13.86	--
Mar-92	--	--	2.75	--	--	--	9.86	--	1.45	--	14.70	--
Jul-92	--	--	--	--	--	--	<0.50	--	1.33	--	12.80	--

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30
Sep-92	--	--	5.00	--	--	--	12.00	--	1.30	--	18.40	--
Dec-92	--	--	2.20	--	--	--	11.10	--	1.00	--	14.50	--
Mar-93	--	--	7.20	--	--	--	7.90	--	1.20	--	14.40	--
Sep-93	--	--	3.80	--	--	--	12.00	--	0.90	--	10.00	--
Sep-96	--	--	5.4	--	--	--	10.1	--	1.4	--	10.4	--
Mar-97	--	--	0.2	--	--	--	9.0	--	0.4	--	5.3	--
Sep-97	--	--	7.4	--	--	--	16.1	--	1.2	--	10.0	--
Mar-98	--	--	2.7	--	--	--	16.6	--	0.6	--	10.7	--
Sep-98	--	--	5.3	--	--	--	17.3	--	1.8	--	9.8	--
Mar-99	--	--	5.2	--	--	--	18.5	--	2.6	--	10.9	--
Sep-99	--	--	1.7	--	--	--	8.8	--	1.1	--	3.2	--
Mar-00	--	--	3.7	--	--	--	17.0	--	2.5	--	3.2	--
Sep-00	--	--	3.2	--	--	--	18.4	--	2.7	--	9.6	--
Mar-01	--	--	4.1	--	--	--	17.6	--	3.2	--	7.9	--
Sep-01	--	--	4.0	--	--	--	16.8	--	2.9	--	8.0	--
Mar-02	--	--	4.5	--	--	--	17.3	--	2.9	--	6.7	--
Jun-02	5.1	--	4.5	1.4	1.1	--	18.2	--	2.9	--	8.4	2.2
Sep-02	6.9	--	6.1	1.9	1.7	--	18.4	--	3.0	--	8.2	2.0
Jan-03	5.0	--	6.1	1.8	1.5	--	18.1	--	3.7	--	11.0	2.2
Jul-03	6.7	--	5.1	2.3	1.2	--	17.2	--	4.0	--	9.7	2.4
Mar-04	5.2	4.5	6.8	2.9	1.5	1.8	21.9	21.2	5.1	3.4	12.5	3.7
May-04	--	--	--	--	--	--	--	--	--	--	--	--
Jul-04	5.3	4.4	5.9	2.1	1.2	1.6	20.5	19.1	5.4	3.9	12.6	2.6
Oct-04	--	--	--	--	--	--	--	--	--	--	--	--
Jan-05	4.9	5.1	2.1	2.4	1.2	1.6	18.8	18.9	4.7	3.5	15.1	2.8
May-05	--	--	--	--	--	--	--	--	--	--	--	--
Jul-05	3.7	4.7	5.7	2.4	1.4	1.3	20.9	18.7	6.0	4.9	13.2	3.1
Oct-05	--	--	--	--	--	--	--	--	--	--	--	--
Feb-06	--	4.3	3.2	2.5	--	1.7	--	17.7	--	4.4	11.3	3.6
May-06	--	--	--	--	--	--	--	--	--	--	--	--
Aug-06	--	4.7	2.7	2.6	--	2.4	--	18.9	--	4.9	9.9	3.7
Nov-06	--	--	--	--	--	--	--	--	--	--	--	--
Feb-07	--	3.7	3.7	2.5	--	2.0	--	19.9	--	4.8	9.7	3.8

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30
Aug-07	--	3.8	3.1	2.4	--	2.2	--	19.3	--	4.7	10.5	3.5
Oct-07	--	--	--	--	--	--	--	--	--	--	--	--
Feb-08	--	3.9	3.9	2.4	--	2.9	--	22.9	--	5.5	10.1	3.9
Jun-08	--	--	--	--	--	--	--	--	--	--	--	--
Aug-08	--	3.440	4.840	3.790	--	2.930	--	21.300	--	4.720	8.972	3.930
Nov-08	--	--	--	--	--	--	--	--	--	--	--	--
Mar-09	--	3.700	2.800	3.100	--	2.900	--	24.700	--	5.400	9.500	4.300
May-09	--	--	--	--	--	--	--	--	--	--	--	--
Sep-09	--	4.751	4.292	3.635	--	3.759	--	24.700	--	6.050	9.374	4.716
Dec-09	--	--	--	--	--	--	--	--	--	--	--	--
3/1/10	--	4.6	4.9	3.1	--	3.8	--	25.0	--	5.7	9.5	4.4
5/1/10	--	--	--	--	--	--	--	--	--	--	--	--
9/1/10	--	2.678	3.519	1.392	--	1.187	--	22.865	--	4.962	11.061	1.761
11/1/10	--	--	--	--	--	--	--	--	--	--	--	--
3/1/11	--	4.900	2.900	3.300	--	3.800	--	19.600	--	6.100	10.200	3.000
5/19/11	--	--	--	--	--	--	--	--	--	--	--	--
8/1/11	--	4.849	3.067	3.464	--	2.884	--	17.895	--	6.342	9.233	2.895
11/16/11	--	--	--	--	--	--	--	--	--	--	--	--
3/1/12	--	4.7	3.2	3.3	--	2.8	--	18.5	--	6.3	9.1	3.5
5/1/12	--	--	--	--	--	--	--	--	--	--	--	--
8/1/12	--	5.826	5.006	4.079	--	3.578	--	20.688	--	6.924	9.752	4.496
11/19/12	--	--	--	--	--	--	--	--	--	--	--	--
3/1/13	--	5.3	4.7	4.1	--	3.6	--	20.6	--	6.4	8.9	4.7
5/23/13	--	--	--	--	--	--	--	--	--	--	--	--
9/30/13	--	3.99	3.43	4.67	--	2.79	--	15.20	--	4.63	8.17	6.08
11/21/13	--	--	--	--	--	--	--	--	--	--	--	--
2/1/14	--	5.9	5.2	5.6	--	3.4	--	22.0	--	7.2	9.8	5.8
6/3/14	--	--	--	--	--	--	--	--	--	--	--	--
10/20/14	--	4.6	3.1	4.43	--	3.39	--	19.5	--	5.4	8.86	3.60
12/8/14	--	--	--	--	--	--	--	--	--	--	--	--
3/19/15	--	5.3	4.5	4.4	--	3.4	--	18.2	--	6.3	10.4	4.8
8/6/15	--	4.04	--	4.90	--	3.00	--	17.00	--	5.35	10.40	4.30
10/15/15	--	--	--	--	--	--	--	--	--	--	--	--

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-23	MW-23A	MW-24	MW-25	MW-26	MW-26A	MW-27	MW-27A	MW-28	MW-28A	MW-29	MW-30
3/31/16	--	5.2	2.3	5.1	--	2.8	--	13.5	--	6.1	12.5	4.3
4/26/16	--	--	--	--	--	--	--	--	--	--	--	--
4/11/17	--	15.00	1.31	9.88	--	2.24	--	10.70	--	5.32	3.77	3.21
11/20/17	--	3.62	2.94	9.56	--	6.74	--	9.27	--	6.10	4.20	3.48
3/20/18	--	4.32	3.74	--	--	8.31	--	9.84	--	5.60	10.50	4.07
5/14/18	--	--	--	--	--	--	--	--	--	--	--	--
8/20/18	--	3.66	2.71	9.78	--	2.59	--	10.10	--	5.44	4.25	4.31
11/14/18	--	--	--	--	--	--	--	--	--	--	--	--
3/19/19	--	3.78	--	4.41	--	2.55	--	--	--	--	9.57	4.57
8/6/19	--	4.02	3.75	3.80	--	2.13	--	10.70	--	5.54	6.70	1.02
12/17/19	--	--	--	--	--	--	--	--	--	--	--	--
3/8/20	--	3.37	4.47	3.79	--	2.31	--	10.10	--	7.49	8.86	--
6/1/20	--	--	--	--	--	--	--	--	--	--	--	--
6/29/20	--	4.00	--	6.25	--	1.91	--	10.6	--	7.17	7.67	6.19
11/3/20	--	--	--	--	--	--	--	--	--	--	--	--
3/30/21	--	4.67	2.29	--	--	3.07	--	9.8	--	6.49	7.50	10.9
5/24/21	--	--	--	--	--	--	--	--	--	--	--	--
8/25/21	--	0.898	1.78	2.83	--	3.44	--	10.3	--	6.57	7.46	4.89
3/21/22	--	--	--	--	--	--	--	--	--	--	--	--
8/15/22	--	5.38	--	2.90	--	4.01	--	12.0	--	7.64	12.3	--
11/29/22	--	--	--	--	--	--	--	--	--	--	--	--
4/2/23	--	4.48	--	4.10	--	3.57	--	11.5	--	6.49	2.45	--
Average	**5.34**	**4.60**	**4.94**	**3.83**	**1.33**	**2.98**	**12.52**	**17.02**	**2.39**	**5.66**	**9.07**	**3.91**

Remarks:

-- = Not Sampled

Some of the older historical data were reported as Nitrite/Nitrate (mg/L). These data are treated as being 100% Nitrate.

* Well 2 was inoperable at the time of this sampling event. A sample from Well 5 was substituted.

**This well, SE of the HLAS is not on city property. Beginning with the 1Q00 sampling event Well 2 has been substituted.

***For data management convenience, all data collected during any day within a particular month are assigned to the last day of that month, with the exception of two samples collected during January 1988 for Well 40421.

"0.0" indicates a result that was either rounded off to zero, or was below the detection limit.

Wells 7, 8, 12, 22, 27 and 29 are wells of concern.

Values in red are potential outliers.

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-31	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36	**40421	R1	R2	R3	Average
Jan-82	--	--	--	--	--	--	--	--	0.52	--	--	--	**0.93**
Jun-82	--	--	--	--	--	--	--	--	1.38	--	--	--	**3.63**
Oct-82	--	--	--	--	--	--	--	--	0.40	--	--	--	**7.38**
Feb-83	--	--	--	--	--	--	--	--	--	--	--	--	**13.94**
Mar-83	--	--	--	--	--	--	--	--	5.00	--	--	--	**5.00**
May-83	--	--	--	--	--	--	--	--	5.76	--	--	--	**7.58**
Jun-83	--	--	--	--	--	--	--	--	--	--	--	--	**7.25**
Jul-83	--	--	--	--	--	--	--	--	--	--	--	--	**5.44**
Sep-83	--	--	--	--	--	--	--	--	--	--	--	--	**4.84**
Oct-83	--	--	--	--	--	--	--	--	--	--	--	--	**5.00**
Jul-84	--	--	--	--	--	--	--	--	6.11	--	--	--	**3.55**
Jan-85	--	--	--	--	--	--	--	--	5.72	--	--	--	**3.65**
Jul-85	--	--	--	--	--	--	--	--	--	--	--	--	**3.56**
Jan-86	--	--	--	--	--	--	--	--	--	--	--	--	**4.32**
Jul-86	--	--	--	--	--	--	--	--	--	--	--	--	**5.96**
Aug-86	--	--	--	--	--	--	--	--	--	--	--	--	**4.30**
Dec-86	--	--	--	--	--	--	--	--	--	--	--	--	**4.30**
Feb-87	--	--	--	--	--	--	--	--	11.40	--	--	--	**11.40**
Jun-87	--	--	--	--	--	--	--	--	--	--	--	--	**6.51**
Jul-87	--	--	--	--	--	--	--	--	11.00	--	--	--	**11.00**
Nov-87	--	--	--	--	--	--	--	--	--	--	--	--	**5.94**
Jan-88	--	--	--	--	--	--	--	--	43.50	--	--	--	**--**
Jan-88	--	--	--	--	--	--	--	--	50.00	--	--	--	**--**
May-88	--	--	--	--	--	--	--	--	--	--	--	--	**1.68**
Oct-88	--	--	--	--	--	--	--	--	0.19	--	--	--	**6.99**
Nov-88	--	--	--	--	--	--	--	--	10.24	--	--	--	**5.37**
Jun-89	--	--	--	--	--	--	--	--	3.70	--	--	--	**5.27**
Dec-89	--	--	--	--	--	--	--	--	13.10	--	--	--	**7.58**
Jun-90	--	--	--	--	--	--	--	--	<0.1	--	--	--	**6.12**
Jan-92	--	--	--	--	--	--	--	--	--	--	--	--	**5.25**
Mar-92	--	--	--	--	--	--	--	--	--	--	--	--	**6.26**
Jul-92	--	--	--	--	--	--	--	--	--	--	--	--	**5.49**

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-31	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36	**40421	R1	R2	R3	Average
Sep-92	--	--	--	--	--	--	--	--	--	--	--	--	**6.75**
Dec-92	--	--	--	--	--	--	--	--	--	--	--	--	**5.55**
Mar-93	--	--	--	--	--	--	--	--	--	--	--	--	**6.00**
Sep-93	--	--	--	--	--	--	--	--	--	--	--	--	**5.20**
Sep-96	--	--	--	--	--	--	--	--	0.7	--	--	--	**4.31**
Mar-97	--	--	--	--	--	--	--	--	0.7	--	--	--	**1.81**
Sep-97	--	--	--	--	--	--	--	--	29.3	--	--	--	**7.18**
Mar-98	--	--	--	--	--	--	--	--	15.8	--	--	--	**6.59**
Sep-98	--	--	--	--	--	--	--	--	15.0	--	--	--	**7.52**
Mar-99	--	--	--	--	--	--	--	--	10.9	--	--	--	**7.93**
Sep-99	--	--	--	--	--	--	--	--	--	--	--	--	**2.92**
Mar-00	--	--	--	--	--	--	--	--	--	--	--	--	**5.84**
Sep-00	--	--	--	--	--	--	--	--	--	--	--	--	**7.44**
Mar-01	--	--	--	--	--	--	--	--	--	--	--	--	**6.63**
Sep-01	--	--	--	--	--	--	--	--	--	--	--	--	**6.44**
Mar-02	--	--	--	--	--	--	--	--	--	--	--	--	**6.43**
Jun-02	0.3	--	3.2	--	--	--	--	--	--	--	--	--	**5.07**
Sep-02	1.9	--	3.5	5.8	--	--	--	--	--	--	--	--	**5.73**
Jan-03	0.9	--	3.0	5.3	--	--	--	--	--	--	--	--	**5.47**
Jul-03	1.1	--	2.7	4.7	--	--	--	--	--	--	--	--	**5.66**
Mar-04	1.8	0.3	2.9	4.2	2.5	7.3	8.6	7.9	--	1.1	0.7	1.5	**5.73**
May-04	--	--	--	--	--	6.9	7.9	6.7	--	--	--	--	**6.83**
Jul-04	1.0	0.8	--	--	2.2	6.1	8.3	7.3	--	--	--	--	**6.05**
Oct-04	--	--	--	--	--	6.5	7.6	6.0	--	--	--	--	**6.30**
Jan-05	0.8	1.1	2.9	3.5	2.3	8.3	9.2	8.2	--	--	--	--	**5.87**
May-05	--	--	--	--	--	8.6	9.8	9.2	--	--	--	--	**8.39**
Jul-05	0.9	0.5	2.4	4.5	2.8	9.8	10.1	8.1	--	--	--	--	**6.16**
Oct-05	--	--	--	--	--	4.7	9.5	8.9	--	--	--	--	**7.20**
Feb-06	--	3.7	4.7	--	3.7	5.7	9.5	8.0	--	--	--	--	**6.03**
May-06	--	--	--	--	--	5.9	9.3	7.8	--	--	--	--	**7.28**
Aug-06	--	1.9	6.0	--	2.6	6.2	10.2	8.9	--	--	--	--	**6.30**
Nov-06	--	--	--	--	--	6.0	10.6	8.8	--	--	--	--	**8.04**
Feb-07	--	1.4	2.1	--	2.2	4.8	9.6	8.2	--	--	--	--	**5.97**

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-31	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36	**40421	R1	R2	R3	Average
Aug-07	--	1.7	4.3	--	2.0	5.7	9.8	8.6	--	--	--	--	**5.96**
Oct-07	--	--	--	--	--	5.2	9.1	8.0	--	--	--	--	**7.15**
Feb-08	--	5.0	6.0	--	2.0	5.2	9.5	8.9	--	--	--	--	**6.57**
Jun-08	--	--	--	--	--	6.134	10.168	10.521	--	--	--	--	**8.74**
Aug-08	--	0.091	4.007	--	1.900	6.470	9.170	8.730	--	--	--	--	**6.10**
Nov-08	--	--	--	--	--	5.920	7.770	7.710	--	--	--	--	**7.11**
Mar-09	--	4.900	5.300	--	2.400	8.000	10.100	9.600	--	--	--	--	**6.76**
May-09	--	--	--	--	--	6.690	8.100	7.890	--	--	--	--	**7.50**
Sep-09	--	7.791	4.658	--	2.770	8.360	9.290	8.880	--	--	--	--	**7.23**
Dec-09	--	--	--	--	--	7.380	8.410	7.390	--	--	--	--	**7.97**
3/1/10	--	2.40	3.9	--	2.4	8.6	10.1	8.4	--	--	--	--	**6.84**
5/1/10	--	--	--	--	--	8.150	9.545	8.394	--	--	--	--	**8.97**
9/1/10	--	8.697	1.531	--	1.659	8.904	10.018	8.686	--	--	--	--	**5.57**
11/1/10	--	--	--	--	--	8.693	9.772	8.402	--	--	--	--	**9.29**
3/1/11	--	7.200	--	--	2.500	9.600	10.000	8.600	--	--	--	--	**6.78**
5/19/11	--	--	--	--	--	8.360	9.020	8.300	--	--	--	--	**9.48**
8/1/11	--	7.141	--	--	2.072	8.707	9.037	8.729	--	--	--	--	**6.74**
11/16/11	--	--	--	--	--	8.887	9.193	8.821	--	--	--	--	**10.20**
3/1/12	--	4.3	--	--	2.4	9.2	9.1	8.7	--	--	--	--	**6.92**
5/1/12	--	--	--	--	--	9.951	8.946	8.634	--	--	--	--	**10.26**
8/1/12	--	5.000	--	--	2.938	10.013	10.033	9.246	--	--	--	--	**7.65**
11/19/12	--	--	--	--	--	9.436	9.862	8.628	--	--	--	--	**10.41**
3/1/13	--	3.6	--	--	2.8	9.6	9.7	8.3	--	--	--	--	**7.30**
5/23/13	--	--	--	--	--	10.055	10.052	8.28	--	--	--	--	**10.54**
9/30/13	--	2.64	--	--	2.25	7.44	8.10	6.41	--	--	--	--	**5.97**
11/21/13	--	--	--	--	--	10.585	11.685	8.381	--	--	--	--	**11.09**
2/1/14	--	4.9	--	--	3.4	11.1	13.6	9.1	--	--	--	--	**8.25**
6/3/14	--	--	--	--	--	9.743	12.019	7.791	--	--	--	--	**10.88**
10/20/14	--	1.1	--	--	2.74	9.04	11.2	6.93	--	--	--	--	**6.97**
12/8/14	--	--	--	--	--	9.981	12.735	8.316	--	--	--	--	**11.22**
3/19/15	--	1.9	--	--	2.7	9.5	13.1	8.0	--	--	--	--	**7.34**
8/6/15	--	2.50	--	--	2.06	8.82	12.50	7.18	--	--	--	--	**6.84**
10/15/15	--	--	--	--	--	8.9	12.3	7.9	--	--	--	--	**10.40**

Table 4. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	MW-31	MW-31A	MW-32	MW-33	MW-33A	MW-34	MW-35	MW-36	**40421	R1	R2	R3	Average
3/31/16	--	4.4	--	--	2.1	10.1	14.7	8.4	--	--	--	--	**7.58**
4/26/16	--	--	--	--	--	9.20	14.20	7.98	--	--	--	--	**10.91**
4/11/17	--	2.65	8.84	--	2.01	14.50	14.00	7.62	--	--	--	--	**6.77**
11/20/17	--	1.00	9.76	--	14.20	8.79	1.26	7.10	--	--	--	--	**6.55**
3/20/18	--	6.74	9.94	--	2.65	16.1	9.19	9.53	--	--	--	--	**7.02**
5/14/18	--	--	--	--	--	9.97	15.4	7.64	--	--	--	--	**11.07**
8/20/18	--	1.71	8.72	--	2.48	8.47	14.20	7.09	--	--	--	--	**6.84**
11/14/18	--	--	--	--	--	7.57	13.10	6.82	--	--	--	--	**8.16**
3/19/19	--	--	--	--	1.18	8.25	13.60	6.53	--	--	--	--	**6.42**
8/6/19	--	0.85	3.77	--	0.67	9.50	14.40	7.37	--	--	--	--	**6.01**
12/17/19	--	--	--	--	--	14.0	--	14.2	--	--	--	--	**10.63**
3/8/20	--	3.07	--	--	1.16	9.75	13.80	6.56	--	--	--	--	**6.49**
6/1/20	--	--	--	--	--	11.00	14.50	6.94	--	--	--	--	**9.73**
6/29/20	--	1.32	--	--	1.41	9.41	14.4	6.97	--	--	--	--	**6.38**
11/3/20	--	--	--	--	--	15.70	5.69	7.12	--	--	--	--	**9.05**
3/30/21	--	0.934	--	--	1.35	8.42	16.10	6.97	--	--	--	--	**6.65**
5/24/21	--	--	--	--	--	--	15.0	6.84	--	--	--	--	**9.13**
8/25/21	--	1.73	--	--	1.06	9.51	15.0	6.52	--	--	--	--	**6.05**
3/21/22	--	7.03	--	--	1.64	9.59	15.3	7.13	--	--	--	--	**7.02**
8/15/22	--	1.77	--	--	1.53	7.90	15.4	7.00	--	--	--	--	**6.89**
11/29/22	--	--	--	--	--	--	14.8	6.29	--	--	--	--	**8.37**
4/2/23	--	0.890	--	--	1.09	8.99	14.7	6.78	--	--	--	--	**5.85**
Average	**1.08**	**3.10**	**4.73**	**4.67**	**2.47**	**8.66**	**10.92**	**8.03**	**11.45**	**1.10**	**0.70**	**1.50**	**5.82**

Remarks:

-- = Not Sampled

Some of the older historical data were reported as Nitrite/Nitrate (mg/L). These data are treated as being 100% Nitrate.

* Well 2 was inoperable at the time of this sampling event. A sample from Well 5 was substituted.

**This well, SE of the HLAS is not on city property. Beginning with the 1Q00 sampling event Well 2 has been substituted.

***For data management convenience, all data collected during any day within a particular month are assigned to the last day of that month, with the exception of two samples collected during January 1988 for Well 40421.

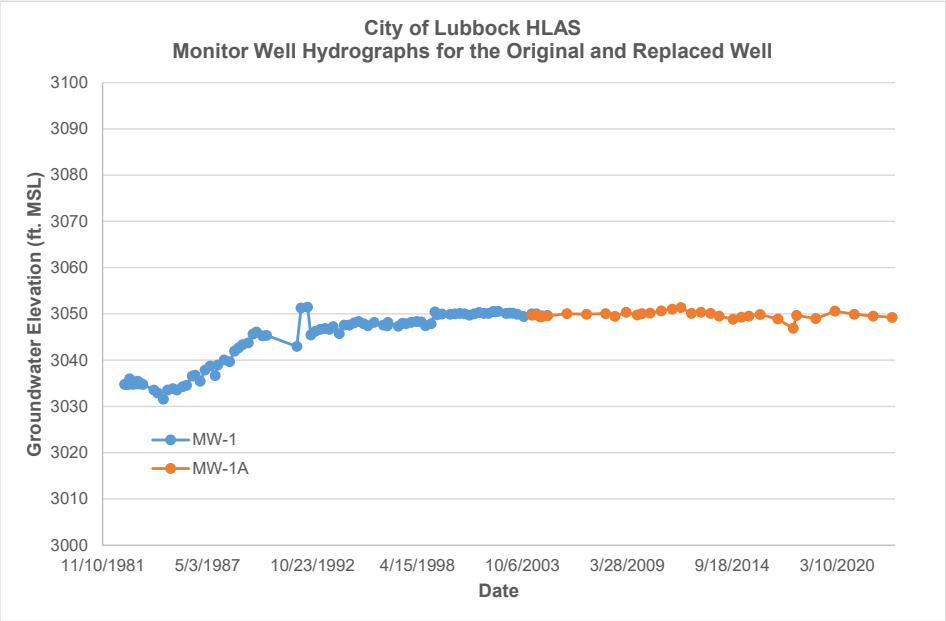
"0.0" indicates a result that was either rounded off to zero, or was below the detection limit.

Wells 7, 8, 12, 22, 27 and 29 are wells of concern.

Values in red are potential outliers.

C

HLAS Monitoring Well Hydrographs


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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3080
3070
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3040
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3000
11/10/1981
5/3/1987
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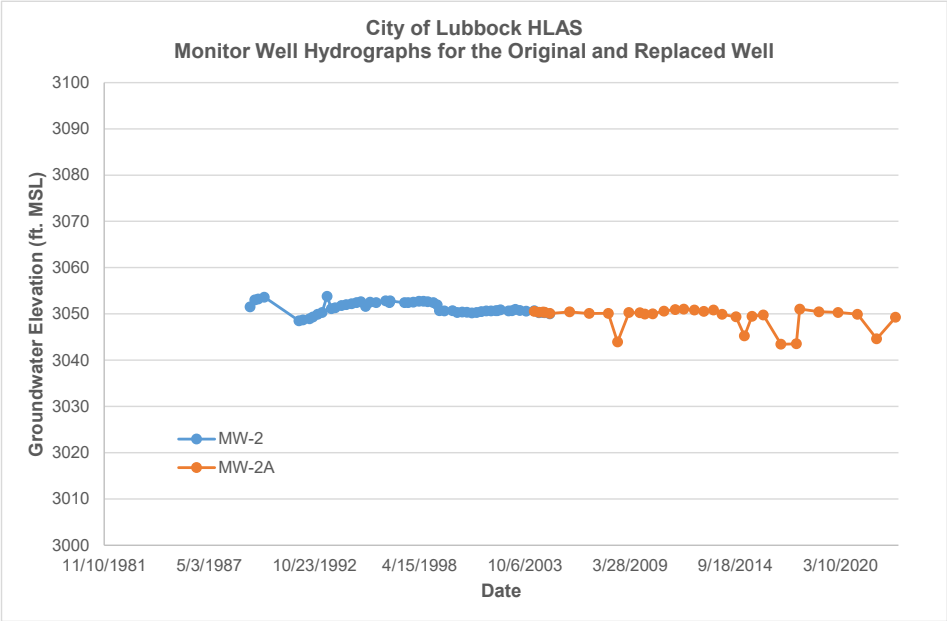
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date
MW-1
MW-1A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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11/10/1981
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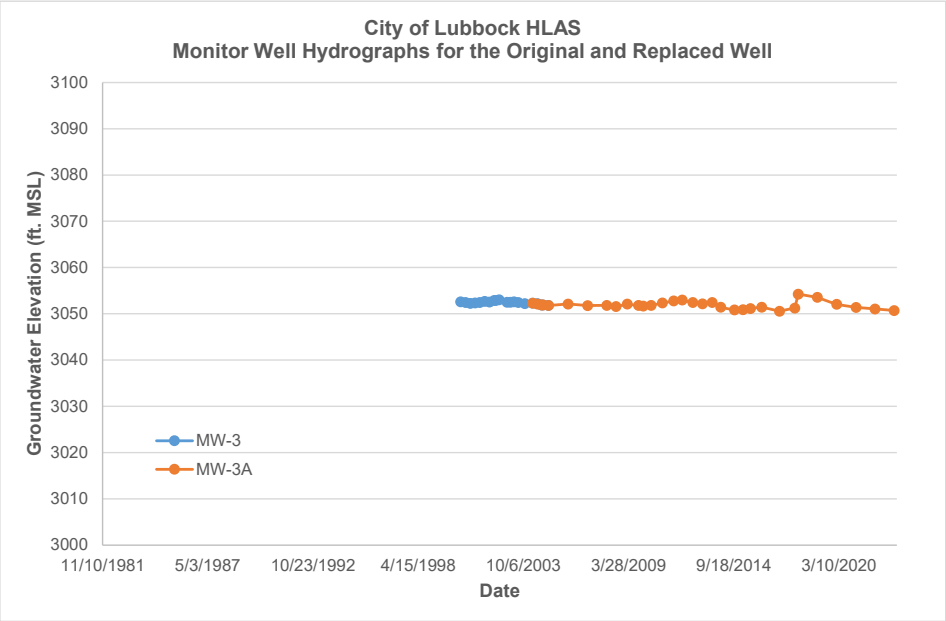
9/18/2014
3/10/2020
Date
MW-2
MW-2A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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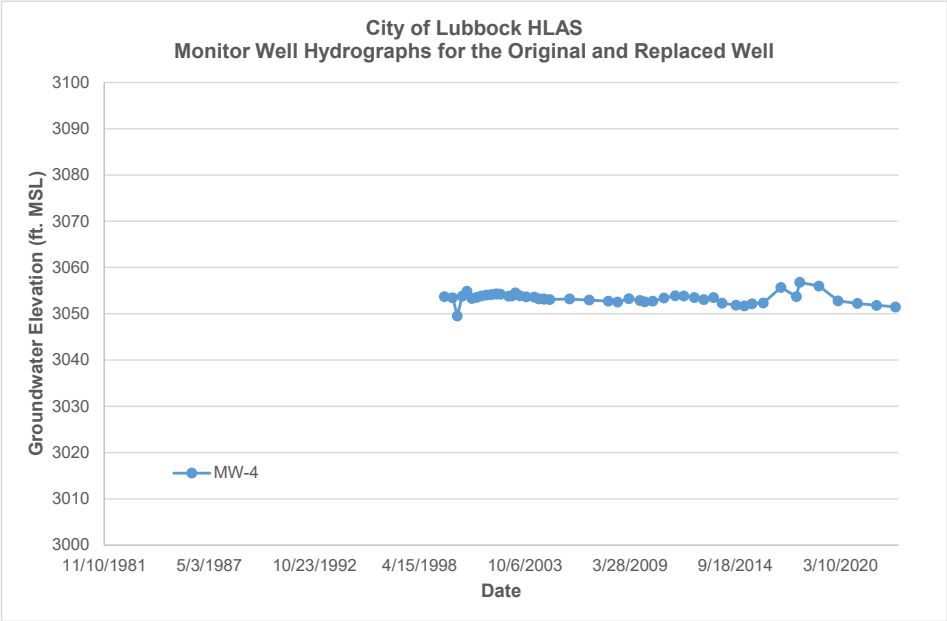
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date
MW-3
MW-3A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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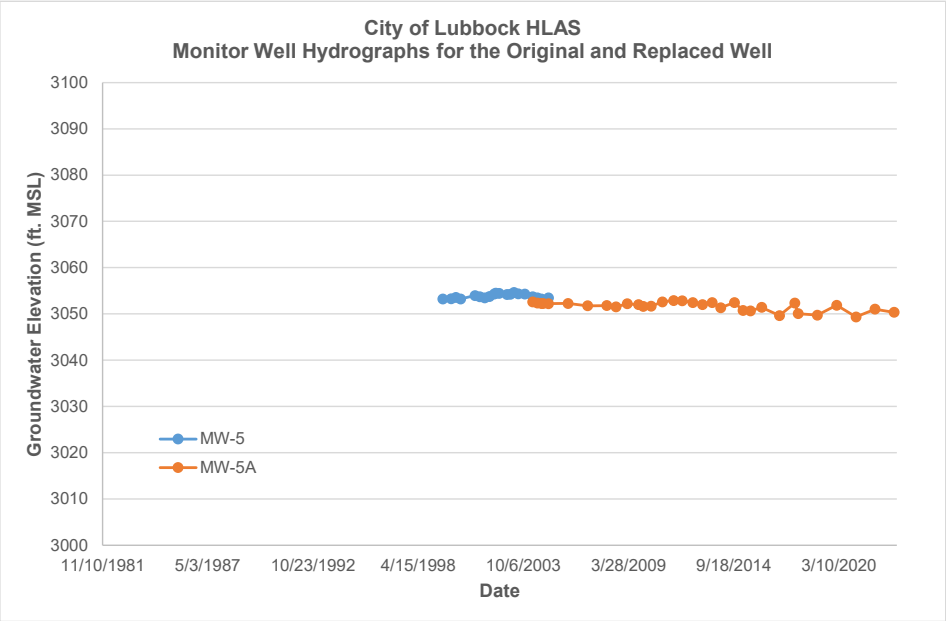
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date
MW-4


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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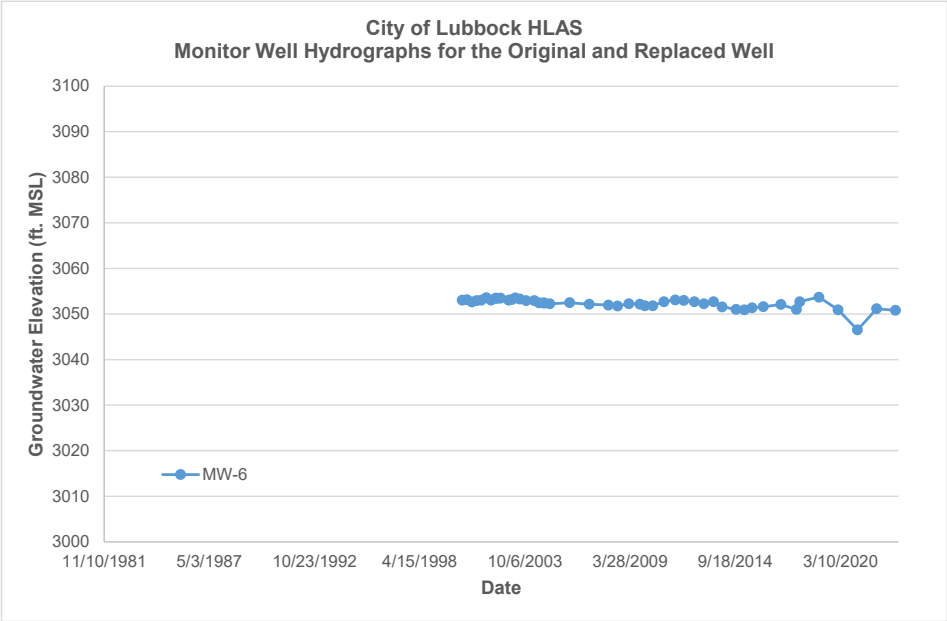
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date
MW-5
MW-5A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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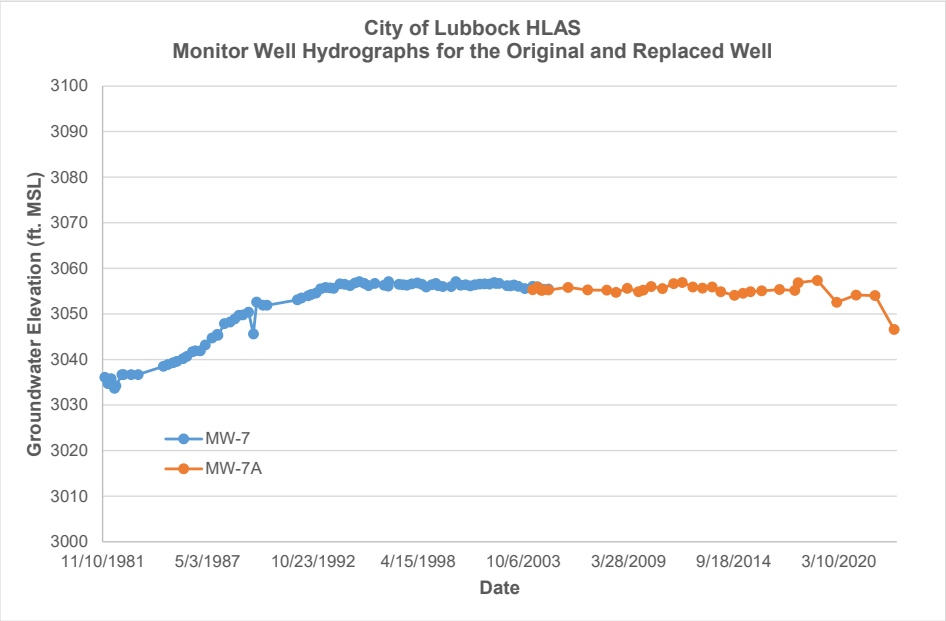
3/28/2009
9/18/2014
3/10/2020
Date
MW-6


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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10/6/2003
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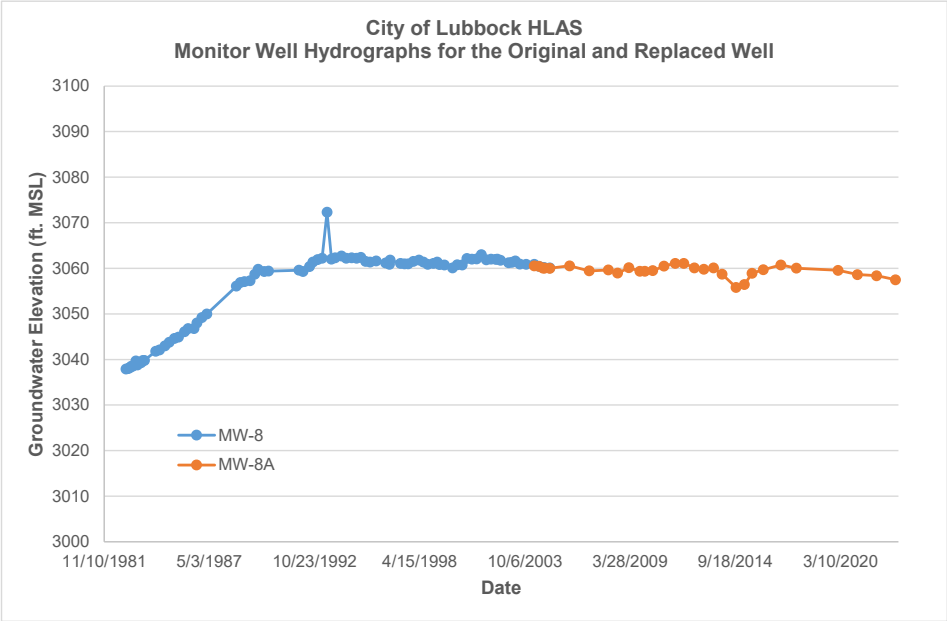
9/18/2014
3/10/2020
Date
MW-7
MW-7A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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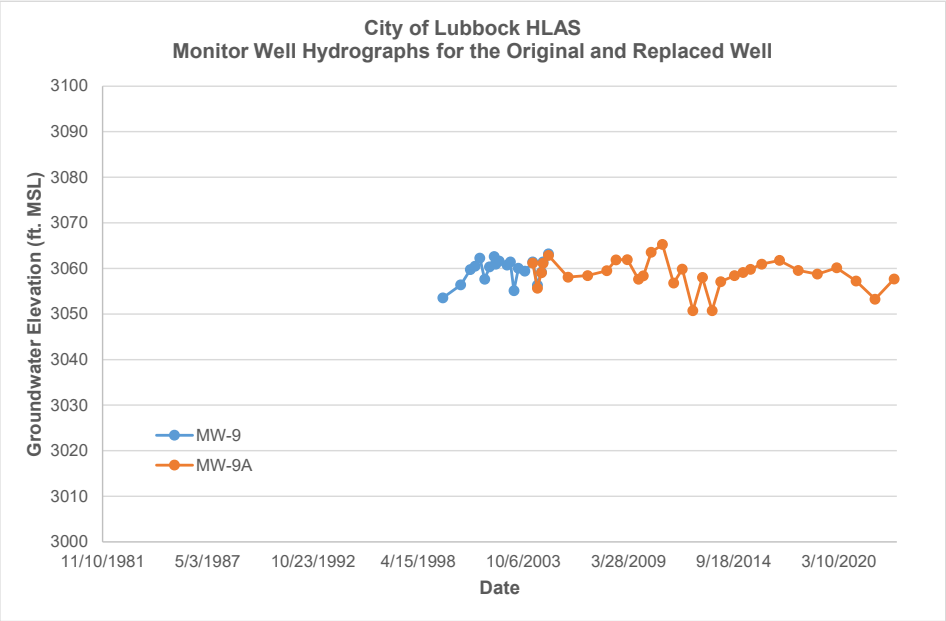
9/18/2014
3/10/2020
Date
MW-8
MW-8A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Monitor Well Hydrographs for the Original and Replaced Well
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9/18/2014
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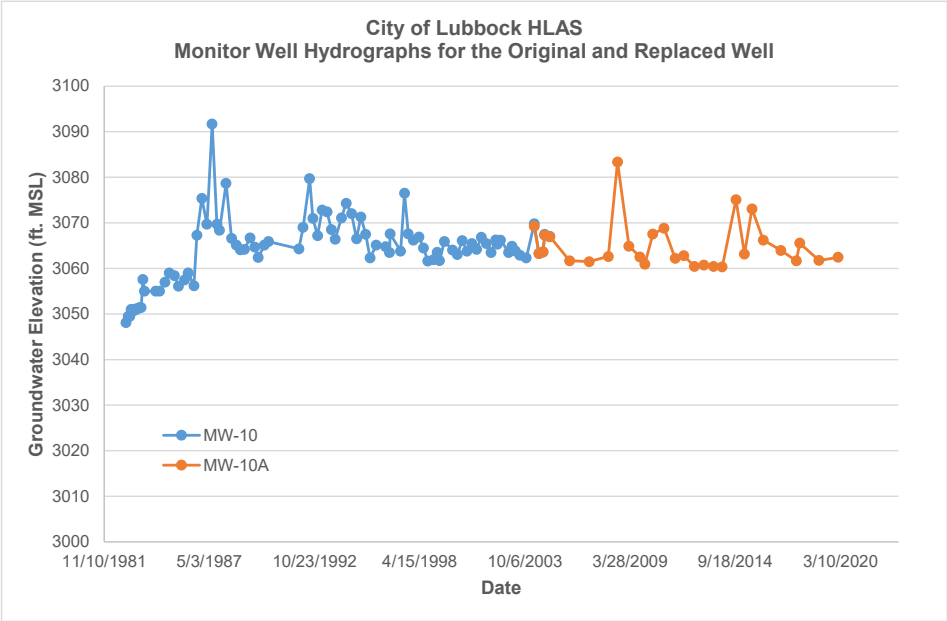
Date
MW-9
MW-9A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Monitor Well Hydrographs for the Original and Replaced Well
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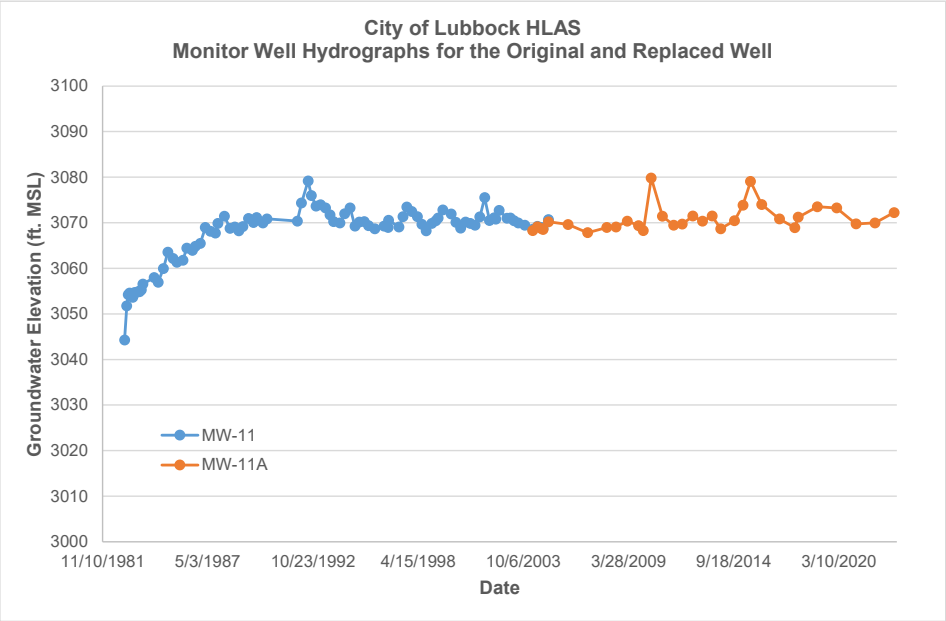
Date
MW-10
MW-10A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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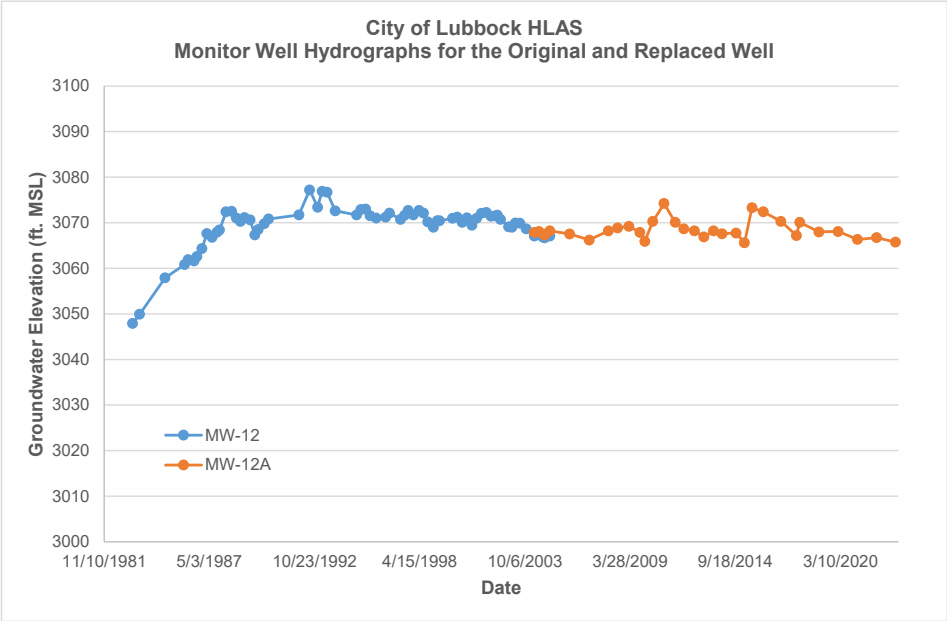
9/18/2014
3/10/2020
Date
MW-11
MW-11A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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3/10/2020
Date
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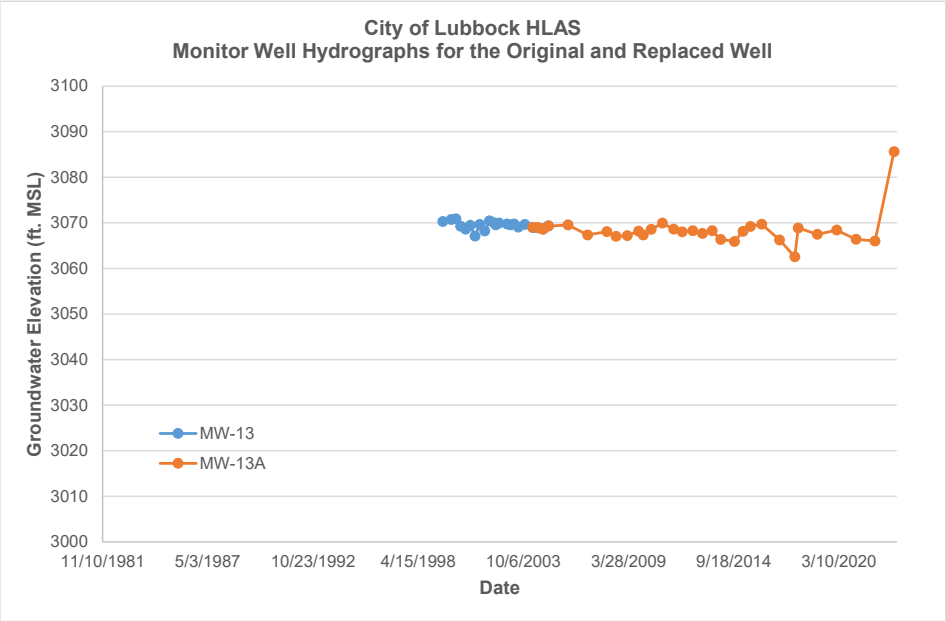
MW-12A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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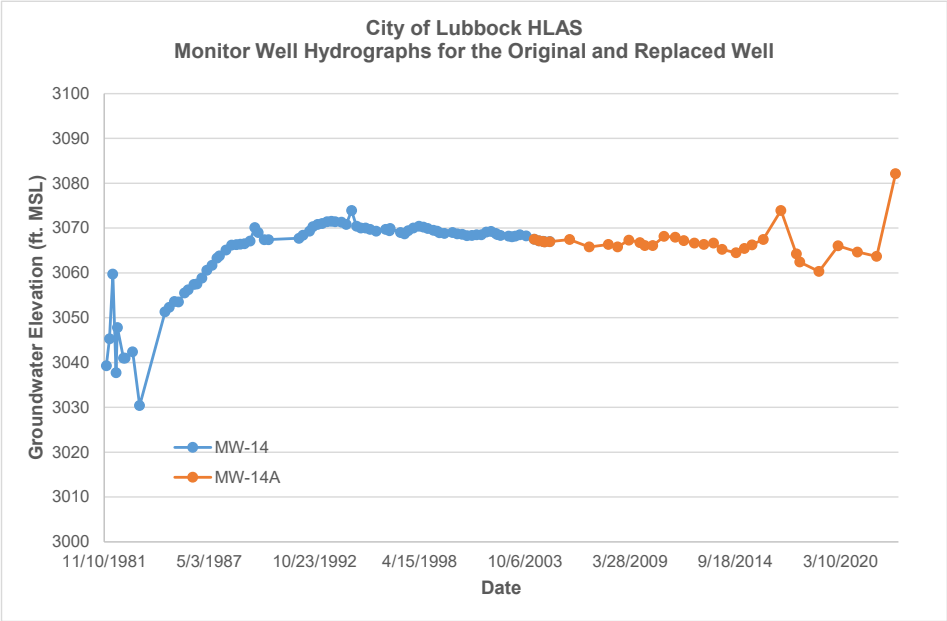
Date
MW-13
MW-13A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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Date
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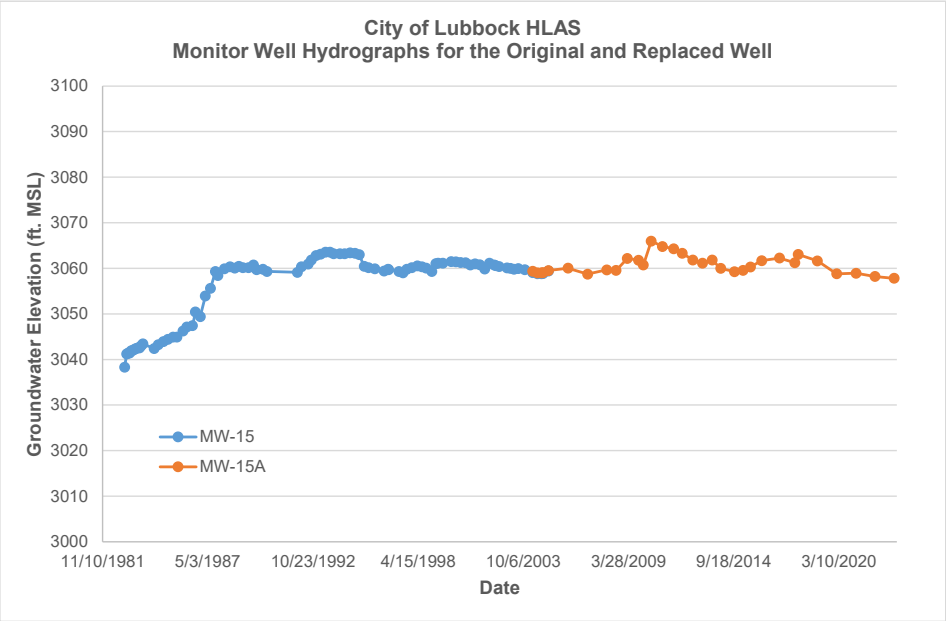
MW-14A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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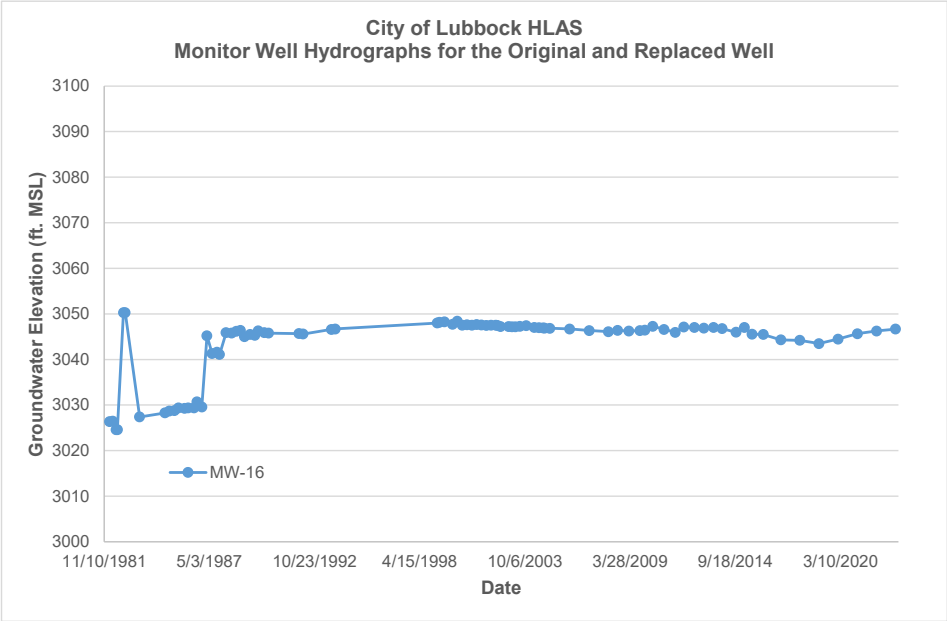
9/18/2014
3/10/2020
Date
MW-15
MW-15A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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9/18/2014
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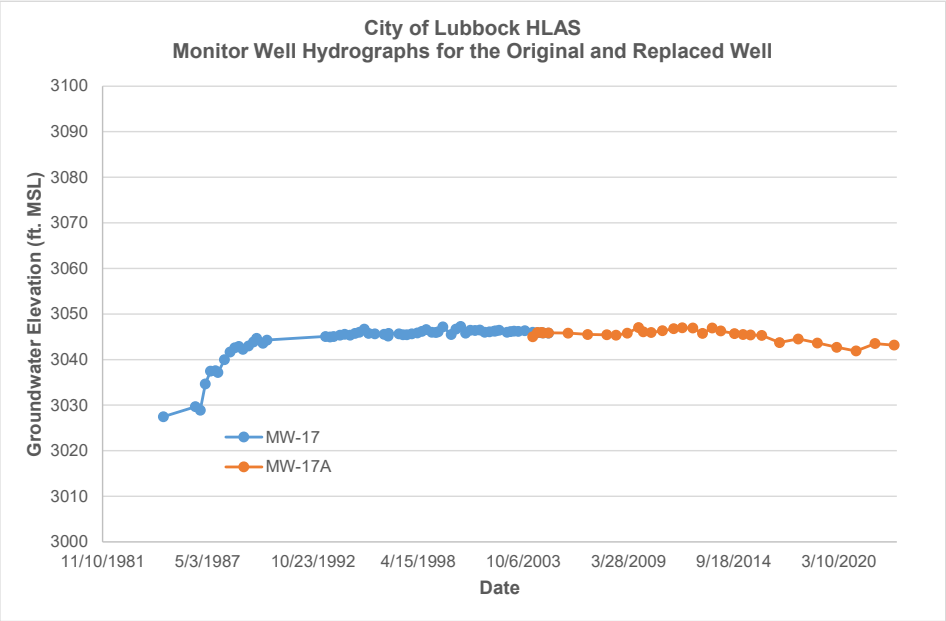
Date
MW-16


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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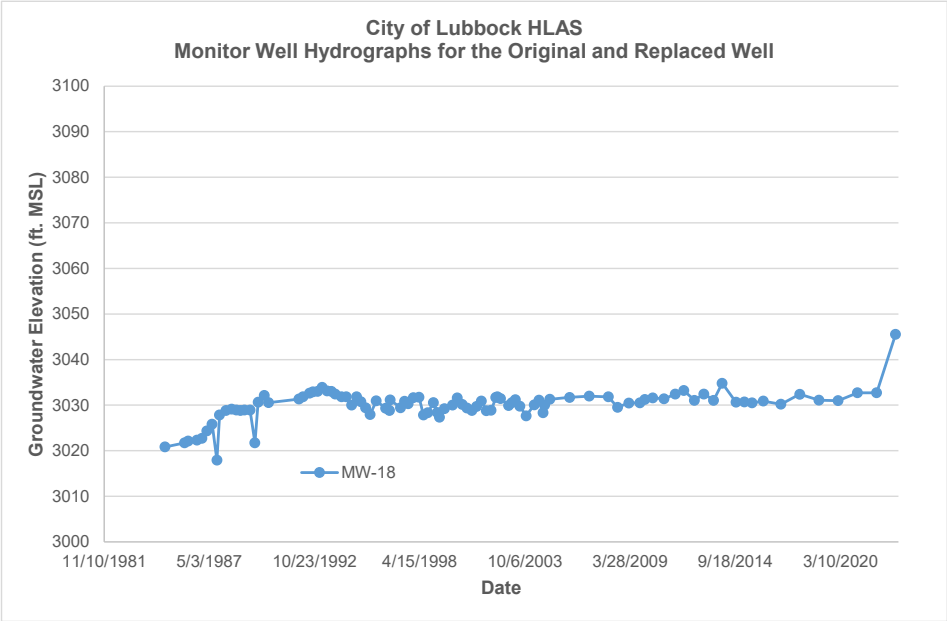
3/10/2020
Date
MW-17
MW-17A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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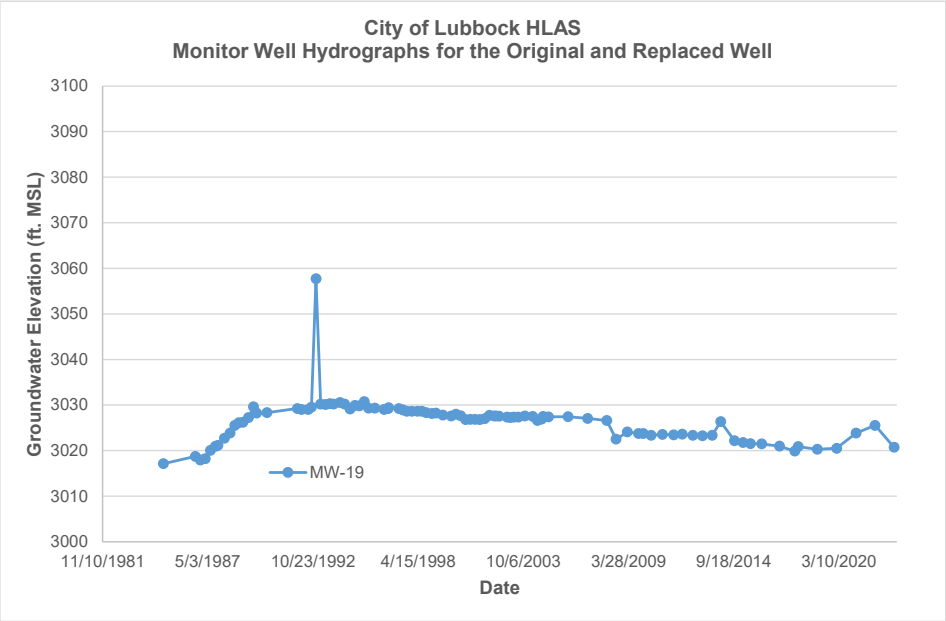
Date
MW-18


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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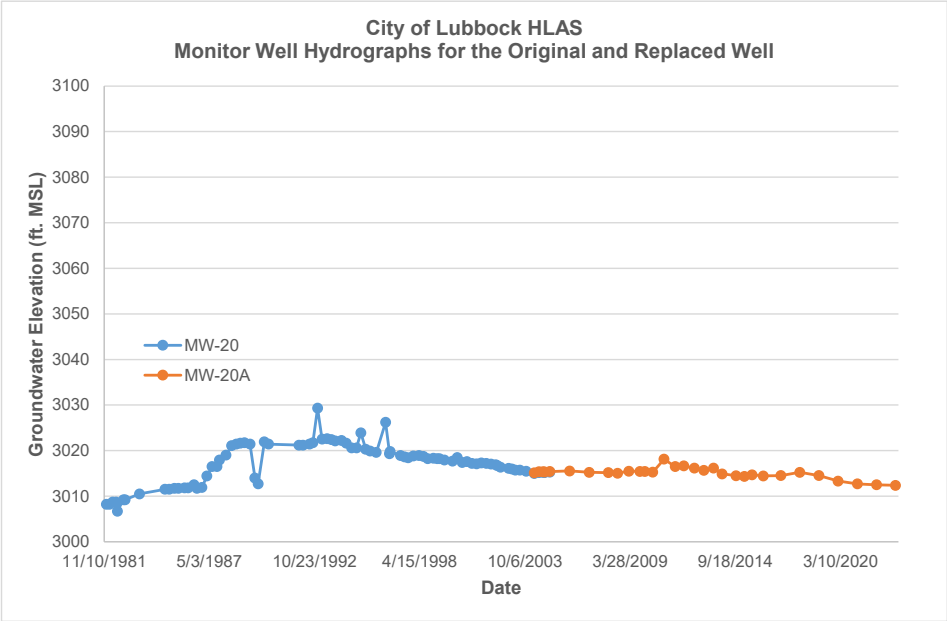
Date
MW-19


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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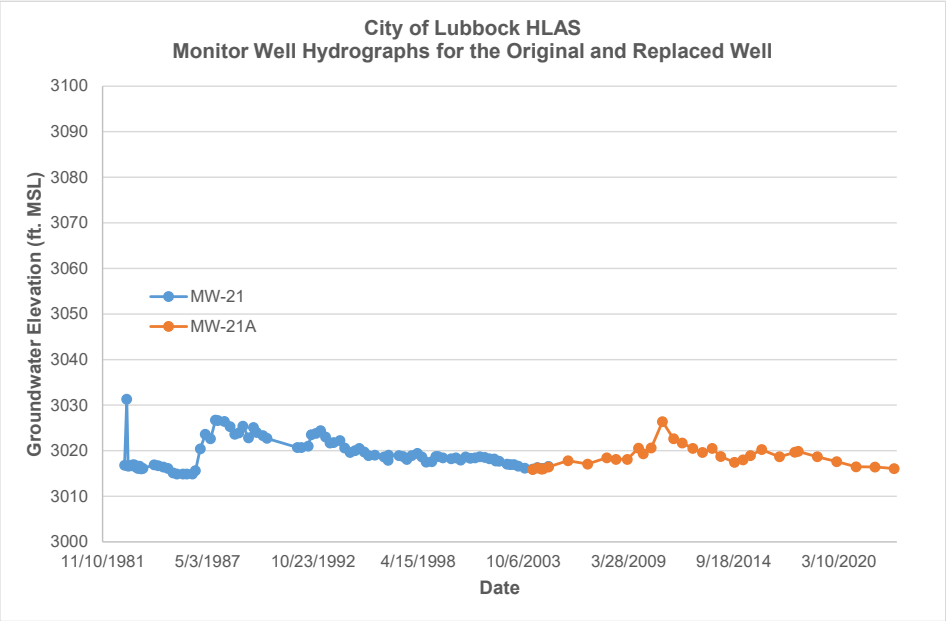
Date
MW-20
MW-20A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
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MW-21
MW-21A
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3/28/2009
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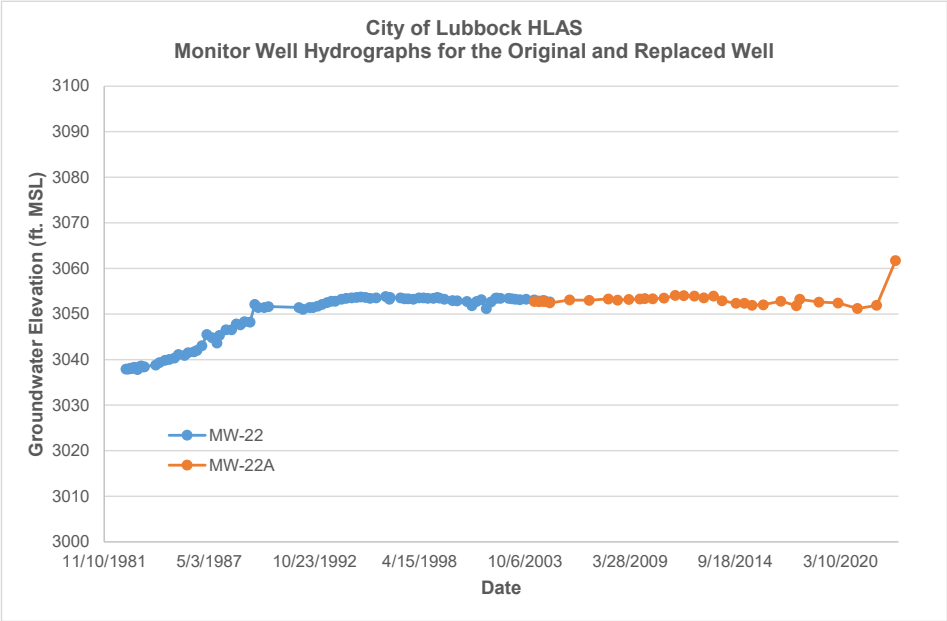
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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3030
3020
3010
3000
MW-22
MW-22A
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10/23/1992
4/15/1998
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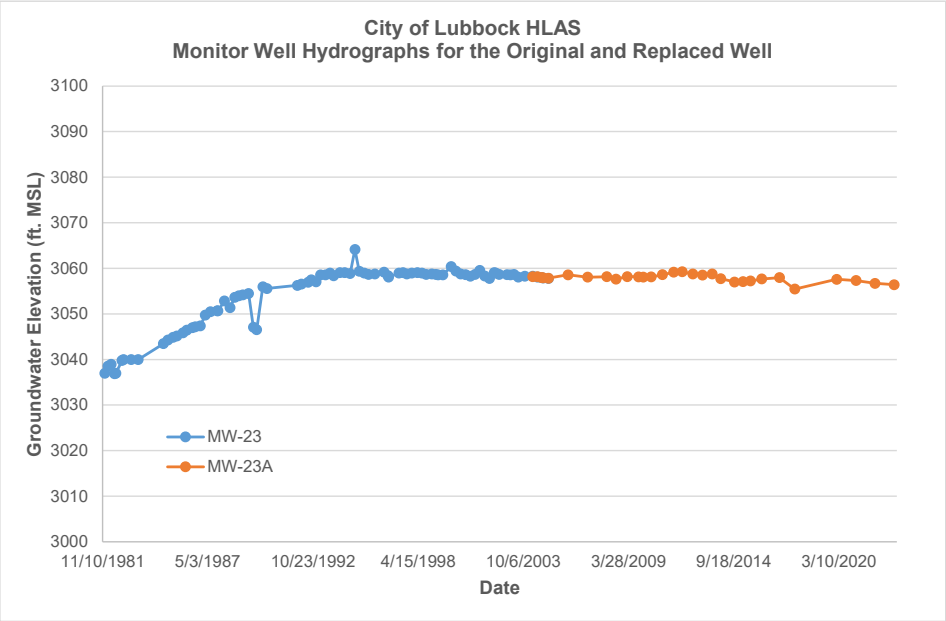
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
3080
3070
3060
3050
3040
3030
3020
3010
3000
MW-23
MW-23A
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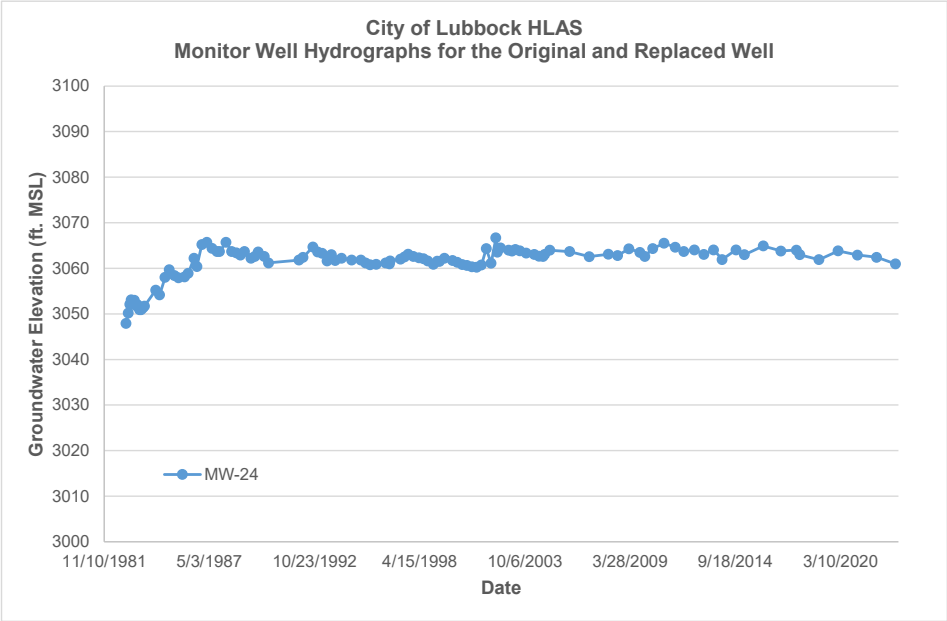
10/23/1992
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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3080
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3050
3040
3030
3020
3010
3000
MW-24
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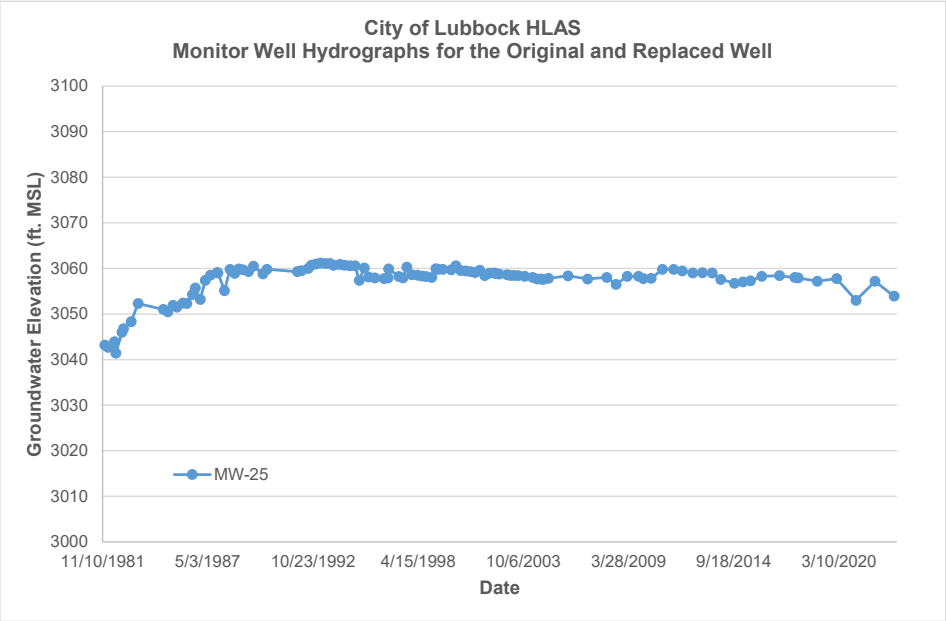
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
3080
3070
3060
3050
3040
3030
3020
3010
3000
MW-25
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4/15/1998
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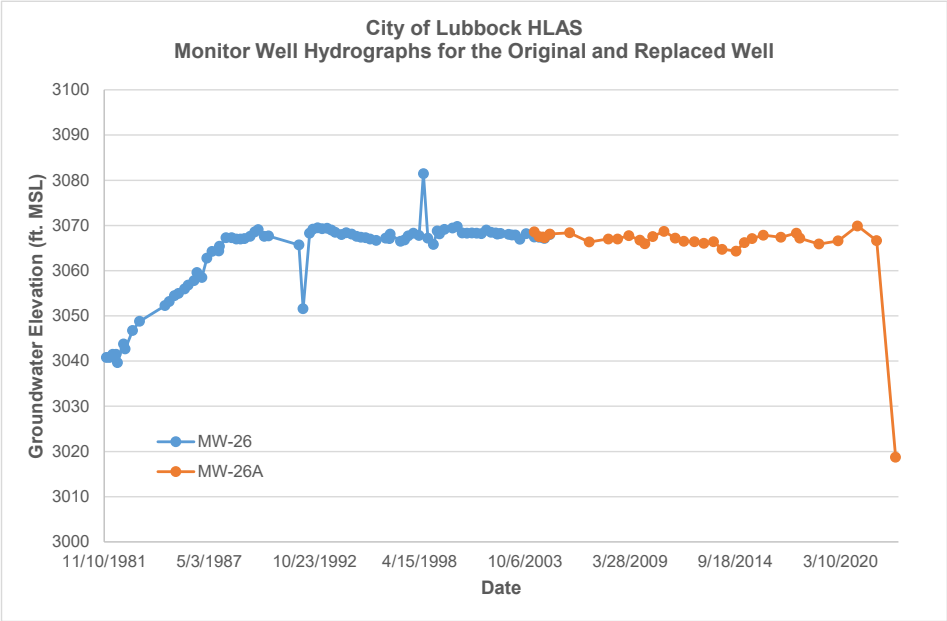
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
3080
3070
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3050
3040
3030
3020
3010
3000
MW-26
MW-26A
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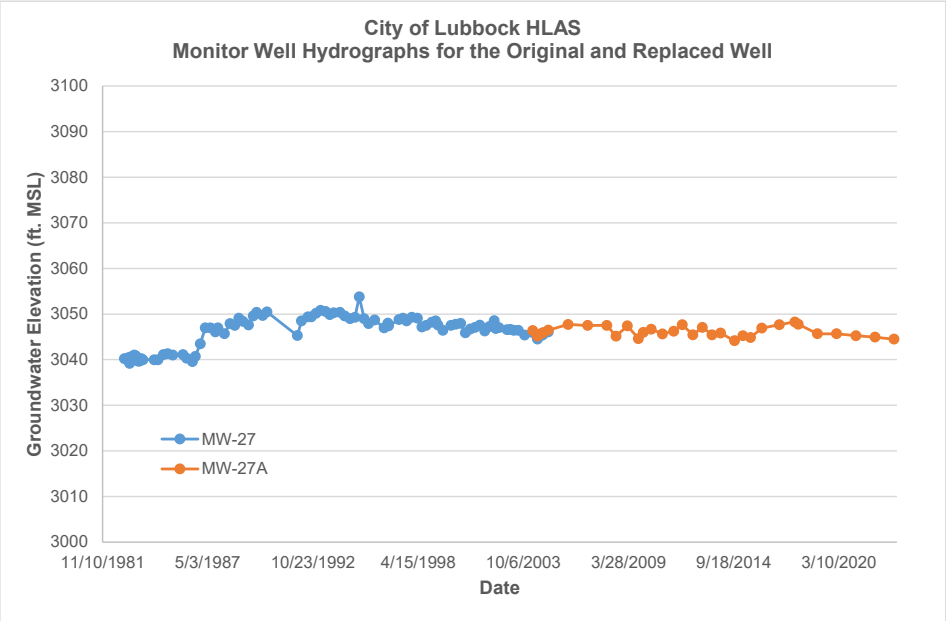
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
3080
3070
3060
3050
3040
3030
3020
3010
3000
MW-27
MW-27A
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10/23/1992
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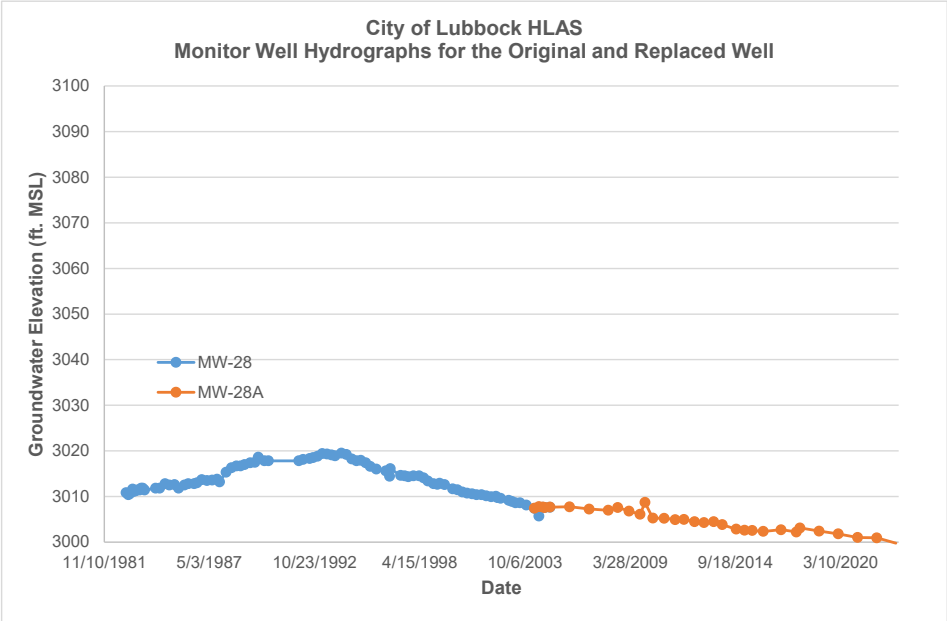
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
3080
3070
3060
3050
3040
3030
3020
3010
3000
MW-28
MW-28A
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4/15/1998
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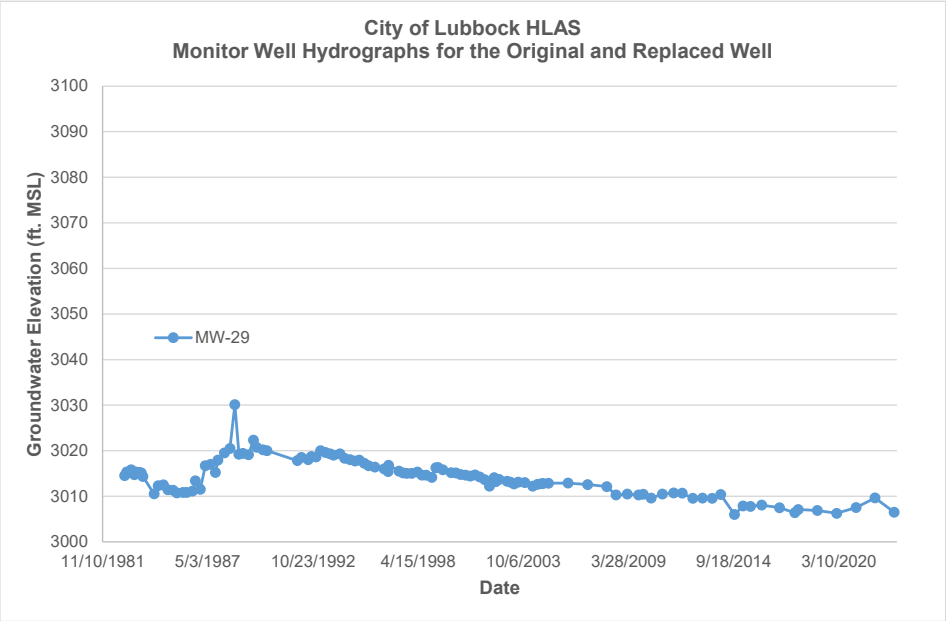
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
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3070
3060
3050
3040
3030
3020
3010
3000
MW-29
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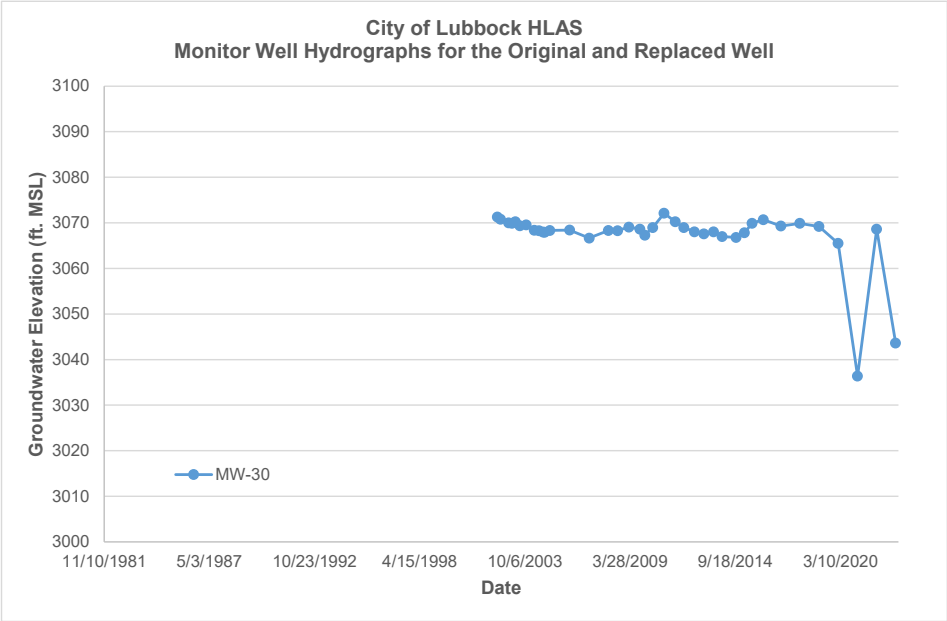
10/23/1992
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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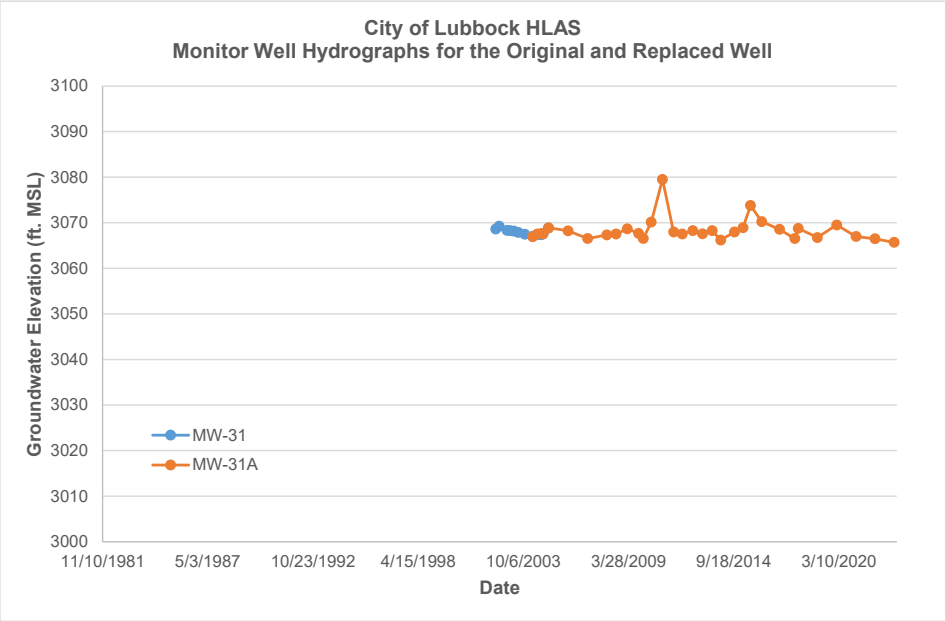
3090
3080
3070
3060
3050
3040
3030
3020
3010
3000
MW-30
11/10/1981
5/3/1987
10/23/1992
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
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3070
3060
3050
3040
3030
3020
3010
3000
MW-31
MW-31A
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10/23/1992
4/15/1998
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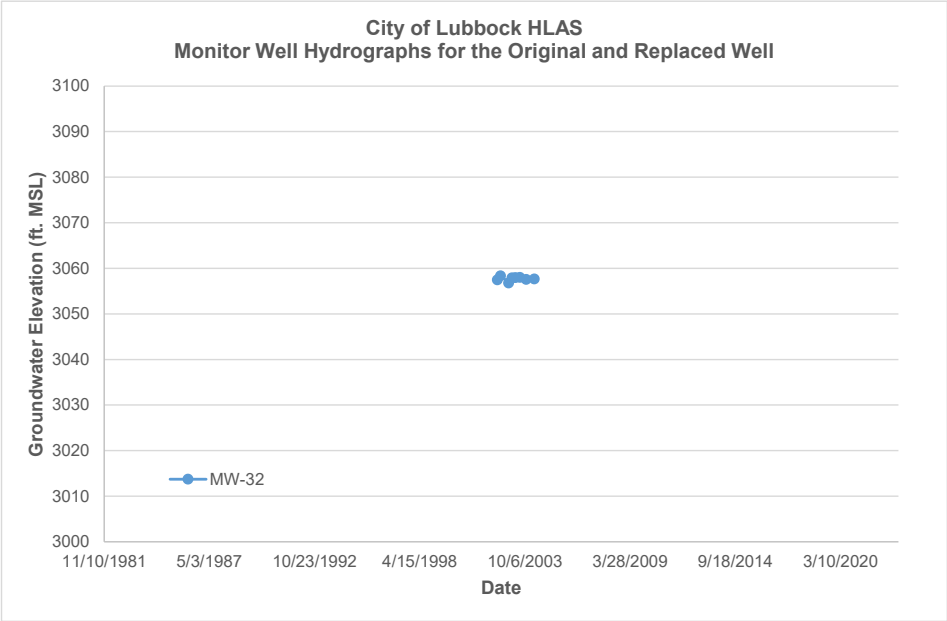
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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3070
3060
3050
3040
3030
3020
3010
3000
MW-32
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10/23/1992
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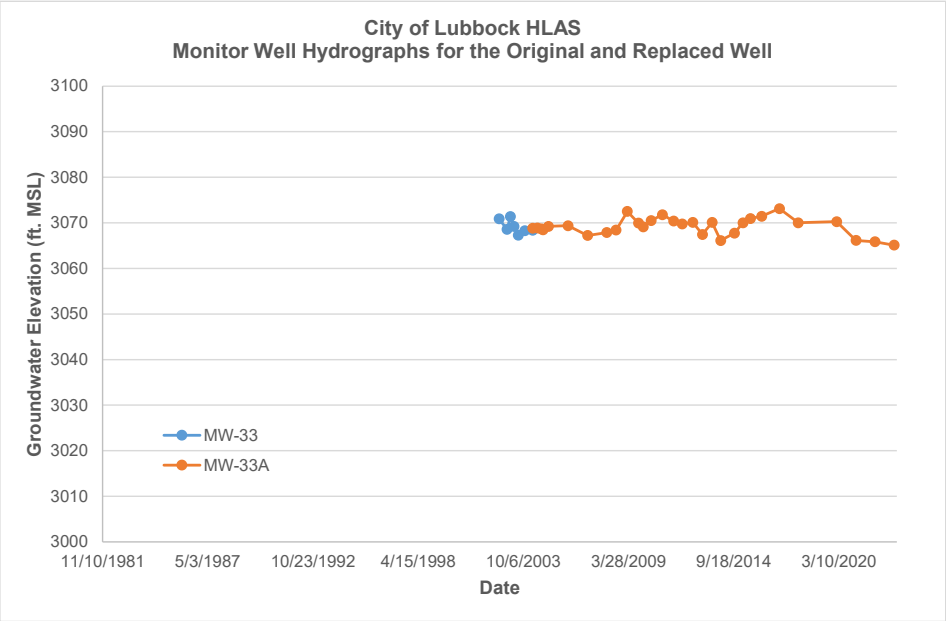
3/28/2009
9/18/2014
3/10/2020
Date


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
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3080
3070
3060
3050
3040
3030
3020
3010
3000
11/10/1981
5/3/1987
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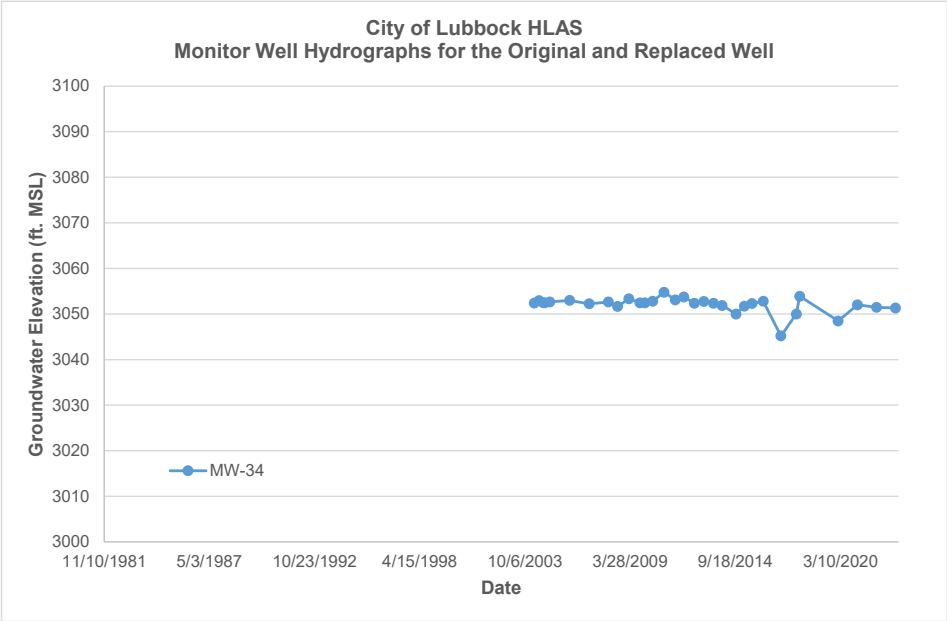
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date
MW-33
MW-33A


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
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3090
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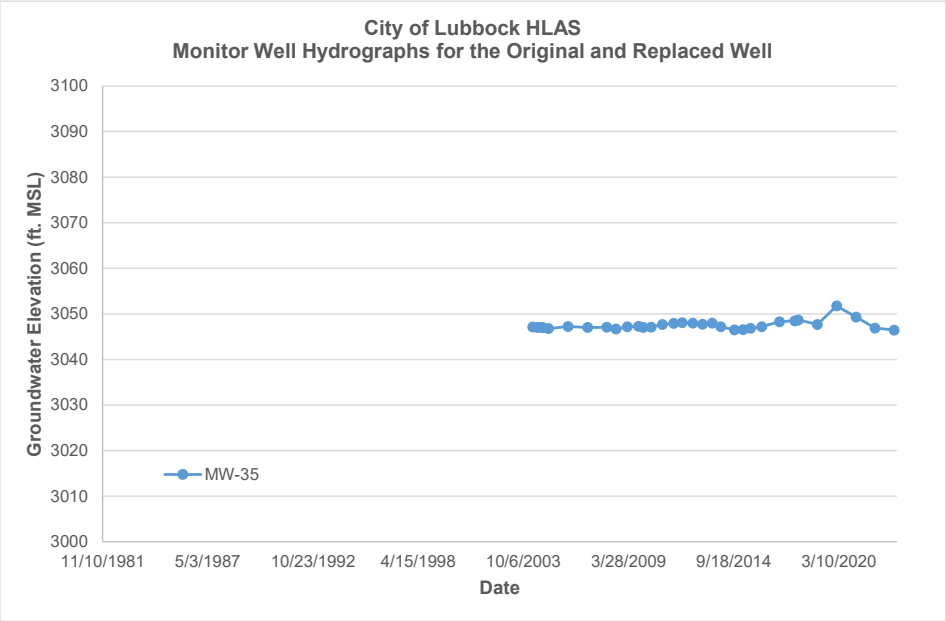
3070
3060
3050
3040
3030
3020
3010
3000
11/10/1981
5/3/1987
10/23/1992
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date
MW-34


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
3080
3070
3060
3050
3040
3030
3020
3010
3000
11/10/1981
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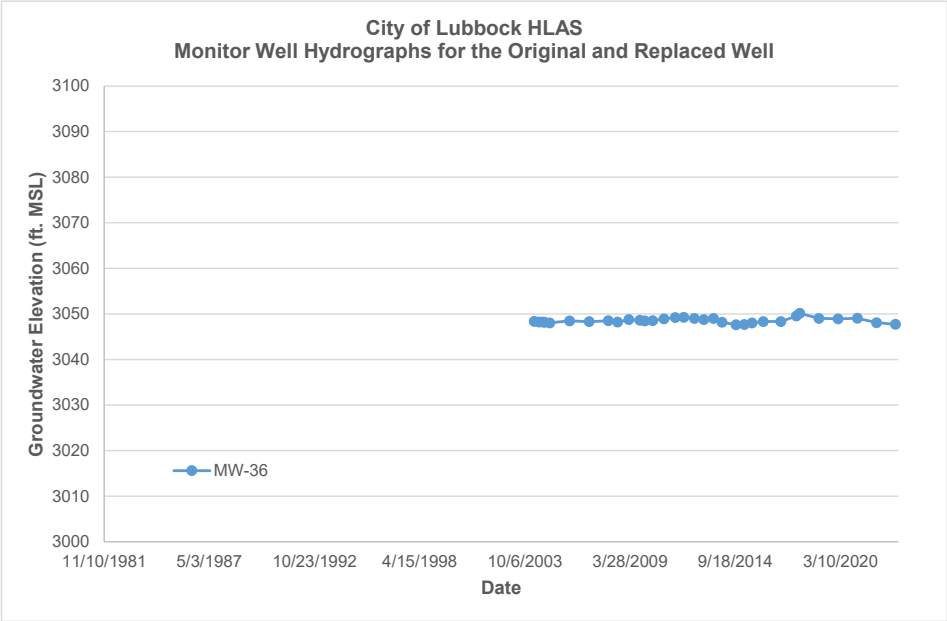
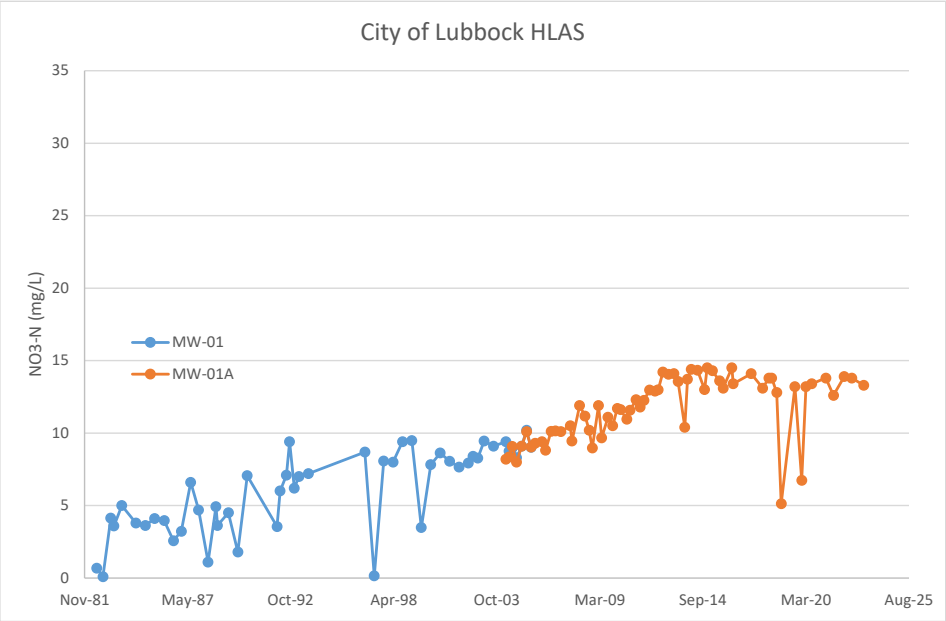
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date
MW-35


City of Lubbock HLAS
Monitor Well Hydrographs for the Original and Replaced Well
Groundwater Elevation (ft. MSL)
3100
3090
3080
3070
3060
3050
3040
3030
3020
3010
3000
11/10/1981
5/3/1987
10/23/1992
4/15/1998
10/6/2003
3/28/2009
9/18/2014
3/10/2020
Date
MW-36

D

Plots of Nitrate-N Concentrations for Individual HLAS Wells


City of Lubbock HLAS
NO3-N (mg/L)
35
30
25
20
15
10
5
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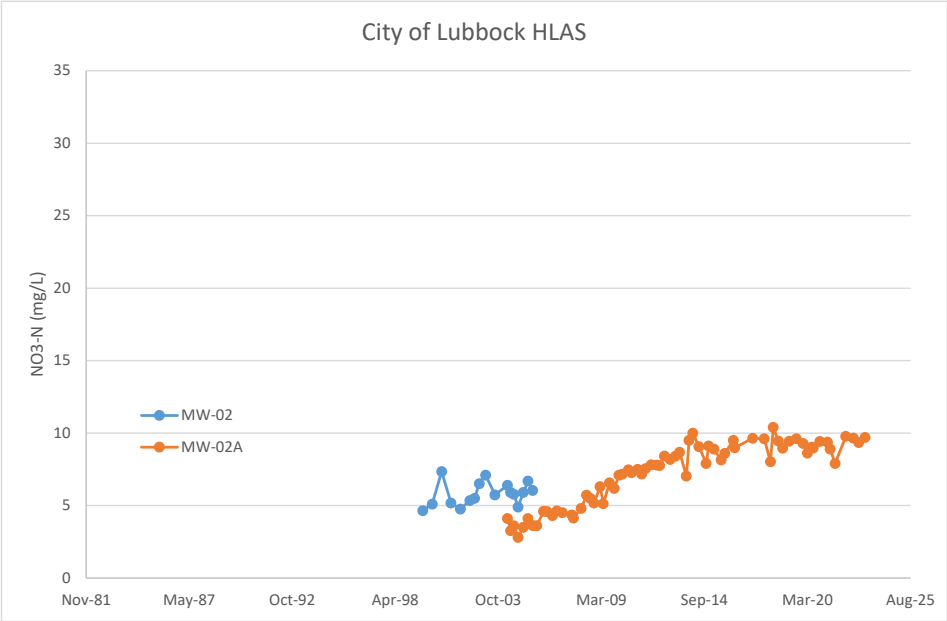
MW-01
MW-01A
Nov-81
May-87
Oct-92
Apr-98
Oct-03
Mar-09
Sep-14
Mar-20
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
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30
25
20
15
10
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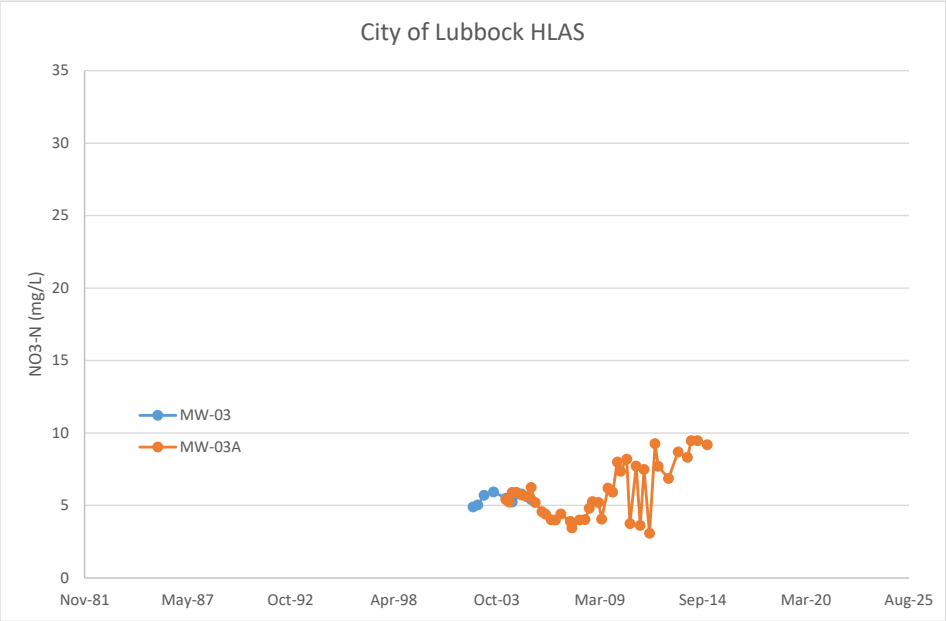
MW-02
MW-02A
Nov-81
May-87
Oct-92
Apr-98
Oct-03
Mar-09
Sep-14
Mar-20
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
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30
25
20
15
10
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MW-03
MW-03A
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Oct-03
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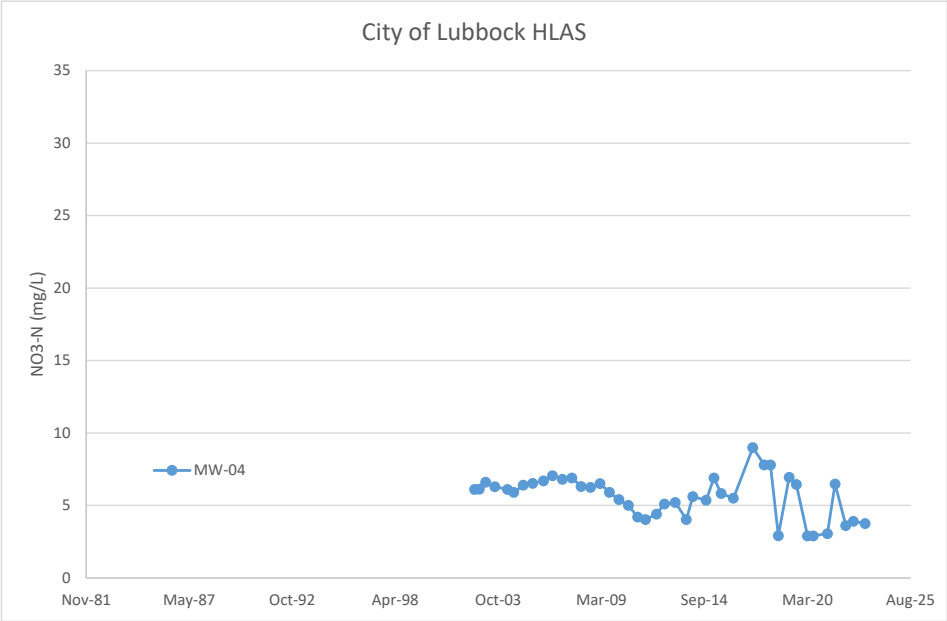
Sep-14
Mar-20
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
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30
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20
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MW-04
Nov-81
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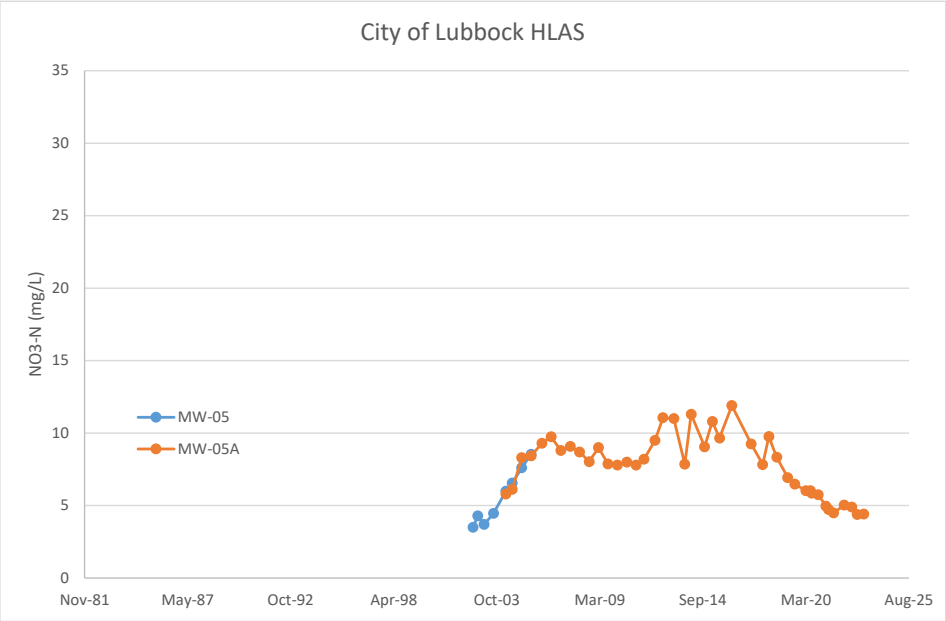
Sep-14
Mar-20
Aug-25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NO3-N (mg/L)
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30
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20
15
10
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MW-05A
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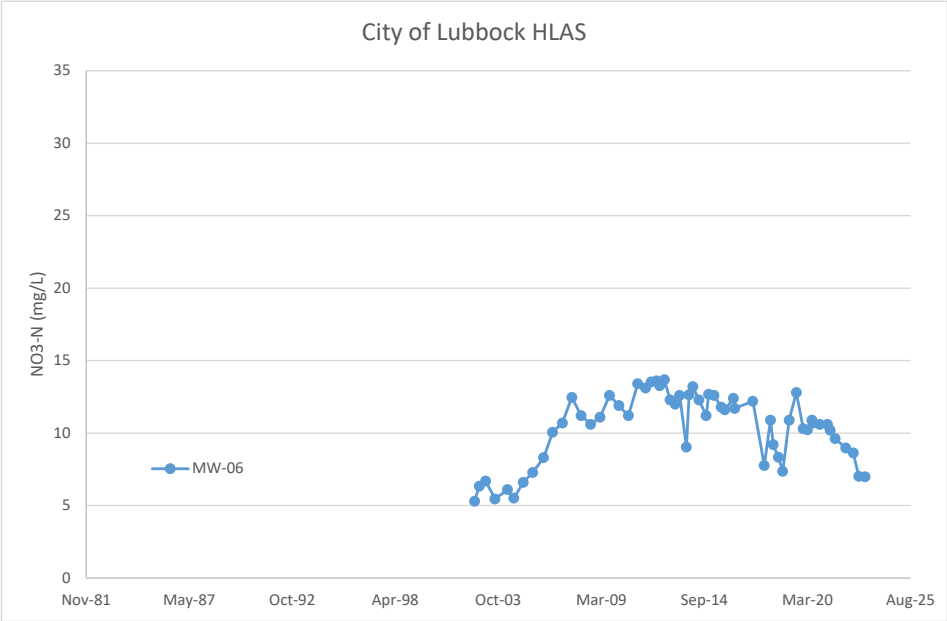
Sep-14
Mar-20
Aug-25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NO3-N (mg/L)
35
30
25
20
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Nov-81
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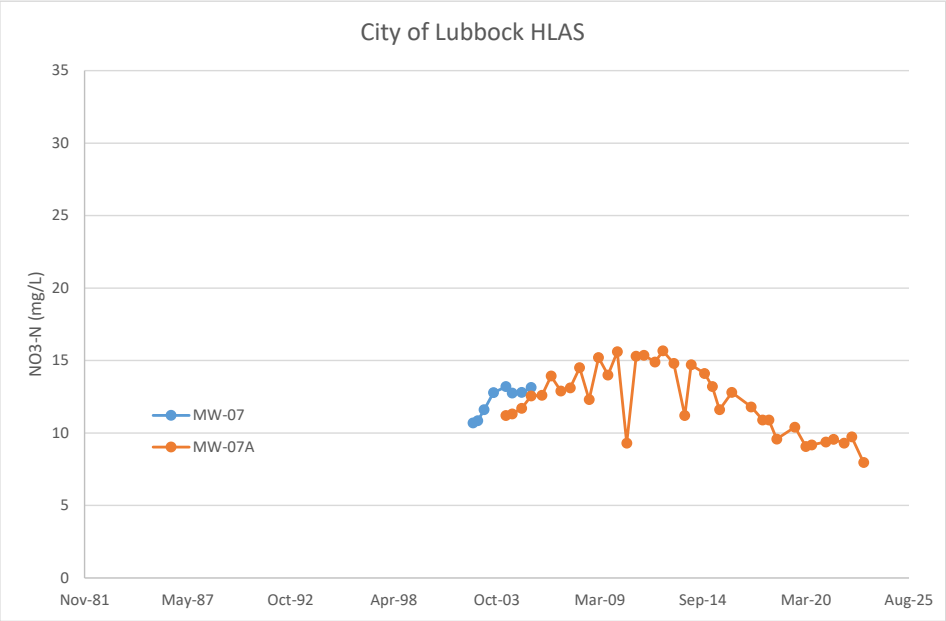
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
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30
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20
15
10
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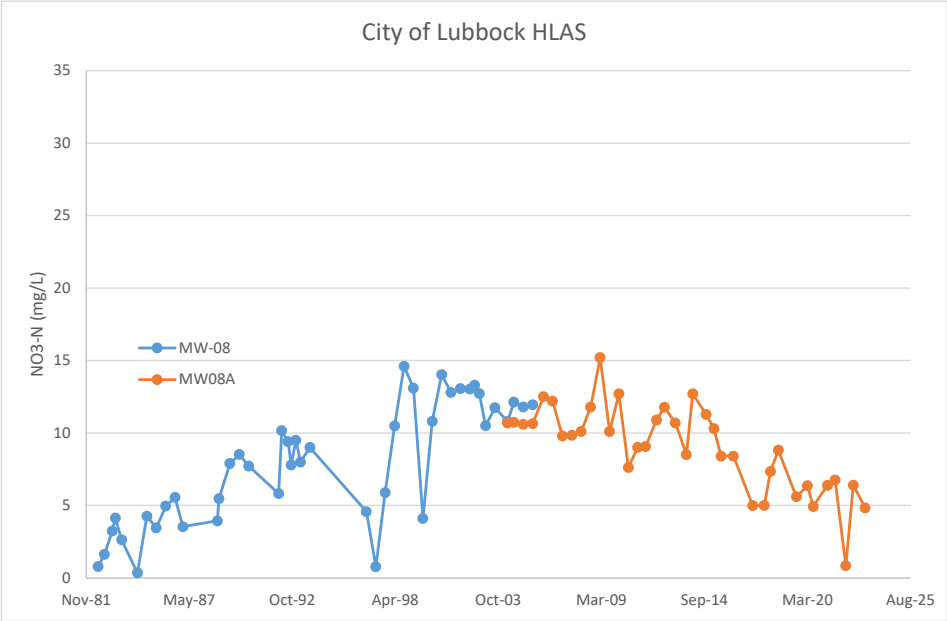
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
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30
25
20
15
10
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MW08A
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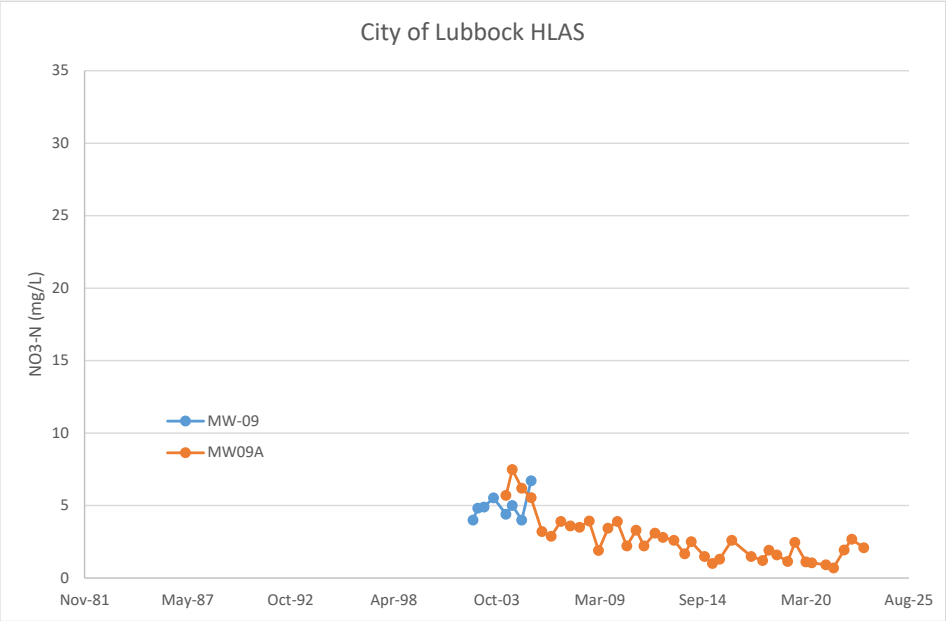
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
35
30
25
20
15
10
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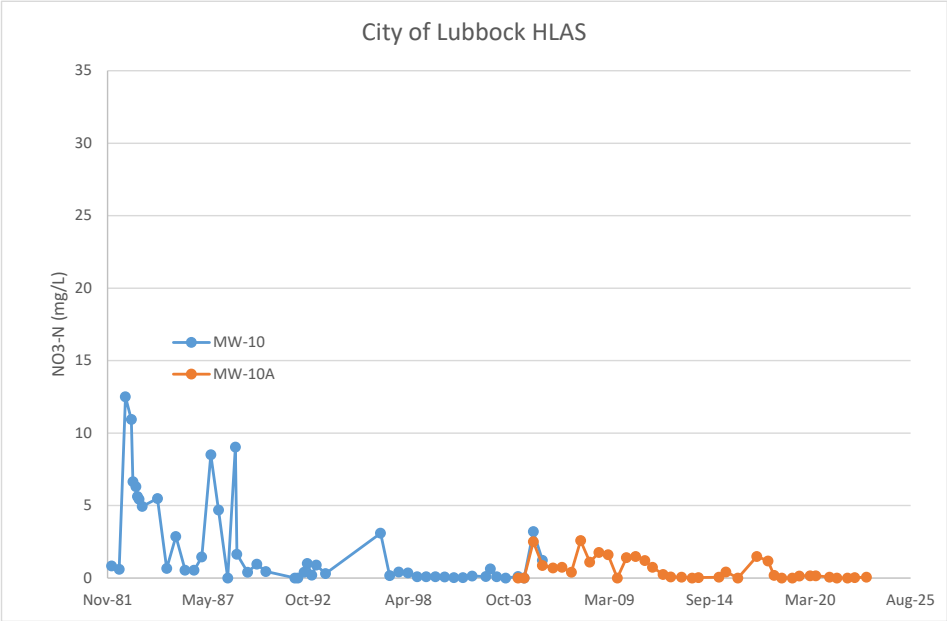
MW-09
MW09A


City of Lubbock HLAS
NO3-N (mg/L)
35
30
25
20
15
10
5
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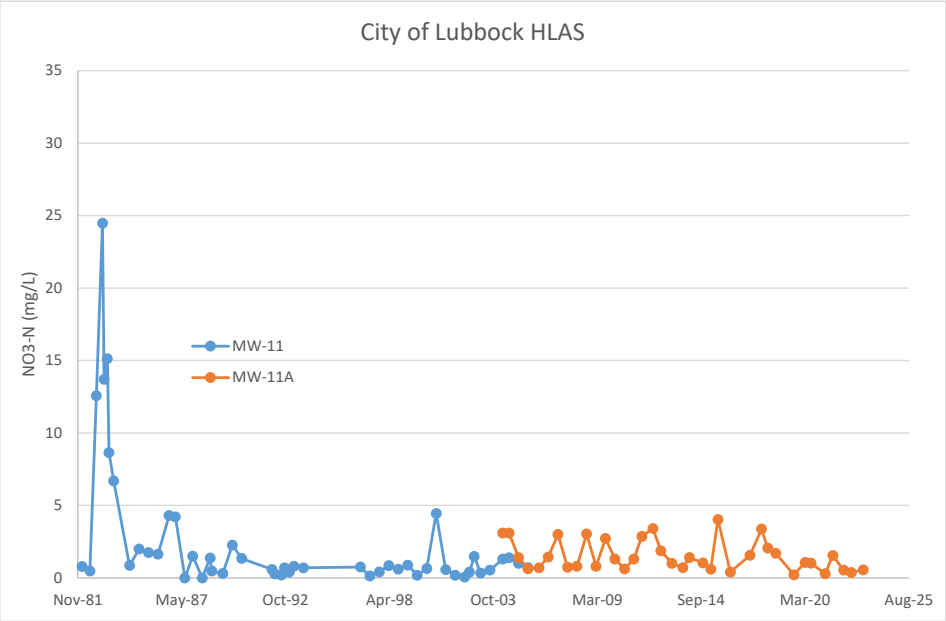
May-87
Oct-92
Apr-98
Oct-03
Mar-09
Sep-14
Mar-20
Aug-25
MW-10
MW-10A


City of Lubbock HLAS
NO3-N (mg/L)
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30
25
20
15
10
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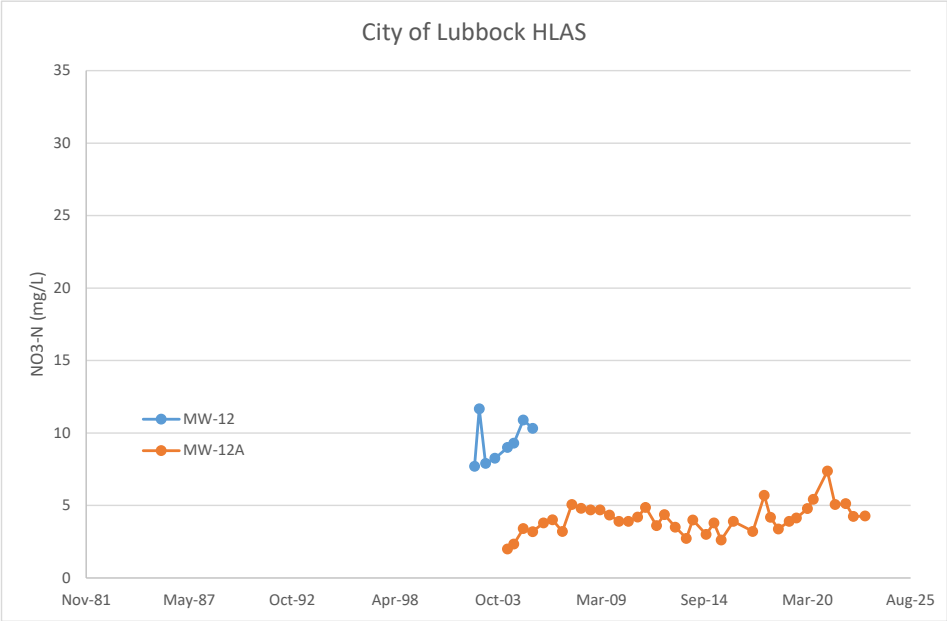
Oct-92
Apr-98
Oct-03
Mar-09
Sep-14
Mar-20
Aug-25
MW-11
MW-11A


City of Lubbock HLAS
NO3-N (mg/L)
35
30
25
20
15
10
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Apr-98
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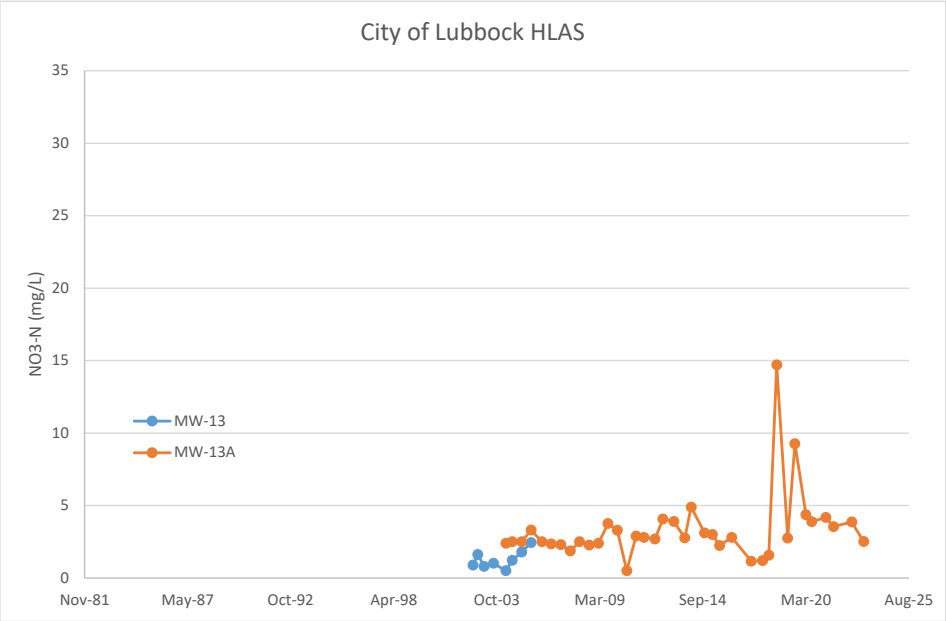
Mar-20
Aug-25
MW-12
MW-12A


City of Lubbock HLAS
NO3-N (mg/L)
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30
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20
15
10
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MW-13A
Nov-81
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Oct-92
Apr-98
Oct-03
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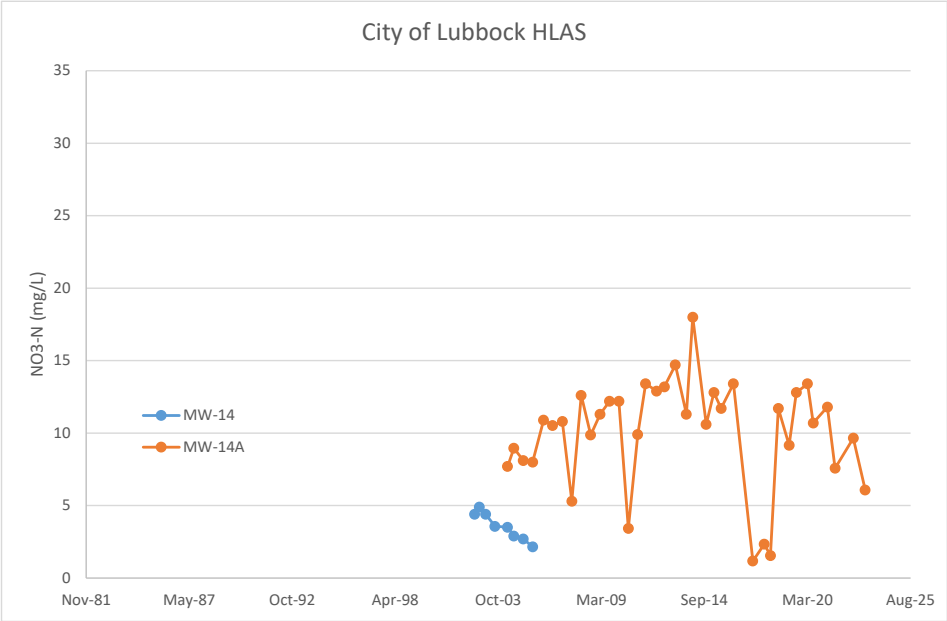
Sep-14
Mar-20
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
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25
20
15
10
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MW-14A
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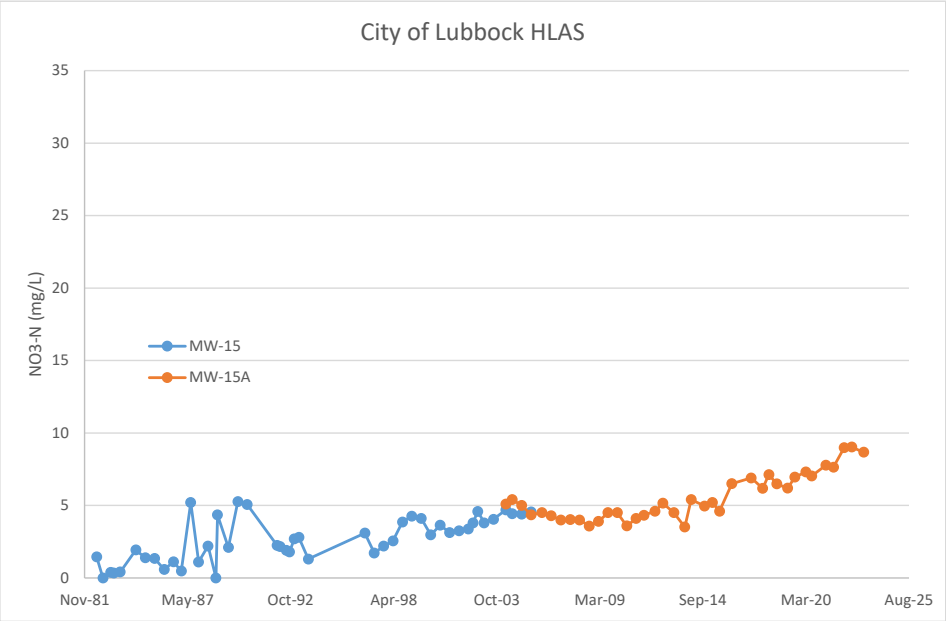
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
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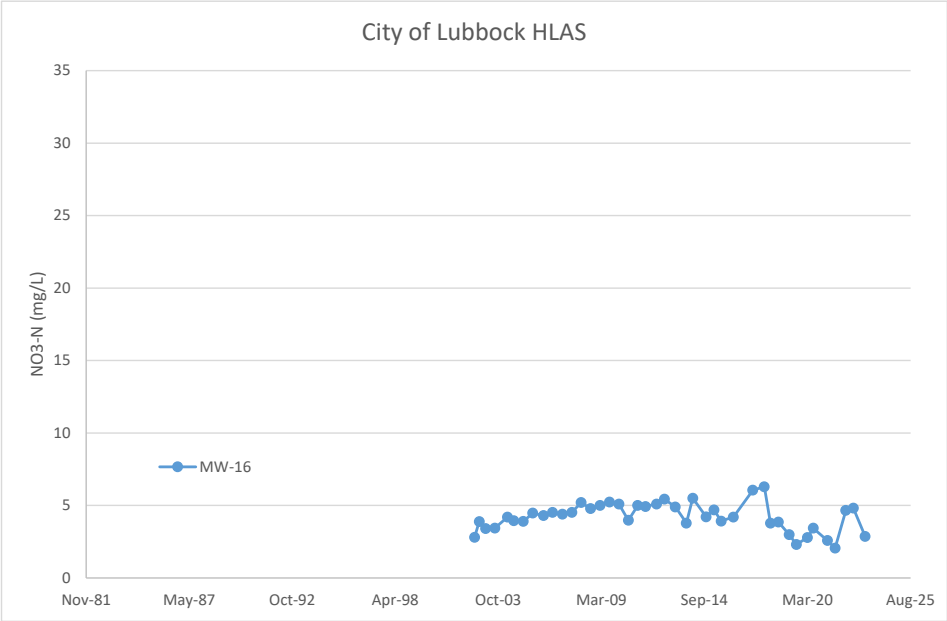
Aug-25


City of Lubbock HLAS
NO3-N (mg/L)
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25
20
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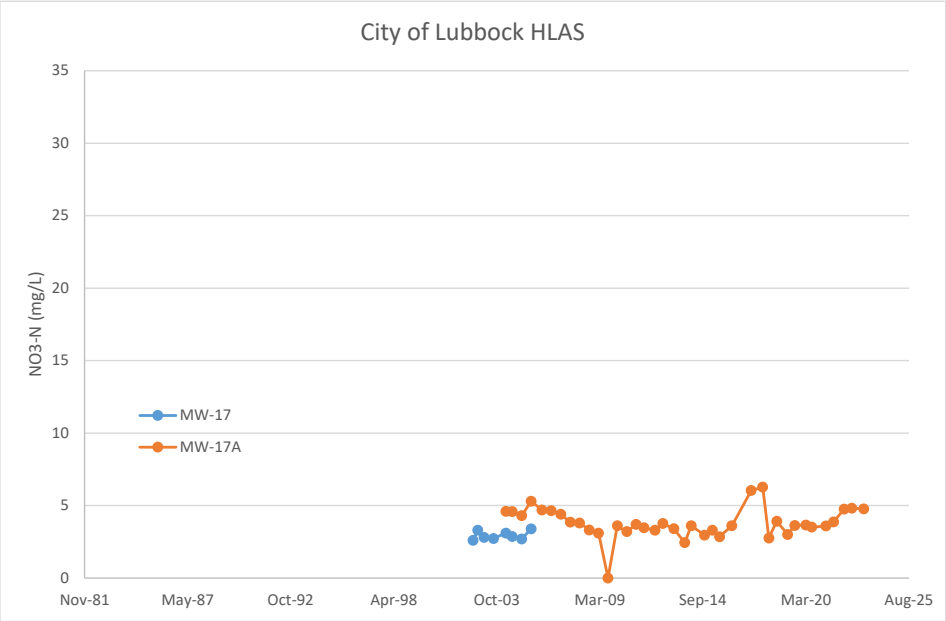
Mar-20
Aug-25


City of Lubbock HLAS
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15
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MW-17A
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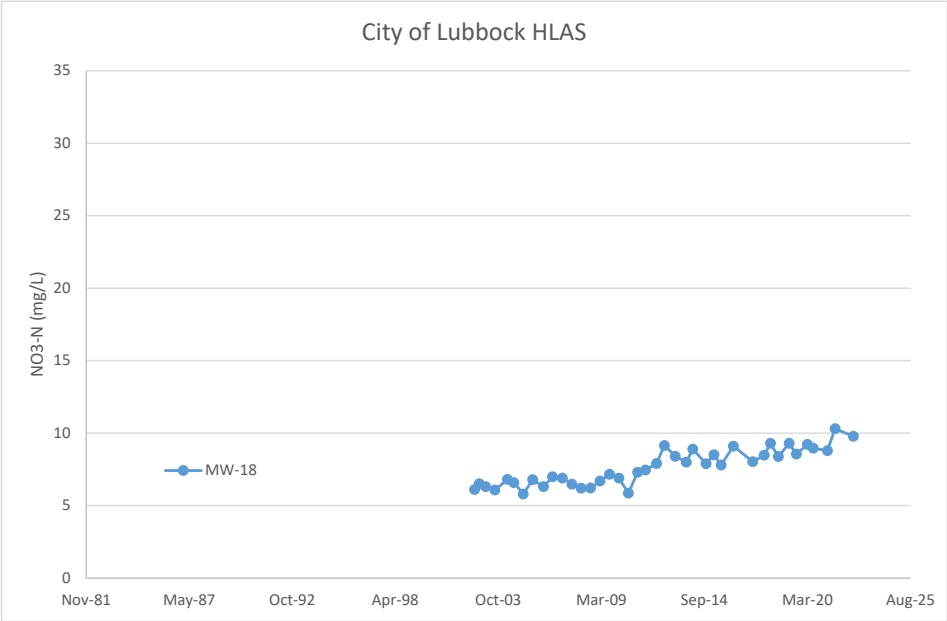
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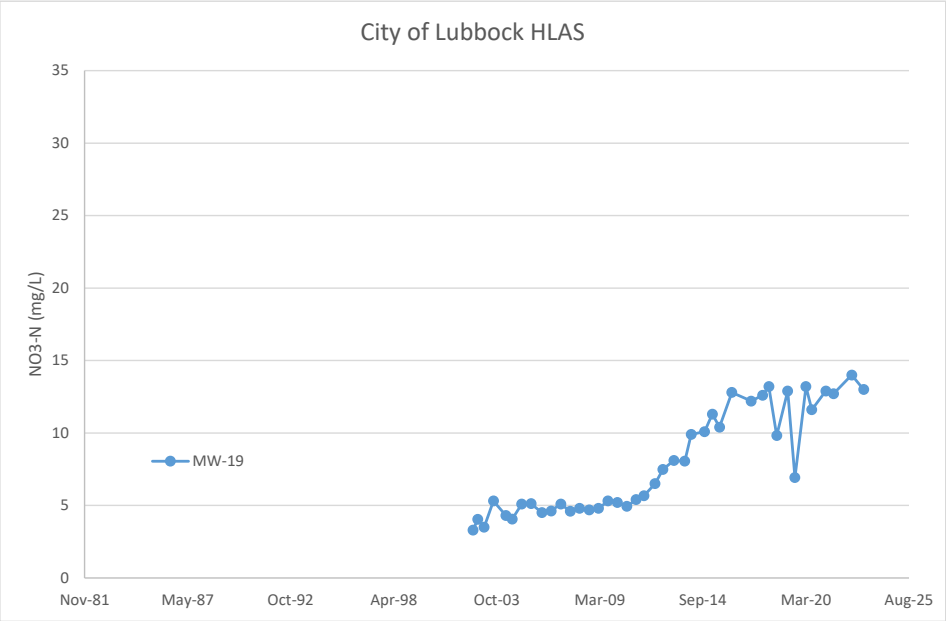
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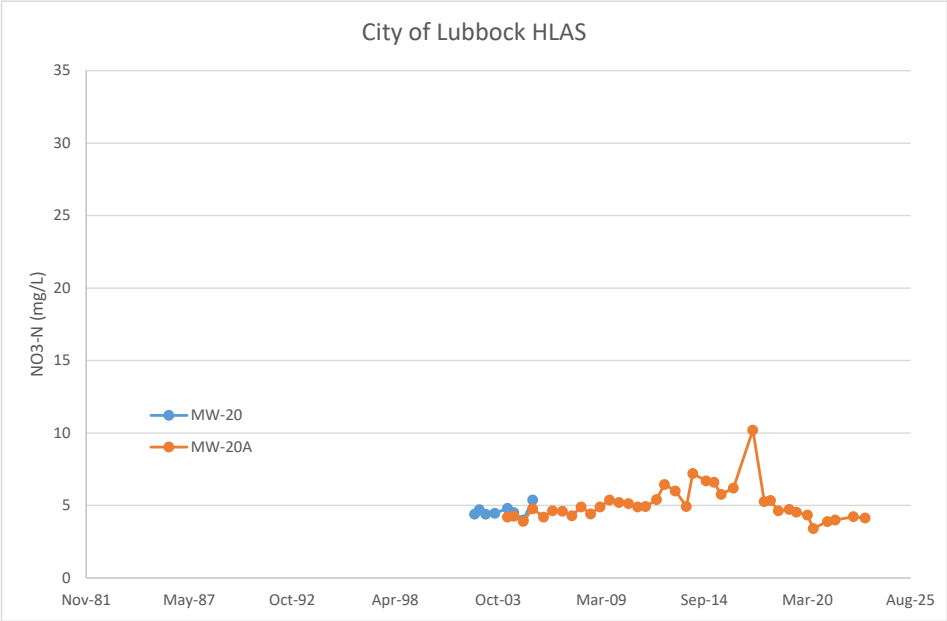
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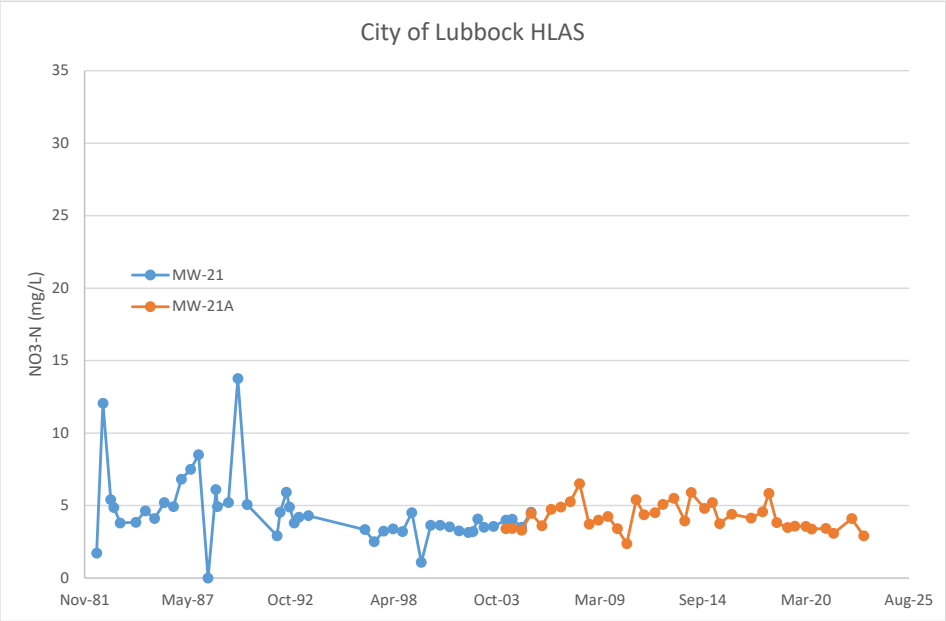
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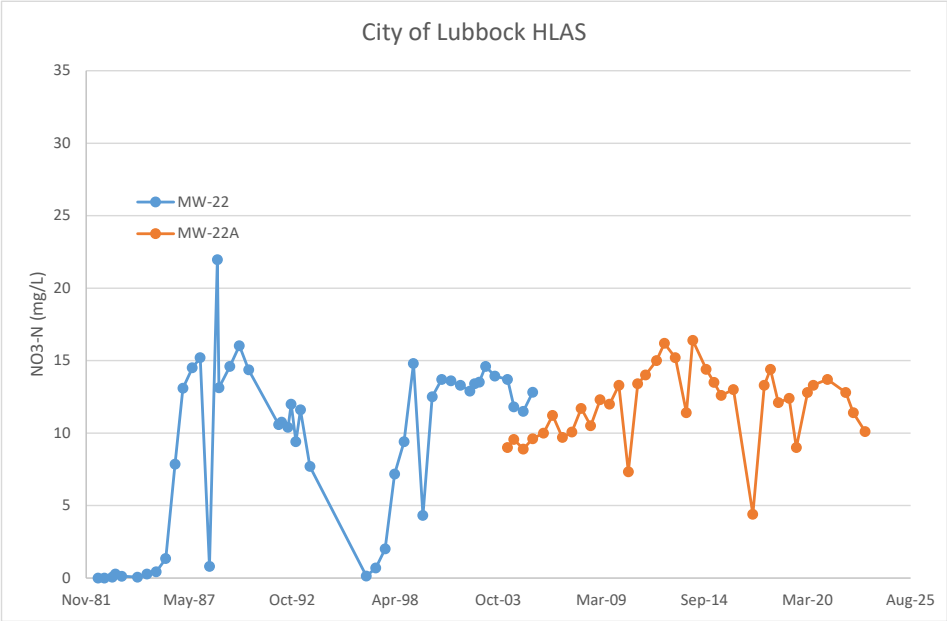
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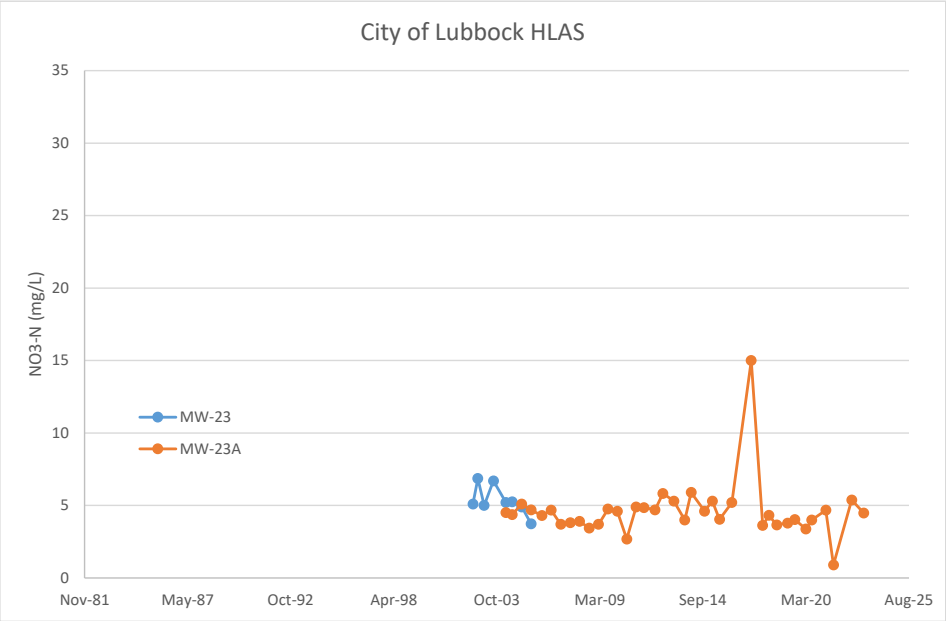
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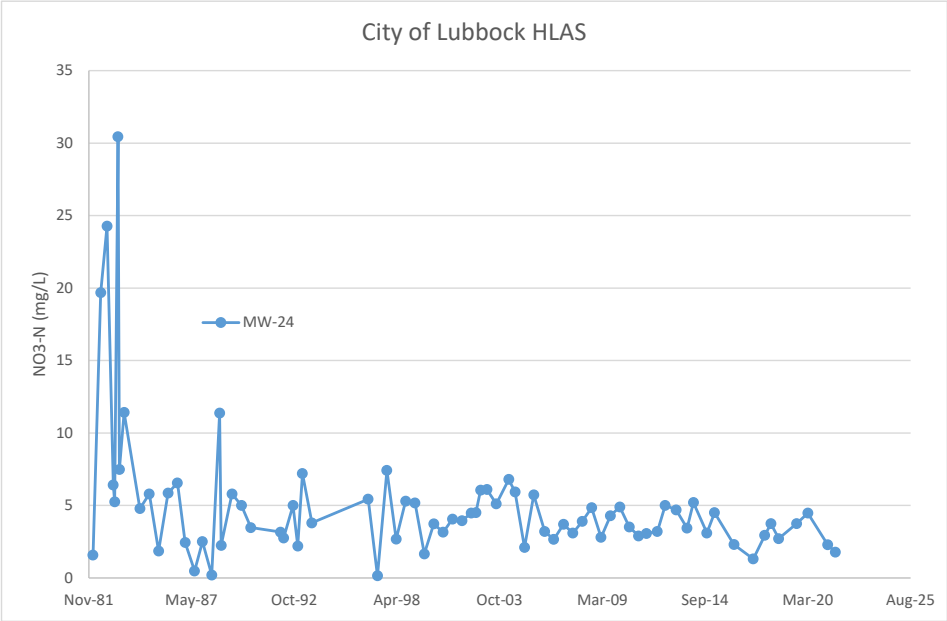
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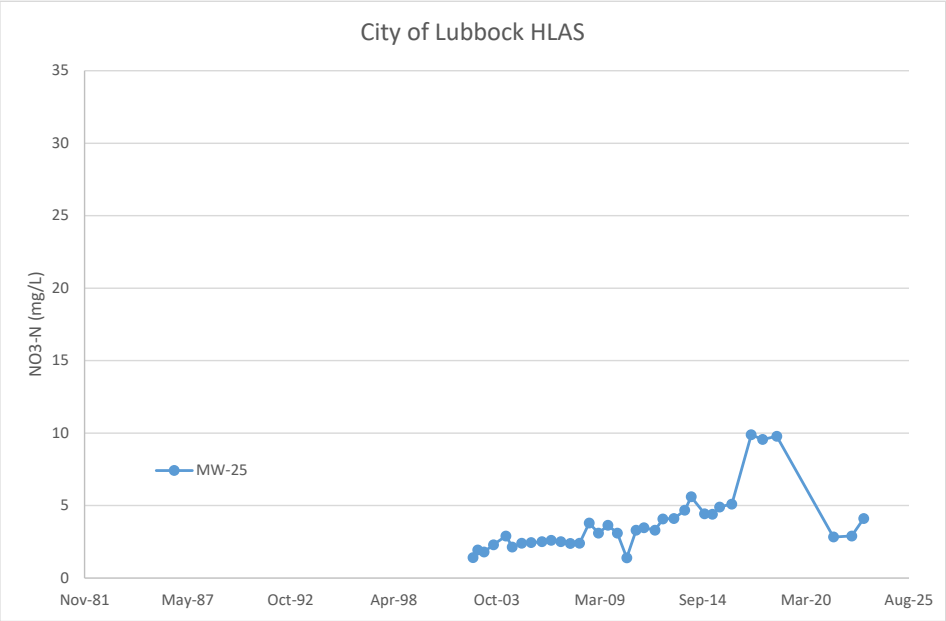
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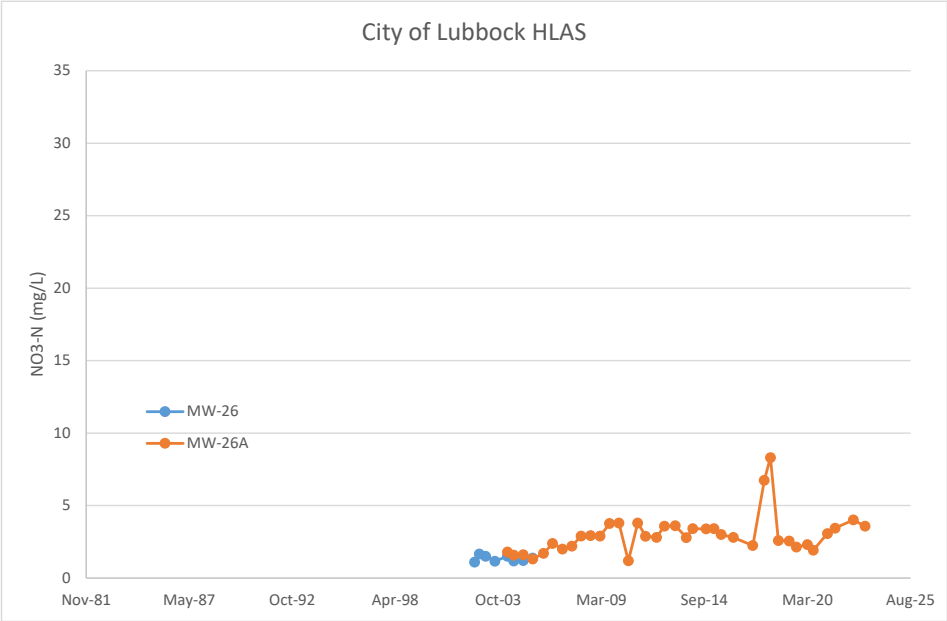
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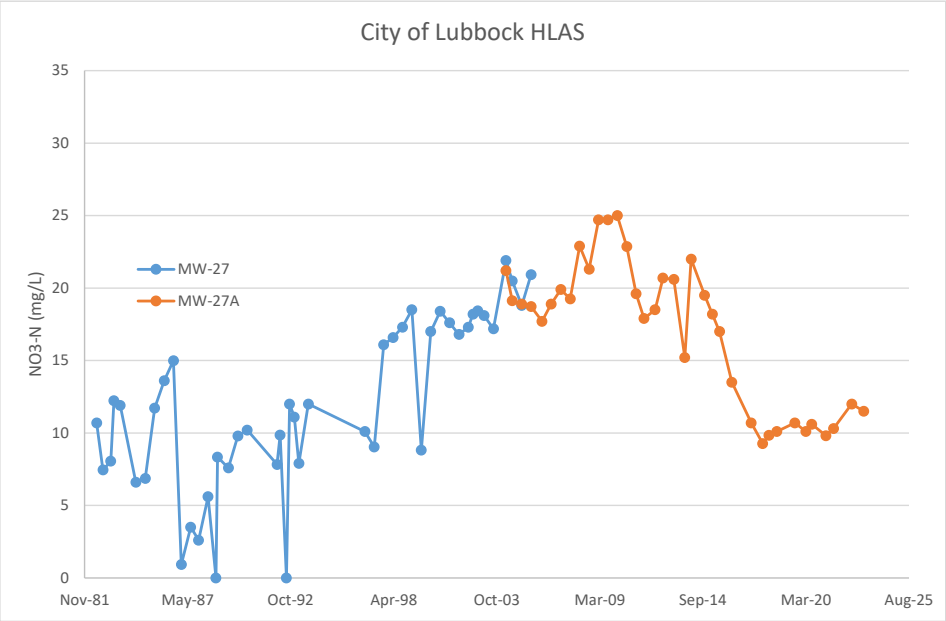
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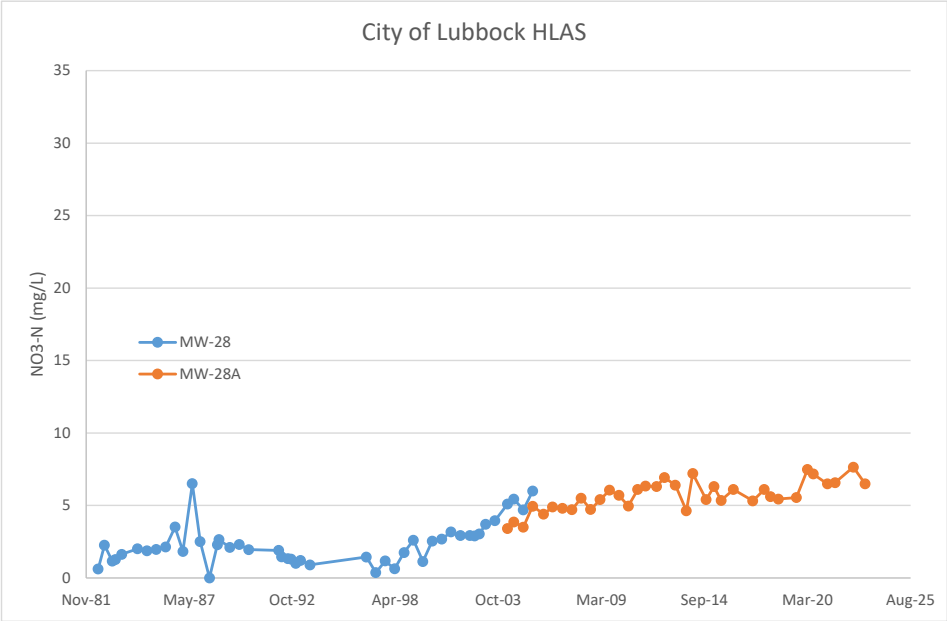
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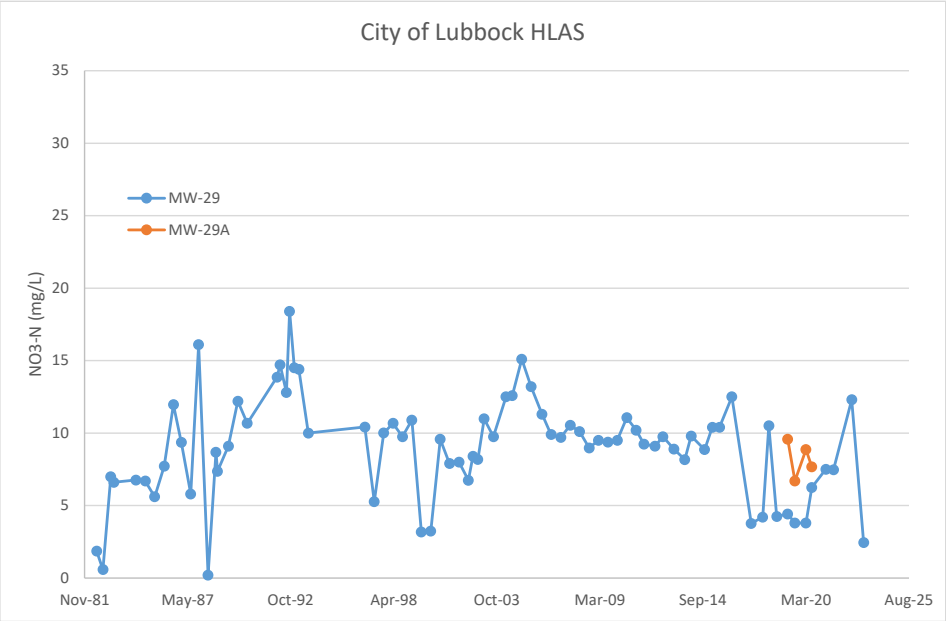
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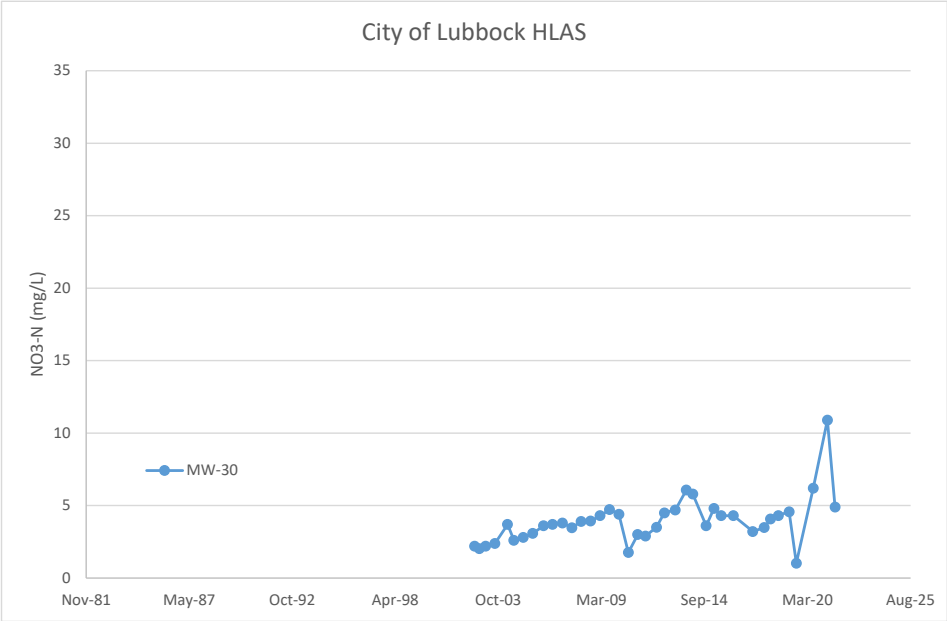
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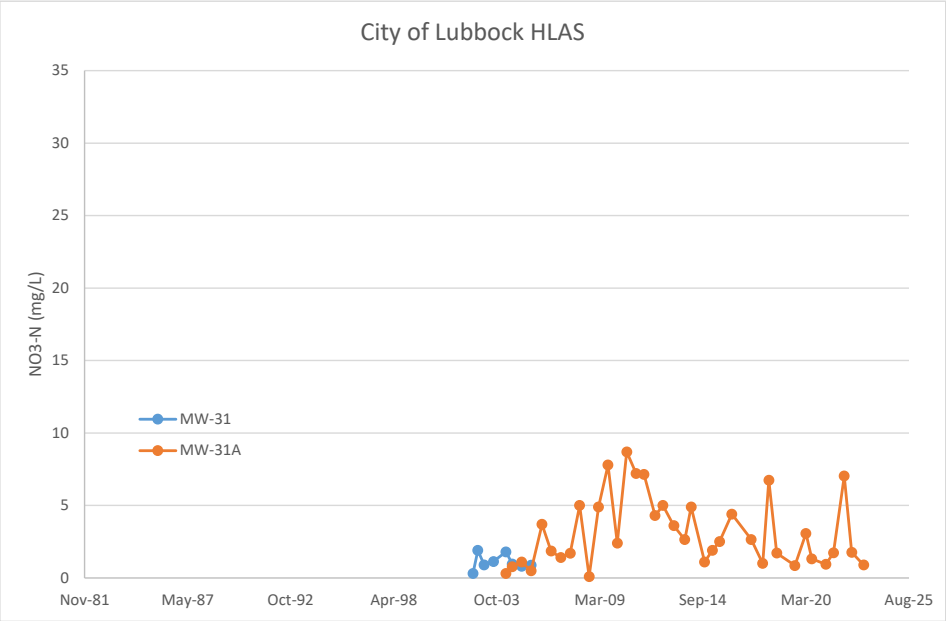
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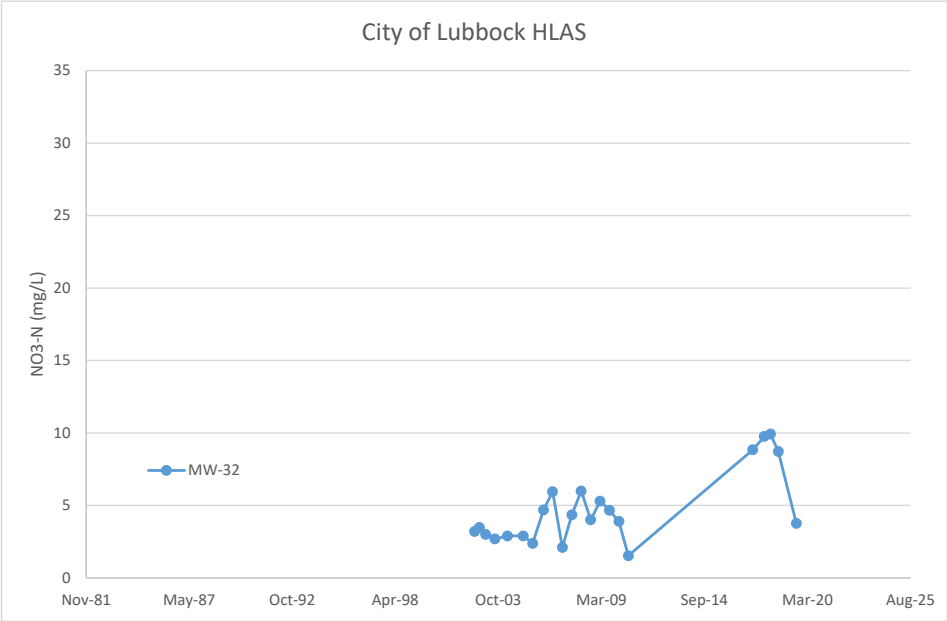
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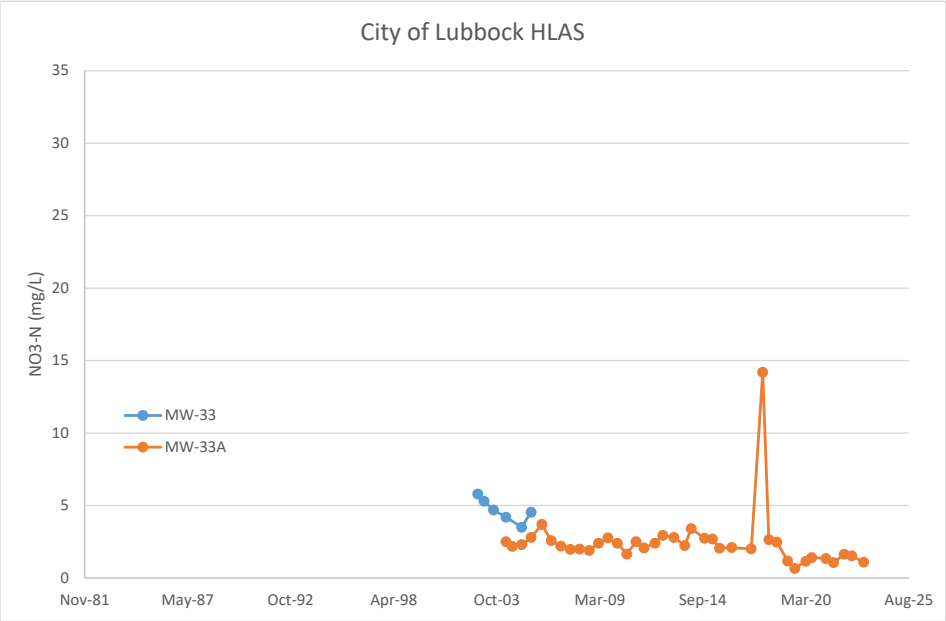
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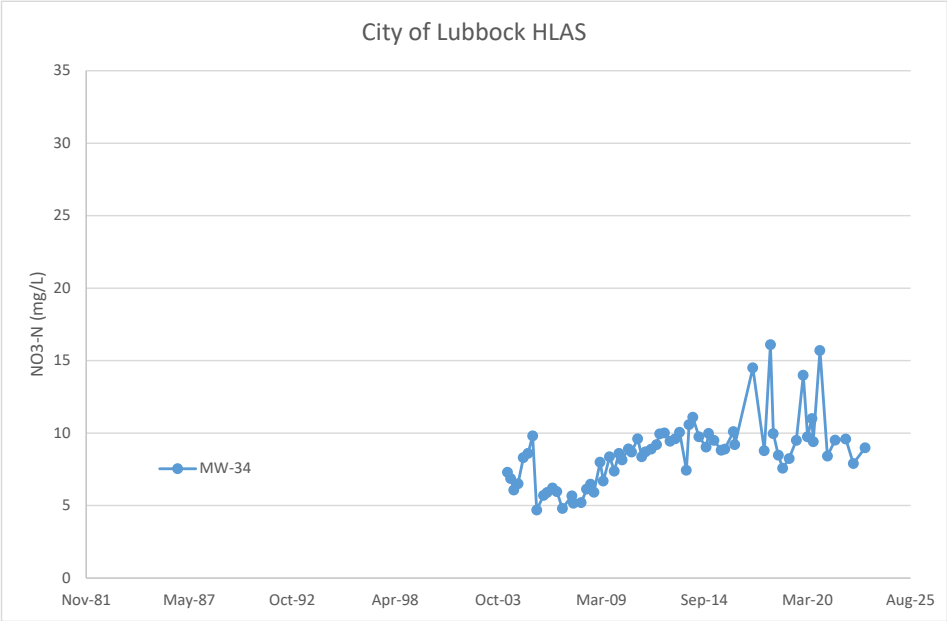
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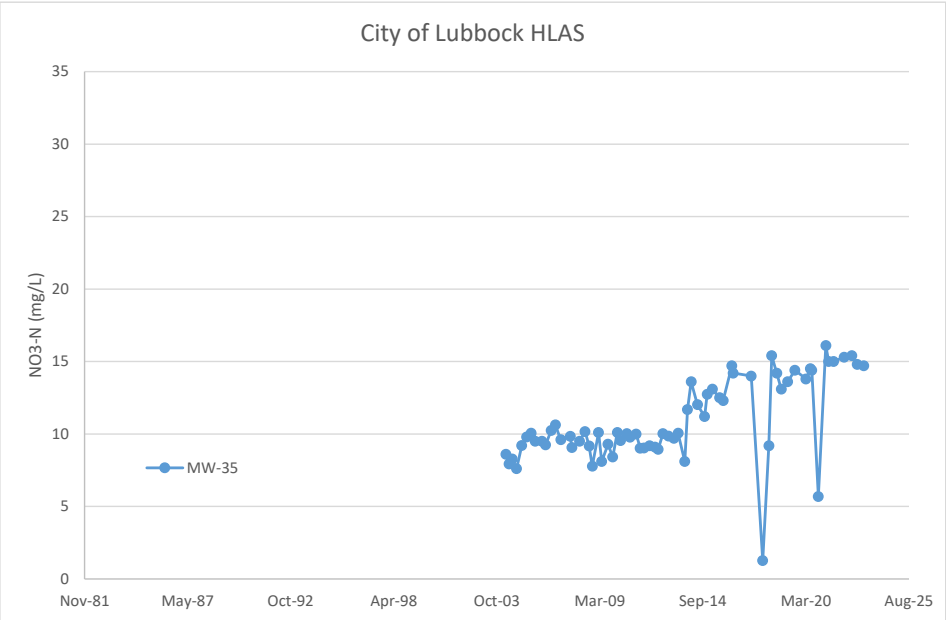
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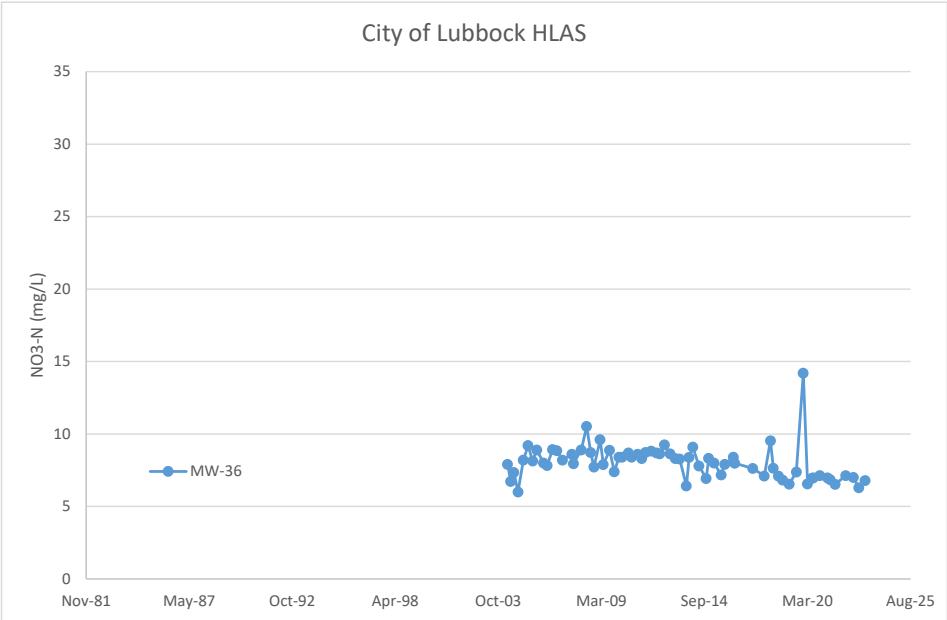
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Aug-25

Annual Report

Groundwater Quality, Water Level Elevations, and Remediation Efforts

Lubbock Land Application Site (LLAS)
City of Lubbock

TPDES Permit WQ0010353002

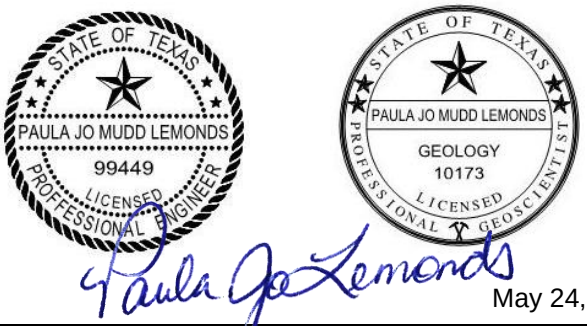
Lubbock County, TX
May 2023

Prepared by HDR Engineering, Inc.
TBPE Firm No. F-754
TBPG Firm No. 50226

Prepared for City of Lubbock

Annual Report

May 2023



May 24,2023

Paula Jo Lemonds, P.E., P.G.

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Appendix E: Data Tables for Section 7 Alterations to Plans based on Models

Acronyms

Term	Definition
ac-ft/ac/y	acre-feet per acre per year
AWT	Agri-Waste Technology Inc.
City	City of Lubbock
CL	Canyon Lakes wells
gal/ac	gallons per acre
GAM	groundwater availability model
gpm	gallons per minute
HLAS	Hancock Land Application Site
HPAS	High Plains Aquifer System
HPWD	High Plains Water District
JBLS	Jim Bertram Lake System
kg	kilogram
LLAS	Lubbock Land Application Site
mg/L	milligrams per liter
MGD	million gallons per day
MO	monitoring well
MSL	mean sea level
MT3DMS	Modular Three-Dimensional Multispecies Transport Model
NWWRP	Northwest Water Reclamation Plant
SCADA	supervisory control and data acquisition
SEWRP	Southeast Water Reclamation Plant
TCEQ	Texas Commission on Environmental Quality
TPDES	Texas Pollutant Discharge Elimination System
TWC	Texas Water Commission

1 Introduction

The City of Lubbock (City) applies reclaimed water at the Lubbock Land Application Site (LLAS) in Lubbock County and at the Hancock Land Application Site (HLAS) in Lynn County as permitted by the Texas Commission on Environmental Quality (TCEQ). This 2023 annual report summarizes the results of groundwater quality and water level measurements and remediation efforts at the LLAS.

The location of the LLAS is shown in Figure 1 and Figure 2. The City's current permit requires them to conduct semi-annual sampling at approximately 140 wells at the LLAS and 40 wells at the HLAS. City personnel collect the data and provide an annual report for each site in late May to TCEQ. The City has irrigated with reclaimed water at LLAS since the 1930s.

Additionally, the City's current permit requires them to perform groundwater modeling to estimate groundwater elevations and quality at the LLAS. The City developed the model in 2002 and updates the model annually to make projections for the next 5 years.

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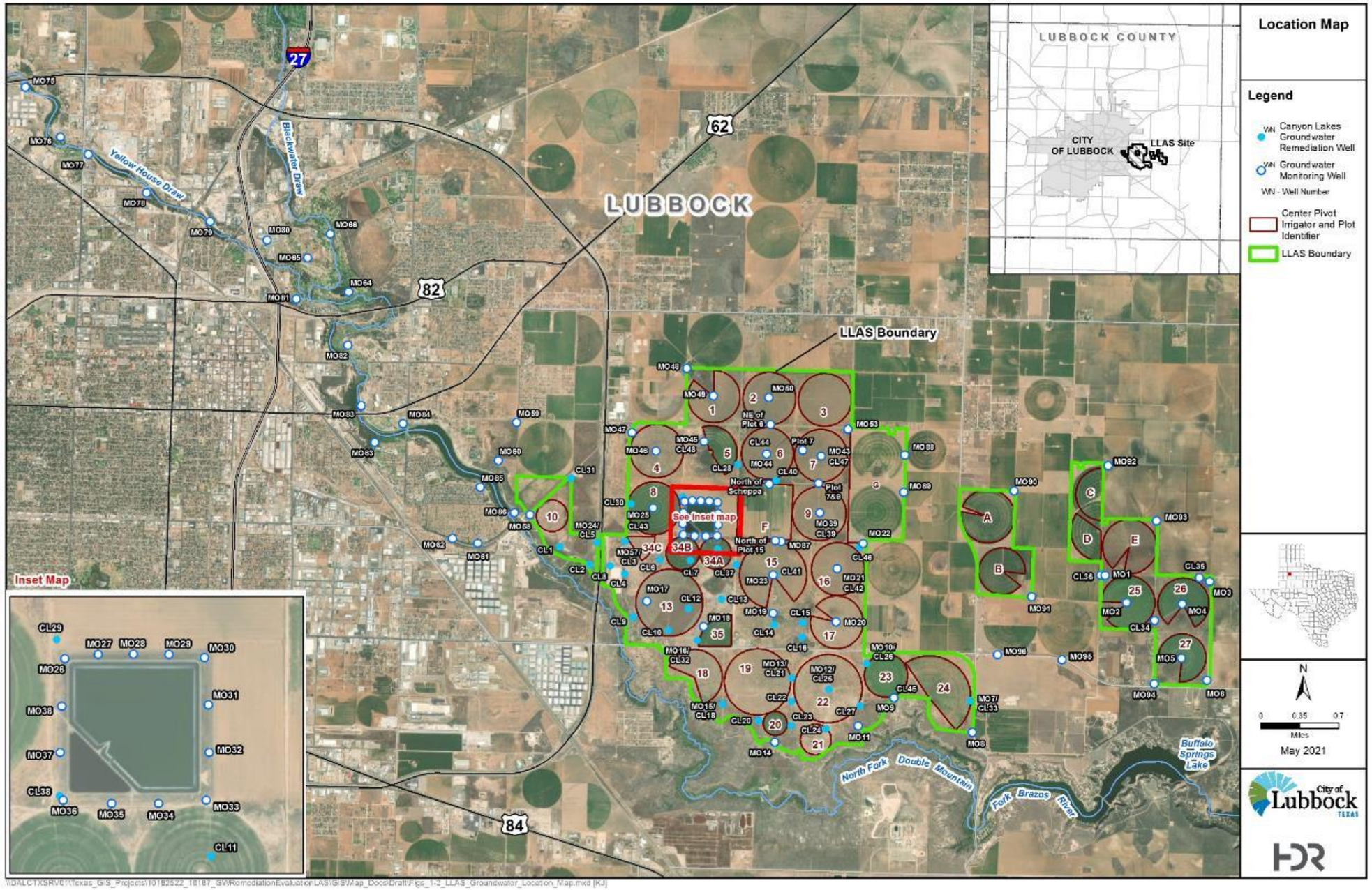

Figure 1. Lubbock Land Application Site, location map

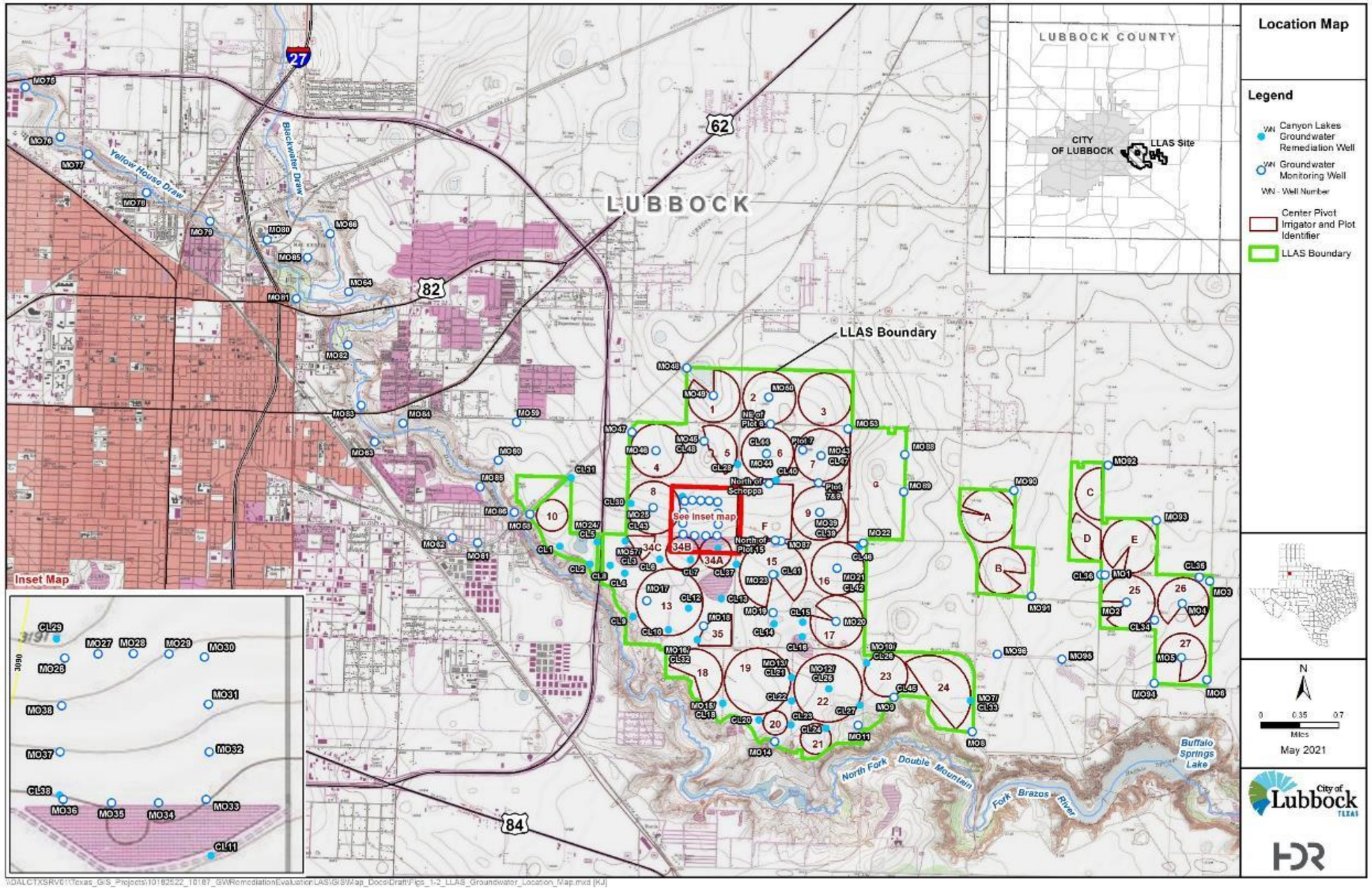

Figure 2. Lubbock Land Application Site, topographic map

1.1 Purpose

This report presents the results of groundwater level and sampling activities at the LLAS. The purpose of this report is to comply with the terms stated in Other Requirement No. 18 of the permit to discharge wastes under provisions of Chapter 26 of the Texas Water Code, Texas Pollutant Discharge Elimination System (TPDES) Permit No. WQ0010353002, renewed through November 27, 2024. Other Requirement No. 18 states:

> *18. The permittee shall continue to implement the "City of Lubbock - Lubbock Land Application Site Ground Water Remediation Plan - Lubbock County, Texas" dated August 23, 1989, and the "Revised Remediation Work Plan - City of Lubbock Land Application Site (LLAS) Prepared for the City of Lubbock - Lubbock County, Texas" dated November 26, 2002, and all subsequent modifications, on the Lubbock Land Application Site (LLAS). Groundwater quality, water elevation levels, and remediation efforts shall be incorporated into an annual report. This annual report at a minimum shall include:*
>
> *a. Static water level results from all monitoring and groundwater recovery wells and a resulting water table map;*
>
> *b. Analytical laboratory results from groundwater sampling at all monitoring and groundwater recovery wells and a resulting nitrate concentration map;*
>
> *c. Annual updates of groundwater modeling summarizing predictive results of the remediation system;*
>
> *d. Volume of groundwater routed through the Jim Bertram Lake System; and volume of groundwater routed for irrigation at other locations;*
>
> *e. In situ groundwater remediation activities (if applicable);*
>
> *f. Any alteration to the cropping and water application plans resulting from water and nitrogen balance models; and*
>
> *g. Any recommended adjustments to the remediation system based on experiences learned from past activities.*
>
> *The permittee shall also implement these plans at the Hancock Land Application Site (HLAS), with the exception of the remediation (groundwater pumping) and groundwater modeling components of these plans. Groundwater quality and water elevation levels shall be incorporated into a similar annual report as established above for the LLAS.*
>
> *All groundwater quality monitoring and water level measurements at the LLAS and HLAS shall comply with the TCEQ approved "Groundwater Sample Collection Quality Assurance Plan for the City of Lubbock Land Application Site - Lubbock County, Texas" dated December 19, 2000 and "Groundwater Level Measurement Quality Assurance Plan for the City of Lubbock Land Application Site - Lubbock County, Texas" dated December 19, 2000 and all TCEQ approved modifications to these plans.*
>
> *All annual groundwater quality samples and static water level measurements shall occur during the late winter months. In addition to the requirements of the above referenced plans, the permittee shall obtain semi-annual samples for nitrate from the LLAS and HLAS monitoring wells.*

> *The permittee shall submit annual reports for the LLAS and HLAS to the TCEQ Region 2 Office in Lubbock, the TCEQ Compliance Monitoring Section (MC-224), and the Water Quality Assessment Team (MC-150) which summarizes the ongoing activities related to groundwater remediation and monitoring at the LLAS and groundwater monitoring at the HLAS. Reports are due prior to May 31st of each calendar year.*

The TPDES permit is a combined permit for both the LLAS and the HLAS. The LLAS is currently permitted to receive and apply up to 14.5 million gallons per day (MGD) of treated wastewater effluent. In April 2018, the City's Northwest Water Reclamation Plant (NWWRP) began discharging treated effluent to Canyon Lake 1 of the Jim Bertram Lake System (JBLS) under a separate discharge permit.

The annual report is organized to follow the requirements of Other Requirement 18 of TPDES Permit No. WQ0010353002. Report sections correspond to permit subsection letters *a* through *g* of the requirement.

1.2 Background

Since the LLAS has been in operation for multiple decades, significant information about the site exists. Following is a brief summary of information available in previously prepared documents.

1.2.1 History and Site Location

The City's wastewater system group monitors and maintains the sewer collection system, manholes, and lift stations. In addition, they operate the NWWRP and the Southeast Water Reclamation Plant (SEWRP). These two treatment facilities treat the water for beneficial uses, including stream discharge, agriculture irrigation, and electric generation.

The SEWRP, located at 3603 Guava Avenue, discharges reclaimed water to a storage reservoir located to the east of Highway Loop 289. Water from the storage reservoir is then used to irrigate the LLAS and contract plots. The LLAS is located on City-owned property in Lubbock. The City does not own or directly control contract plots but must meet contractual requirements for land application.

On portions of the property, land application dates to the 1930s, when the property was the Gray Farm. As documented in previous reports, by 1976, Mr. Gray controlled approximately 3,000 acres, and land applied to the 3,000 acres plus an additional approximately 2,000 acres of neighboring land. The capacity of the treatment facility was 25 MGD resulting in a land application rate of approximately 5.6 acre-feet per acre per year (ac-ft/ac/y). In 1981 and 1984, permitting requirements set the land application rate at 4.1 and 4.8 ac-ft/ac/y, respectively. These land application rates were greater than the groundwater flow rates and resulted in a groundwater mound below the site that was first recognized in 1968.

The City purchased the LLAS in 1986 and began upgrading drainage berms and installing center pivot irrigation systems. The City converted to growing crops with high nitrogen and water consumption capacity, including wheat, corn, alfalfa, and hay. In an effort to reduce the groundwater mound, the City developed a plan to pump the excess groundwater into a series of lakes. In 1976, the City began installing pumping wells (designated as the Canyon Lake [CL] wells) at the LLAS and constructing recreational lakes along Yellow House Draw, now known as the JBLS. The groundwater pumped from the wells supplies the lakes that are a part of the JBLS.

In addition to the improvements at the LLAS, in 1980, a storage and distribution system was constructed to divert a portion of SEWRP effluent to the HLAS located near the City of Wilson in Lynn County. Lubbock Christian University owned and operated the HLAS for cotton research until 1999 when the City purchased the land.

By 1990, the City's efforts to improve farming practices, their incorporation of the JBLS project, and the addition of the HLAS resulted in a net decrease in groundwater levels beneath the LLAS.

Groundwater quality investigations in the 1980s revealed elevated nitrate-N concentrations. Reed & Associates, (now Arcadis) and the Texas Water Commission (TWC) (now TCEQ) conducted an inventory of water wells over an approximately 80-square-mile area to the northeast, east, and southeast of Lubbock. Data showed nitrate-N concentrations in the groundwater mound were greater than the Safe Drinking Water Act's maximum contaminant level (MCL) of 10 milligrams per liter (mg/L).

Due to the groundwater mound and elevated nitrate-N concentrations, the TWC issued an Agreed Order in November 1989 requiring the City to initiate a groundwater remediation program. Reed & Associates prepared the initial remediation plan[1]. Remediation included pumping from the groundwater mound an annual average of 1,580 gallons per minute (gpm) and discharging to the headwaters of the JBLS to maintain lake levels. Additionally, pumped groundwater was used to irrigate City parks and other lands of varied ownership. Monitoring was required and was useful for evaluating progress and making changes to the pumping, as needed.

Groundwater investigations continued in the 2000s, including studies by Arcadis and Agri-Waste Technology Inc. (AWT), which resulted in the development of a groundwater model and infrastructure improvements that allowed for the City's stream discharge of effluent. In 2002, remediation plan revisions increased the pumping rate to a minimum annual average of 1,680 gpm[2]. By 2004, monitoring showed that average nitrate-N concentrations at the LLAS had decreased to 2.3 mg/L.

1.2.2 Site Stratigraphy and Hydrogeology

The principal aquifer in the area is the High Plains Aquifer[3]. The Ogallala Aquifer, part of the High Plains Aquifer, consists of the saturated section of the Ogallala Formation, as well as those underlying and overlying geologic units that are hydraulically connected. The Ogallala Formation consists chiefly of sediments deposited by headwater streams in the mountainous areas to the west and northwest. The Ogallala Formation was deposited on the eroded surfaces of underlying Triassic and Cretaceous aged sediments.

The original layer of sediments that formed the Ogallala Formation extended from the Rocky Mountains eastward through north central Texas. The Ogallala Formation has subsequently eroded such that the segment in southeastern New Mexico and the Southern High Plains of Texas is

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[1] Reed & Associates, Inc. 1989. City of Lubbock – Lubbock Land Application Site Groundwater Remediation Plan – Lubbock County, Texas. August 23, 1989.

[2] Arcadis. 2002. Revised Remediation Work Plan – City of Lubbock Land Application Site (LLAS). November 25, 2002.

[3] McGuire, V.L., M.R. Johnson, R.L., Schieffer, J.S. Stanton, S.K. Sebree, and I.M. Verstraeten. 2003. Water in storage and approaches to ground-water management, High Plains Aquifer, 2000: U.S. Geological Survey Circular 1243, U.S. Department of the Interior, Reston, Virginia, 51p.

isolated from underground connection with other water-bearing beds, except through underlying older sediments, which may contain highly mineralized water, unlike the fresh water in the Ogallala Aquifer. In Texas and New Mexico, the source of the recharge to the Ogallala Aquifer is precipitation falling on the unconsolidated lacustrine, fluvial, and eolian deposits sediments, which overlie the Ogallala Formation. Thus, these Quaternary-aged materials serve as important conduits for recharge to the Ogallala Aquifer. The amount of recharge depends on many factors, including the amount, distribution, and intensity of precipitation and the types of soil and vegetative cover. Research has estimated that recharge to the Ogallala Aquifer in Groundwater Management Area (GMA) 2 can vary from 1/4 inch to 2 ¼ inches per year[4].

The stratigraphy of the region's aquifers and the formations that comprise them is depicted in Table 1. Throughout the area, recent aged fluvial deposits occur along major stream valleys. The Quaternary-aged Blackwater Draw Formation overlies the Ogallala Formation. The Ogallala Aquifer is composed of Tertiary-age sediments and is the most consistently productive aquifer in the area. Wells have been flow-tested to 800 gpm in Lubbock County as recently as 2011[5]. However, thin saturated thicknesses limit productivity in some areas.

Table 1. Stratigraphy of the Llano Estacado Region

System	Formation	Aquifer
Quaternary	Ogallala	Ogallala
Tertiary		
Cretaceous	Duck Creek	Edwards-Trinity High Plains
	Kiamichi	
	Edwards	
	Comanche Peak	
	Walnut	
	Antlers	
Triassic	Cooper Canyon	Upper Dockum
	Trujillo	
	Tecovas	Lower Dockum
	Santa Rosa	
Permian	Dewey Lake	--
	Rustler	

Cretaceous-aged sediments of the Edwards-Trinity High Plains (ETHP) Aquifer directly underlie the Ogallala Formation in much of the central portion of the Southern High Plains. These sediments

[4] https://gma2.hpwd.org/

[5] Deeds, N.E., J.J. Harding, T.L. Jones, A. Singh, S. Hamlin, and R.R. Reedy. 2014. Conceptual Model for the High Plains Aquifer System Groundwater Availability Model. GAM report prepared for the Texas Water Development Board.

consist primarily of sandstone, shale, and limestone, with the sandstone and limestone being the principal water-bearing units.

Upper Triassic-aged rocks underlie the Cretaceous formations or directly underlie the Ogallala Formation in the area. The Dockum sediments are comprised of the Cooper Canyon, Tecovas, Trujillo, and Santa Rosa formations. The Cooper Canyon, Trujillo, and Tecovas formations consist chiefly of interbedded siltstone, mudstone, sandstone, and shale, while the Santa Rosa Formation consists mainly of medium to coarse conglomeratic sandstone. In this area, the water quality can be saline to briny and unsuitable for most purposes.

The 2019 LLAS Annual Report[6] includes a summary from the 2009 LLAS Annual Report[7] of the general stratigraphic relationship between the Ogallala deposits and underlying Cretaceous limestones and Triassic "red beds." The 2019 report states, "The cross sections indicate that the wells are generally installed to depths of between 100 to 200 feet below ground surface (bgs) and generally encountered a coarsening downward sequence of clays, sands, and sometimes gravels overlying limestone at the base. In parts of the eastern portion of the study area, sands and gravel deposits overlie what were occasionally referred to as "red bed" deposits at relatively shallow depths in monitoring wells MO 88 and MO 89 (Figure 1) corresponding to elevations of approximately 3,020 to 3,025 feet mean sea level (MSL). A review of a map prepared by the High Plains Underground Water Conservation District No. 1 (HPWD) depicting the approximate altitude of the base of the Ogallala Formation in Lubbock County shows that the base of the Ogallala Formation is interpreted to be at an elevation of 3,000 feet MSL or lower in this area. Based on additional investigation and review of other drilling logs, these relatively shallow "red bed" deposits, which are presumably of low permeability material in the eastern portion of the study area, are presumed to be part of the Ogallala Formation. However, this interpretation is subject to reconsideration based on additional information."

1.2.3 Installed Monitoring and Recovery Wells

Table 2 shows each monitoring well and the corresponding latitude and longitude. MO wells are installed wells for monitoring purposes. CL wells are those wells that recover groundwater from beneath the LLAS.

Table 2. Monitoring and Recovery Wells for the LLAS

Well Name	Latitude	Longitude
CL 1	33.56147778	-101.7939635
CL 10	33.55103072	-101.7765684
CL 11	33.56183176	-101.7692493
CL 12	33.55391161	-101.7735217
CL 13	33.5552993	-101.7684416
CL 14	33.55223282	-101.7601084

[6] Terracon Consulting Engineers and Scientists. 2019. 2019 Annual Report – Groundwater Quality and Water Level Elevations – Lubbock Land Application Site (LLAS).

[7] Terracon Consulting Engineers and Scientists. 2009. 2009 Annual Report – Groundwater Quality and Water Level Elevations – Lubbock Land Application Site (LLAS).

Well Name	Latitude	Longitude
CL 15	33.55256947	-101.755627
CL 16	33.55063329	-101.7556331
CL 2	33.55925802	-101.789174
CL 20	33.53958803	-101.7620323
CL 22	33.54222295	-101.7569997
CL 23	33.53905592	-101.7569455
CL 24	33.53877894	-101.7514606
CL 27	33.54194235	-101.7462398
CL 28	33.57295833	-101.7665504
CL 29	33.56852591	-101.774978
CL 30	33.56737145	-101.7830627
CL 31	33.57049444	-101.7925506
CL 34	33.55424764	-101.7006225
CL 35	33.56005194	-101.6938624
CL 36	33.55999327	-101.7092508
CL 37	33.55988086	-101.7662626
CL 38	33.56369898	-101.7748637
CL 39	33.5670436	-101.7533509
CL 4	33.55823821	-101.783683
CL 40	33.5710271	-101.7604678
CL 41	33.55869664	-101.7600788
CL 42	33.55968337	-101.7504214
CL 43	33.56682899	-101.7794882
CL 44	33.57463719	-101.76211
CL 45	33.54314223	-101.740814
CL 46	33.56265685	-101.7471366
CL 47	33.57447975	-101.753692
CL 48	33.57591872	-101.7717848
CL 6	33.5602246	-101.7782782
CL 7	33.56026883	-101.7734569
CL 9	33.55258942	-101.7821558

Well Name	Latitude	Longitude
MO 1	33.55995475	-101.7086172
MO 10/CL 26	33.54745775	-101.7454254
MO 11	33.53929317	-101.7464385
MO 12/CL 25	33.54393939	-101.7512298
MO 13/CL 21	33.54529739	-101.7571133
MO 14	33.5368474	-101.7594323
MO 15/CL 18	33.54160108	-101.7677246
MO 16/CL 32	33.54979928	-101.7720343
MO 17	33.55475221	-101.7800995
MO 18	33.55168303	-101.7710651
MO 19	33.55366049	-101.7603173
MO 2	33.55650513	-101.7050995
MO 20	33.55280935	-101.7504064
MO 21	33.55975142	-101.7505096
MO 22	33.56316648	-101.7465373
MO 23	33.55868261	-101.7604904
MO 24/CL 5	33.56245107	-101.7837523
MO 25	33.56695144	-101.7795571
MO 26	33.5679377	-101.7746641
MO 27	33.56806953	-101.7734369
MO 28	33.56807347	-101.7721265
MO 29	33.56807009	-101.7708129
MO 3	33.55956371	-101.6922058
MO 30	33.56797188	-101.7694954
MO 31	33.56650778	-101.7693447
MO 32	33.56504212	-101.7693168
MO 33	33.56357661	-101.7694308
MO 34	33.56347029	-101.7711893
MO 35	33.5634682	-101.7729345
MO 36	33.5635707	-101.774728
MO 37	33.56504133	-101.7748393

Well Name	Latitude	Longitude
MO 38	33.56646572	-101.7747843
MO 39	33.56700756	-101.7534837
MO 4	33.55654955	-101.6963867
MO 43	33.57441286	-101.7535469
MO 44	33.57447451	-101.7620582
MO 45	33.57584403	-101.7719132
MO 46	33.57440449	-101.7793937
MO 47	33.57673773	-101.7832147
MO 48	33.58533193	-101.7749468
MO 49	33.58184575	-101.7706537
MO 5	33.54946515	-101.6962497
MO 50	33.58187666	-101.7619883
MO 53	33.57806169	-101.7494578
MO 57/CL 3	33.56222536	-101.7881699
MO 58	33.56556774	-101.7987621
MO 59	33.57758419	-101.8013174
MO 6	33.54667885	-101.6921958
MO 60	33.57252717	-101.8039853
MO 61	33.56163771	-101.8067915
MO 62	33.56215222	-101.8107409
MO 63	33.57439165	-101.8234141
MO 64	33.59396441	-101.8282147
MO 65	33.5982635	-101.8347917
MO 66	33.601444	-101.8313974
MO 7/CL 33	33.54296484	-101.7290522
MO 75	33.6193507	-101.8797963
MO 76	33.61298335	-101.8740493
MO 77	33.61083401	-101.869593
MO 78	33.60607099	-101.8602825
MO 79	33.60259981	-101.8502432
MO 8	33.53890034	-101.728594

Well Name	Latitude	Longitude
MO 81	33.5928244	-101.8363424
MO 82	33.58700261	-101.8280562
MO 83	33.57913091	-101.825658
MO 84	33.57697216	-101.8190635
MO 85	33.56897984	-101.8066879
MO 86	33.56577117	-101.8012312
MO 87	33.5630951	-101.7593684
MO 88	33.57492314	-101.7404499
MO 89	33.57001993	-101.7404494
MO 9	33.54312094	-101.7409739
MO 90	33.57066653	-101.7232342
MO 91	33.55688289	-101.7199367
MO 92	33.57434428	-101.7086538
MO 93	33.56731549	-101.7008047
MO 94	33.54597892	-101.7003799
MO 95	33.54876838	-101.7149399
MO 96	33.54917754	-101.725002
N of Plot 15	33.56318856	-101.7602847
N of Schoppa	33.57055217	-101.7615559
NE of Plot 6	33.57837224	-101.761597
Plot 7	33.57513053	-101.7564389
Plot 7 & 9	33.57086597	-101.7538095

2 Static Water Level Elevations

[TPDES Permit Other Requirement 18a]

Static water level elevations are typically measured in January or February when the remediation wells are temporarily turned off and allowed to recover static conditions. As required in Other Requirement No. 18a of TPDES Permit WQ0010353002, static water level results from all monitoring and groundwater recovery wells and a resulting water table map are included in this section.

Static water level elevations were measured on January 18, 2023, after establishing that static conditions were met. Static conditions are defined as water level changes that are less than 0.15 feet in a 24-hour period after ceasing operations at the LLAS. After stopping operations at the LLAS, static conditions are typically met within 7 to 10 days. Static water level elevations from 1991 through the most recent measurement are shown in Appendix A, Table 1, for the MO and CL pumping wells.

The HPWD annually measures the static water level elevations in irrigation wells within the HPWD. These off-site wells surrounding the LLAS provide useful information for understanding the water table in the area. Static water level elevations from 2005 to the most recent measurement are shown in Appendix A, Table 2, for the nearby off-site irrigation wells, as measured by the HPWD.

2.1 Water Table Map

The groundwater table, as measured under static conditions on January 18, 2023, is depicted in Figure 3. The semi-annual groundwater elevations for LLAS wells were supplemented with groundwater elevations measured in early 2023 in selected off-site wells by the HPWD. The groundwater gradient is generally toward the east and southeast across the LLAS. Numerous CL wells (CL 27, CL 45, CL 33, CL 26, and CL 24) were not operating in the 2021-2023 monitoring year, as depicted in Figure 3.

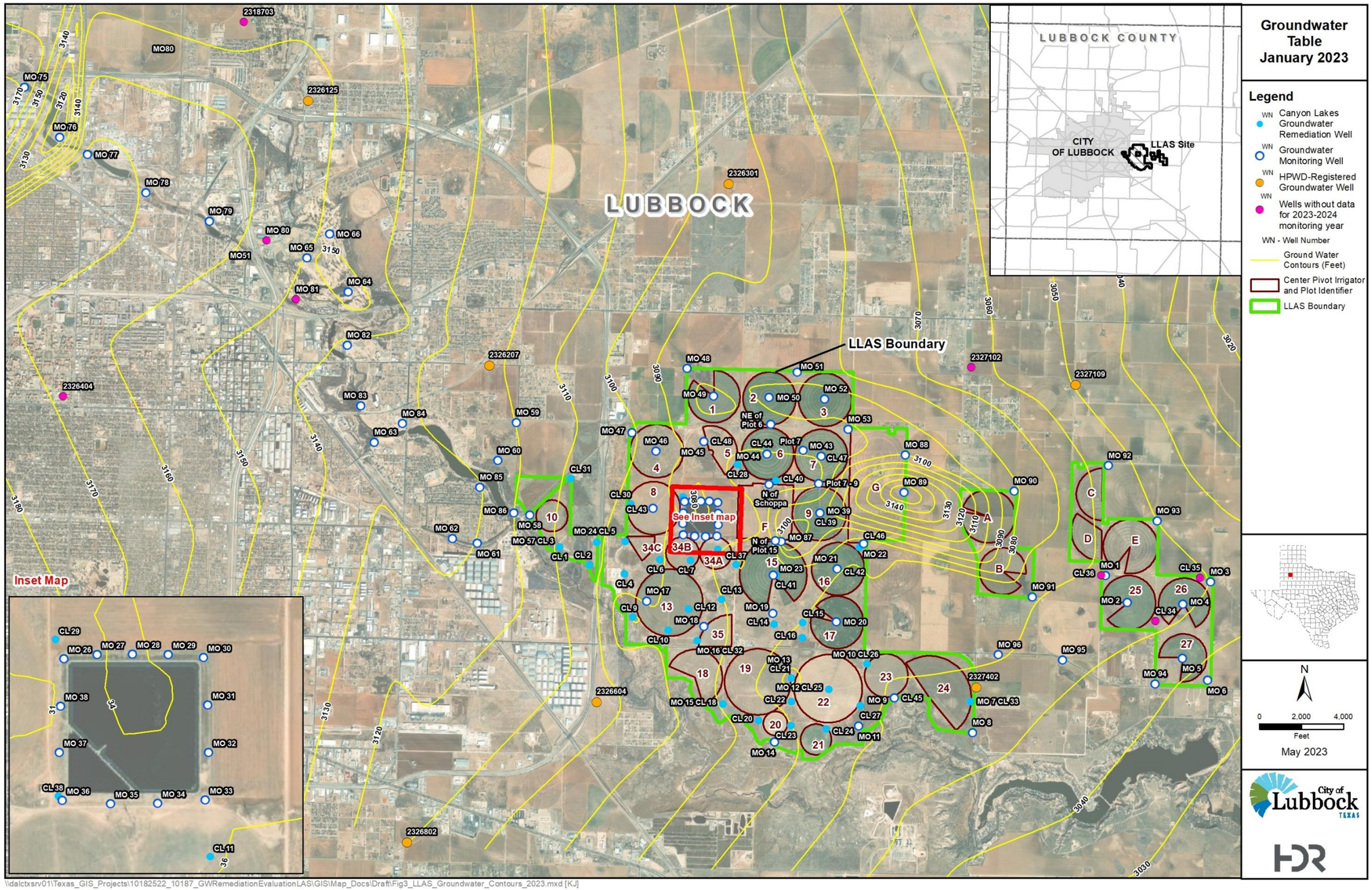

Figure 3. Groundwater Table Measured Under Static Conditions on January 2023

3 Groundwater Quality Sampling Results

[TPDES Permit Other Requirement 18b]

As detailed in Other Requirement No. 18b of TPDES Permit WQ0010353002, analytical laboratory results from groundwater sampling at all monitoring and groundwater recovery wells and a resulting nitrate concentration map are included in this section.

The 2023 semi-annual sampling events occurred over 44 days between June 12 and July 26, 2022, and over 44 days between February 12 and March 28, 2023. Groundwater field data, including pH, temperature, conductivity, dissolved oxygen, and oxygen-reduction potential (ORP) are included in Appendix B, Table 1.

Nitrate-N groundwater monitoring data for the LLAS MO wells are included in Appendix B, Table 2. Nitrate-N groundwater monitoring data for the LLAS CL recovery wells are included in Appendix B, Table 3.

Time series figures of nitrate-N concentrations in the MO wells and CL recovery wells are included in Appendix C. Average nitrate-N concentrations through time for LLAS MO and CL recovery wells are depicted in Figure 4 and Figure 5, respectively.

3.1 Nitrate Concentration Map

Isoconcentration (line of equal concentration) contour maps of nitrate-N in groundwater were developed for the sampling events. The nitrate-N concentration maps for the June/July 2022 and February/March 2023 sampling events are shown in Figure 6 and Figure 7, respectively.

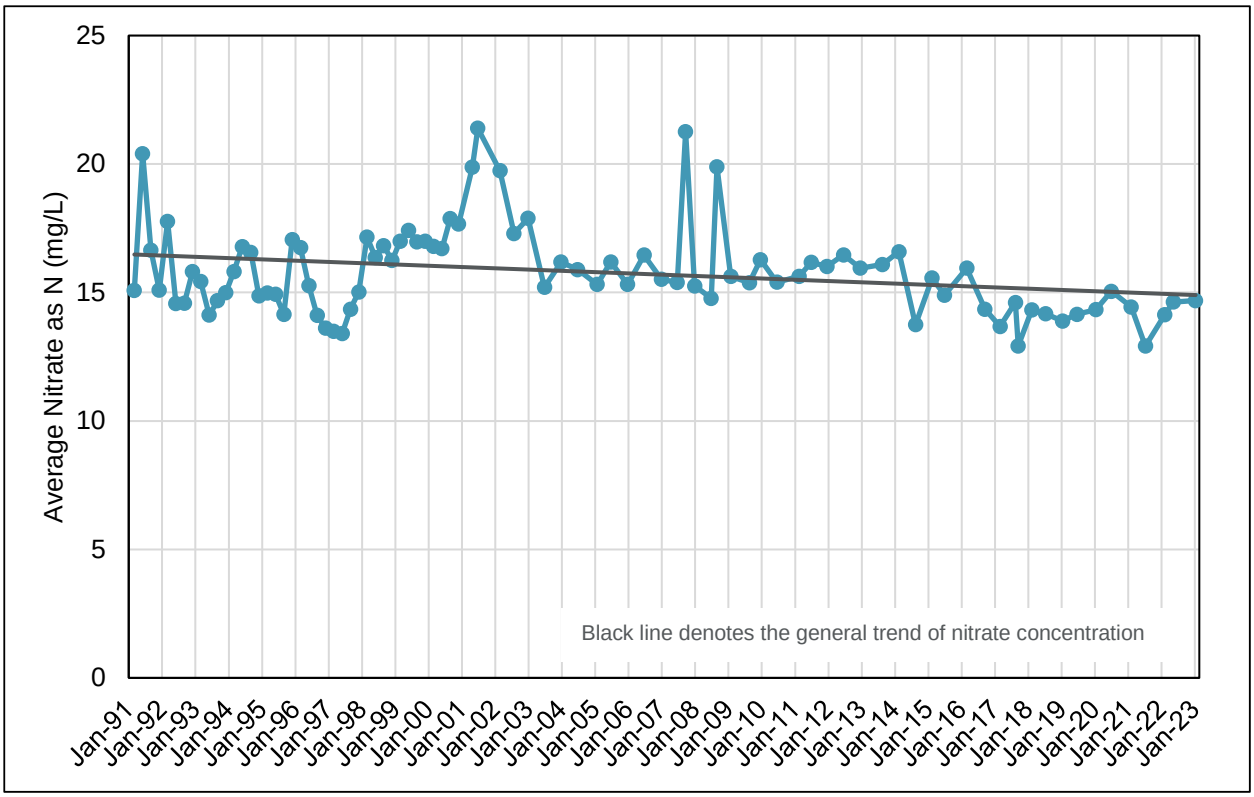

Figure 4. Average Nitrate-N Concentrations through Time for LLAS Monitoring Wells

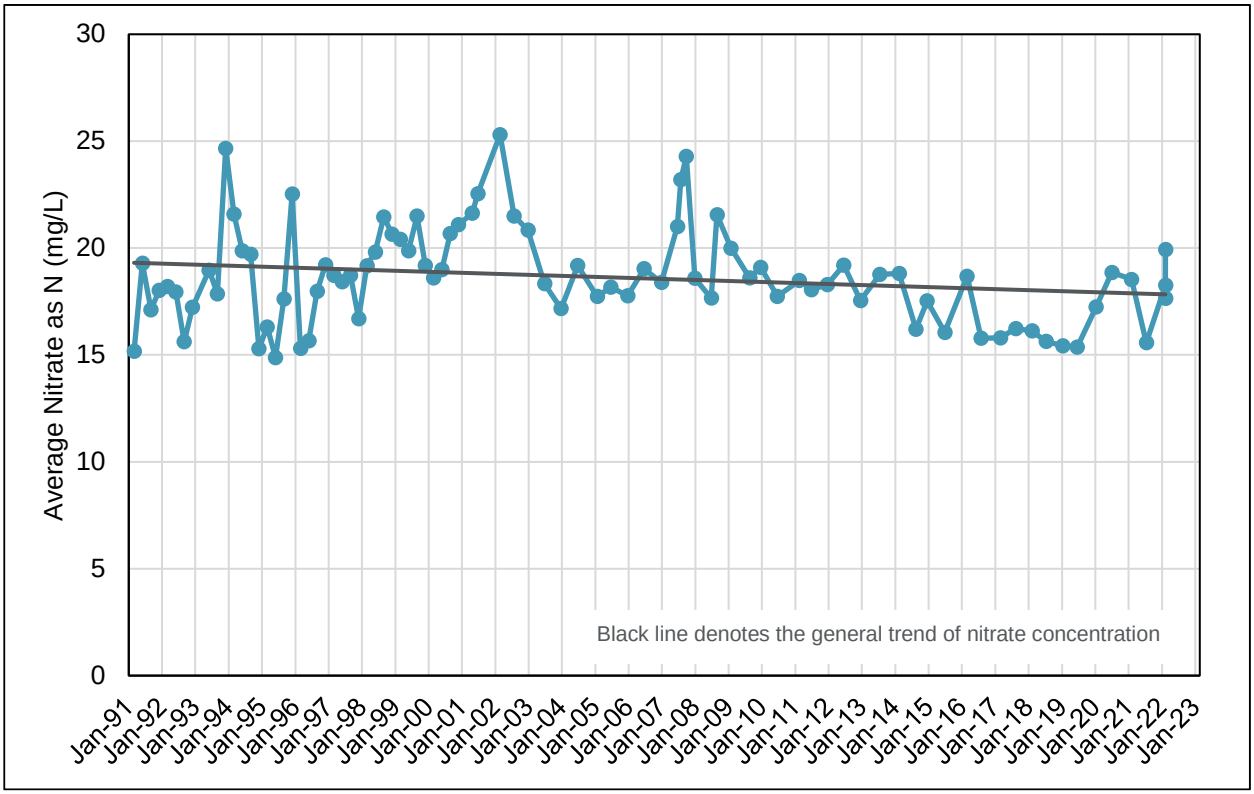

Figure 5. Average Nitrate-N Concentrations through Time for LLAS CL Recovery Wells

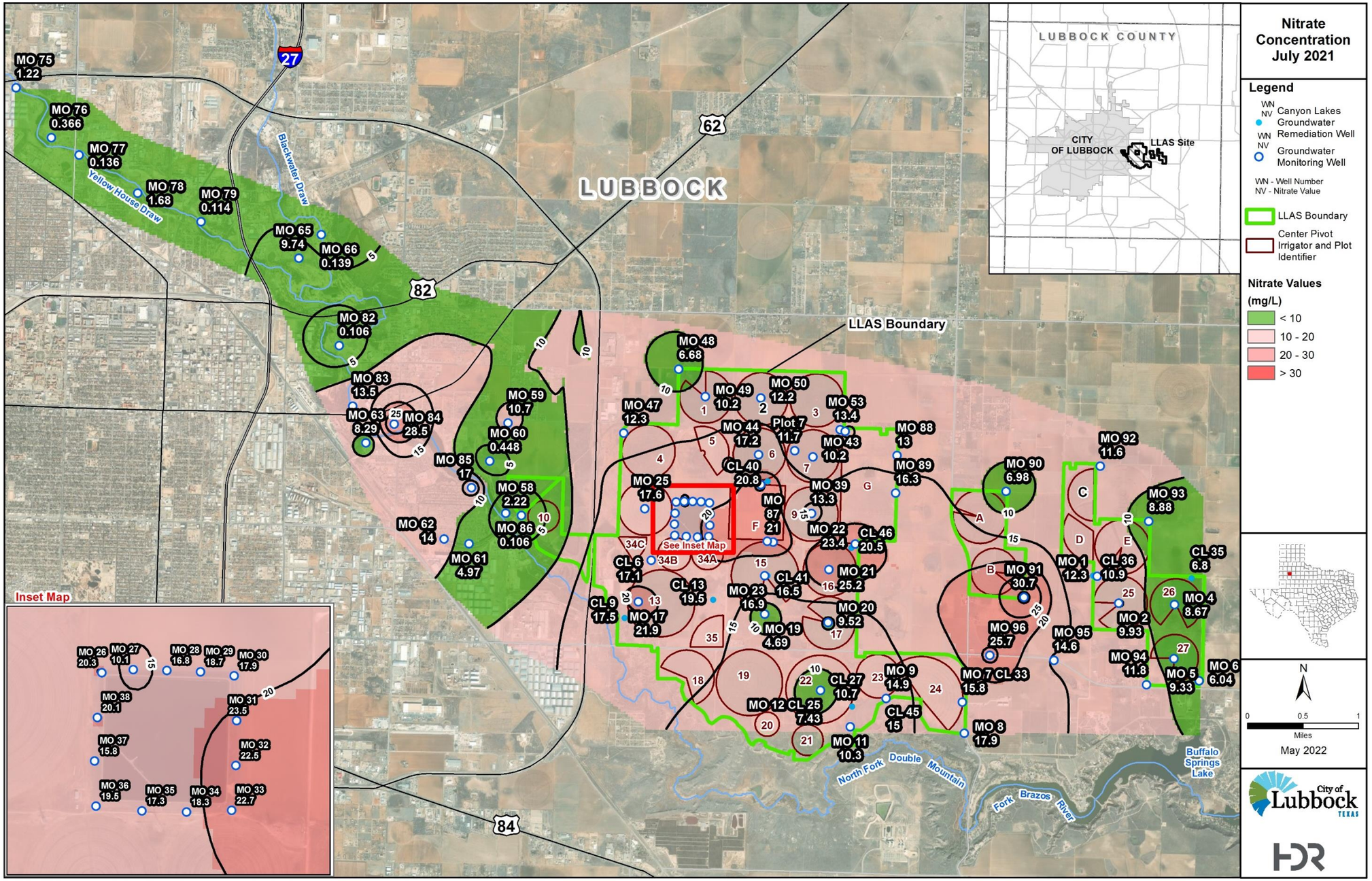

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Figure 6. Nitrate-N Concentrations Map for the June/July 2022 Sampling Event

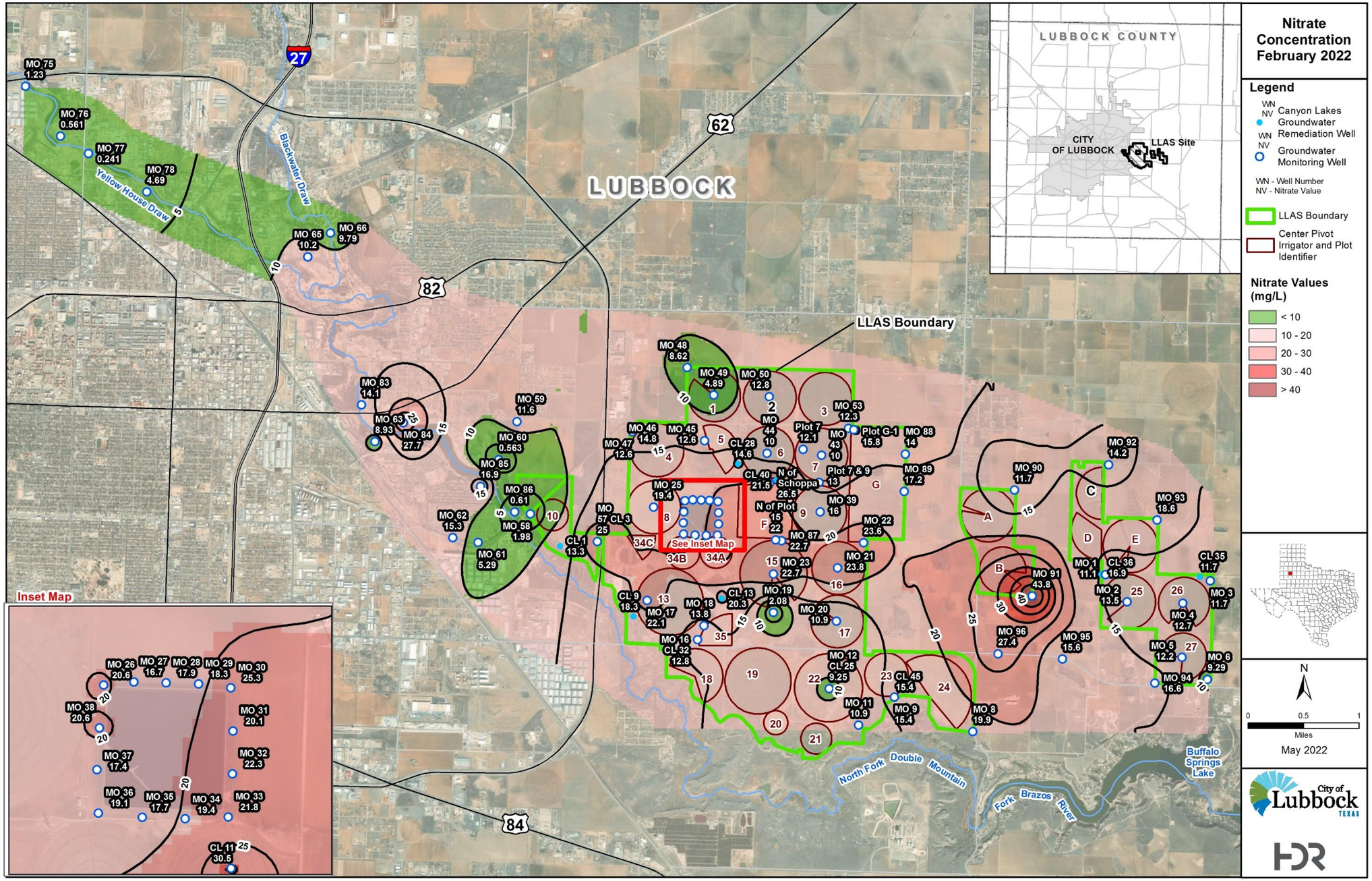

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Figure 7. Nitrate-N Concentrations Map for the February/March 2023 Sampling Event

4 Groundwater Modeling Update

[TPDES Permit Other Requirement 18c]

4.1 Introduction

As described in Other Requirement No. 18c of TPDES Permit No. WQ0010353002, the City is required to perform annual updates of the groundwater modeling, including 5-year predictive simulations of the remediation system, to estimate groundwater elevations and quality at the LLAS.

To satisfy the permit requirement, the groundwater model was first developed in 2002 and is updated annually to predict results of the remediation system in the LLAS area for each future 5-year period. In addition to model predictions, water and nitrate-N levels at LLAS wells are recorded periodically throughout the year and are compared to model results. Since the annual report submitted in 2021, model adjustments beyond those typically included in annual updates were made and are summarized in Section **Error! Reference source not found.**.

In this report, all elevations referenced are to the MSL vertical datum. All references to nitrate-N are nitrate-N-N or nitrate-N as nitrogen.

4.2 Background

Arcadis developed the original groundwater model in 2002 and then it progressed to Carollo Engineers from 2010 through 2019. Appendix F of the May 2019 annual report – Groundwater Quality and Water Level Elevations – summarizes the latest model development performed by Carollo. HDR began annual model updates starting in 2020 (covering the 2019 year) to present. Previous models developed for the 2020 annual report were used as a basis for the 2020 model and beyond. The 2019 report provided by Carollo was limited in detail about the original 2002 model development.

The 2022 annual update to groundwater modeling used for predictive results of the LLAS remediation system was documented in the 2022 annual report[8]. The 2022 annual LLAS groundwater model is referred to as the 2022 model in this report. The model covering the 2022 year and documented as the annual update for this report is referred to as the 2023 model.

4.3 Conceptual Model

The LLAS area is located southeast of the center of Lubbock, Texas, and northeast of the North Fork Double Mountain Fork Brazos River. Treated wastewater effluent is applied to the LLAS and contract plots. CL remediation pumping wells are located at the LLAS to pump the infiltrated wastewater from beneath the LLAS. The pumped groundwater is then transported to ground storage tanks, then pumped upstream via the booster pump, and discharged into Canyon Lake 1 of the JBLS. A portion of this water is also used for irrigation at the Lubbock Cemetery and the Berl Huffman Athletic Complex.

Groundwater flow direction is to the southeast and toward Buffalo Springs Lake and generally in the direction of flow of North Fork Double Mountain Fork Brazos River. Groundwater mounding has

[8] HDR. 2022. Annual Report, Groundwater Quality, Water Level Elevations, and Remediation Efforts. May 2022.

historically occurred beneath the LLAS; however, groundwater pumping has appeared to eliminate the mounding. Water levels and nitrate-N levels are usually measured at LLAS wells biannually. Error! Reference source not found. shows the model extent and the LLAS area. Vertically, the model geometry consists of one hydrostratigraphic layer representing the Southern Ogallala Aquifer. The model domain covers an area that includes the City, approximately 25 miles east to west, and 13 miles north to south, with a uniform cell size of 528 by 528 feet.

4.4 Previous 2022 Model Summary

The 2022 annual LLAS groundwater model is an update from the 2021 model to estimate results of the LLAS remediation system. The LLAS model is based on the Texas Water Development Board's (TWDB) Southern Ogallala Groundwater Availability Model (GAM) and available data. The U.S. Geological Survey's (USGS) MODFLOW-2000 program[9] was selected to simulate groundwater flow and a Modular Three-Dimensional Multispecies Transport Model (MT3DMS) program[10] was used to simulate nitrate-N transport. Groundwater Vistas (version 8) was used to execute MODFLOW-2000 and MT3DMS and perform pre- and post-processing.

[9] Harbaugh, A.W., Banta, E.R., Hill, M.C., and McDonald, M.G. 2000. The U.S. Geological Survey Modular Ground-Water Model – User Guide to Modularization Concepts and the Ground-Water Flow Process, Open-File Report 00-92.

[10] Zheng, C., and Wang, P.P. 1999. MT3DMS, A Modular Three-Dimensional Multispecies Transport Model Documentation and User's Guide. Prepared for U.S. Army Corps of Engineers.

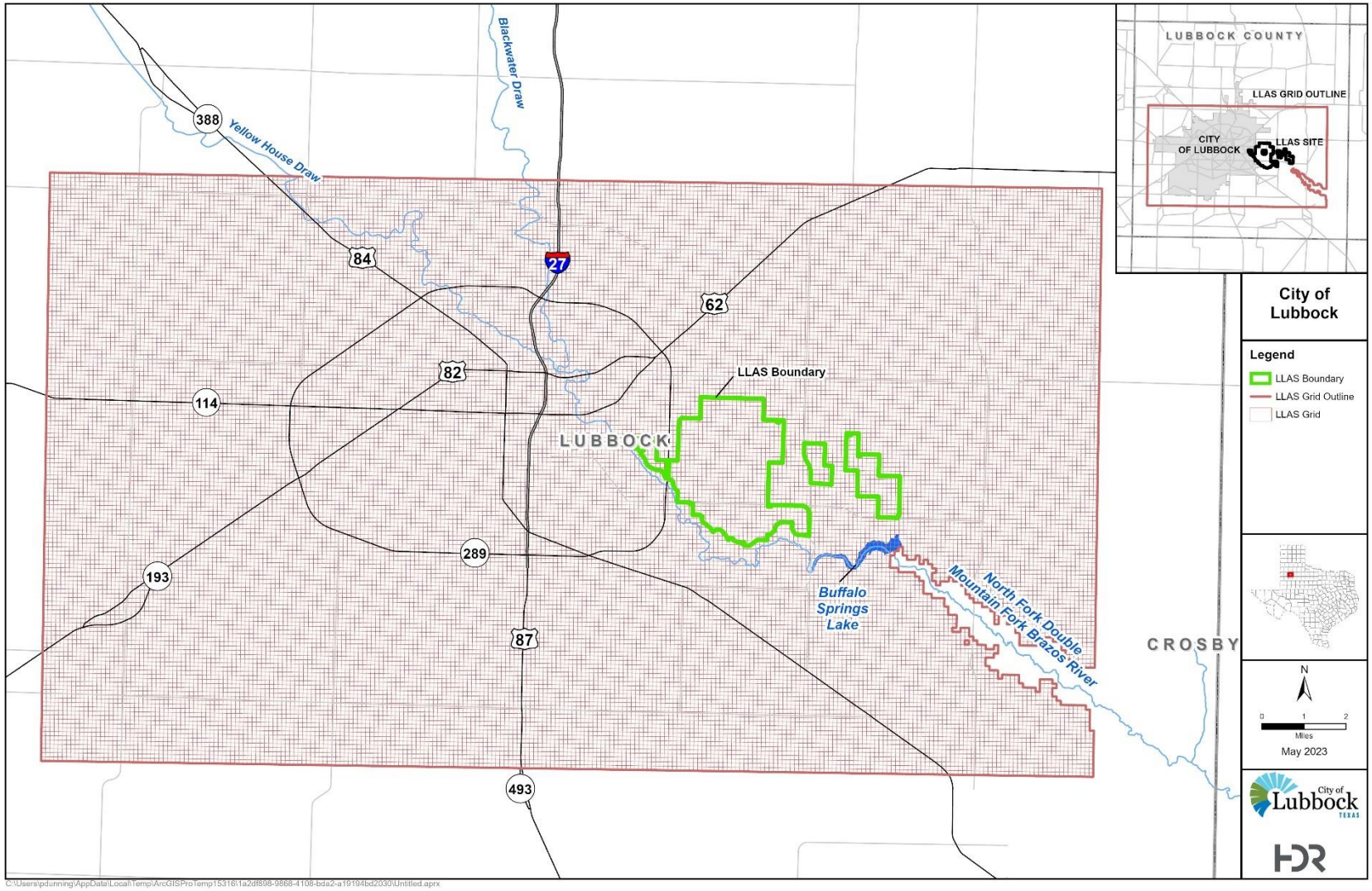

Figure 8. Groundwater Model Domain

4.5 2023 Model Revisions and Development

The 2023 groundwater model adopted the 2022 model with the addition of data and inputs for the 2022-2023 year to estimate results of the LLAS remediation system. Revisions to the 2023 model include adding nitrate-N and water level targets for 2022 and 2023, updated recharge and nitrate application values for irrigation plots in the LLAS, and 2022 pumping for CL recovery wells.

Recommended model updates, as documented in the July 23, 2021 HDR memo, that were made to the 2022 model and are therefore included in the 2023 model:

- Changed the areas of high and unverifiable nitrate concentrations to zero.
    - East of irrigation plot no. 24 with a previously modeled nitrate concentration of 10 mg/L and 30 mg/L (model recharge zones 276 and 257, respectively). This area has likely discontinued irrigation according to City staff.
    - South of irrigation plot no. 25 with a nitrate concentration of 5 mg/L (model recharge zone 245)
- JBLS input nitrate concentration set to 13.8 mg/L, described further below.

While observed water levels and nitrate concentration levels were added to the model, there was no calibration performed. No adjustments were made to model parameters or boundary conditions. Each component of model updates is summarized in more detail below.

4.5.1 Water Level Targets

Water level targets consisted of the MO and CL series of wells measured on January 18, 2022, and January 18, 2023, during the 2022–2023 year. These water levels were added to the established targets in the model. Water levels taken at state wells[11] within the model boundaries were also added as targets with the assumption that the reading was taken on January 1, 2023 for those levels taken during 2023.

4.5.2 Irrigation Recharge

Modeled irrigation recharge used two different methods based on the timeframe of the model. For years prior to 2010, the values used in the previous model developed in 2019 was used. For years after 2010, values presented in AWT reports were used.

Based on the 2019 Carollo report, for the years prior to 2010, the total recharge and nitrate associated with the recharge was initially set in the model at the 5-year (2005–2009) average applied irrigation as reported by AWT plus the Southern Ogallala GAM irrigated recharge value of 2.2 inches per year (in/yr). The final assigned recharge was adjusted during calibration.

For years after 2010, a different approach for inputs for recharge was used. The 2019 model appeared to have significantly higher recharge values and nitrate loads compared to the 2019 AWT *Groundwater Recharge Estimation* report[12]. Total recharge previously modeled for 2009 through 2019 was approximately 134.7 inches per year. The 2019 AWT report estimated recharge at approximately 35.6 inches for 2019. As a result, the 2010 through February 2023 recharge and nitrate application as inputs to the model were based on data presented in annual AWT reports.

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[11] Texas Water Development Board. www3.twdb.texas.gov/apps/WaterDataInteractive/GroundwaterDataViewer

[12] AWT. 2019. Groundwater Recharge Estimation.

January through February of 2023 in the historical calibrated model used 2022 estimates; however, the 5-year predictive model (as described below) used the future predictive estimates 2023, as documented in the AWT memo *LLAS Groundwater Recharge Estimation (2023)*[13], dated April 28, 2023.

Simulated recharge rates for 2022 and 2023 is shown in **Error! Reference source not found.** and **Error! Reference source not found.**, respectively. **Error! Reference source not found.**, and **Error! Reference source not found.** show simulated nitrate-N concentrations in recharge for 2022 and 2023, respectively.

4.5.3 JBLS Nitrate Input

Another input of nitrate to the model is at the upstream end of Yellow House Draw into the JBLS. Previous modeling included a concentration of 17 mg/L added through nine river boundary condition cells (MODFLOW RIV package) and 10 mg/L added through one RIV cell. Modeled nitrate-N level trends differed from the measured nitrate-N trends in four nearby monitoring wells. Modeled nitrate-N concentrations were higher than measured nitrate-N concentrations in MO 75, MO 76, and MO 79, and lower than measured concentrations in MO 78. Modeled and measured nitrate-N concentrations in MO 77 follow the same trend. Measured nitrate-N concentrations are generally steady or trending downward with time. Modeled nitrate-N concentrations are trending upward in MO 75, MO 76, and MO 79 and trending downward in MO 77 and MO 78.

An average nitrate-N concentration of 13.8 mg/L was calculated in the cumulative discharge water from pumping from the CL wells in 2020. Therefore, the concentration of nitrate-N in the 10 RIV cells at the JBLS LLAS discharge area was updated to 13.8 mg/L and provided a better match of modeled results to measured values at nearby wells (see HDR, July 27, 2021 memo).

[13] AWT. 2023. LLAS Groundwater Recharge Estimation (2023). April 28, 2023.

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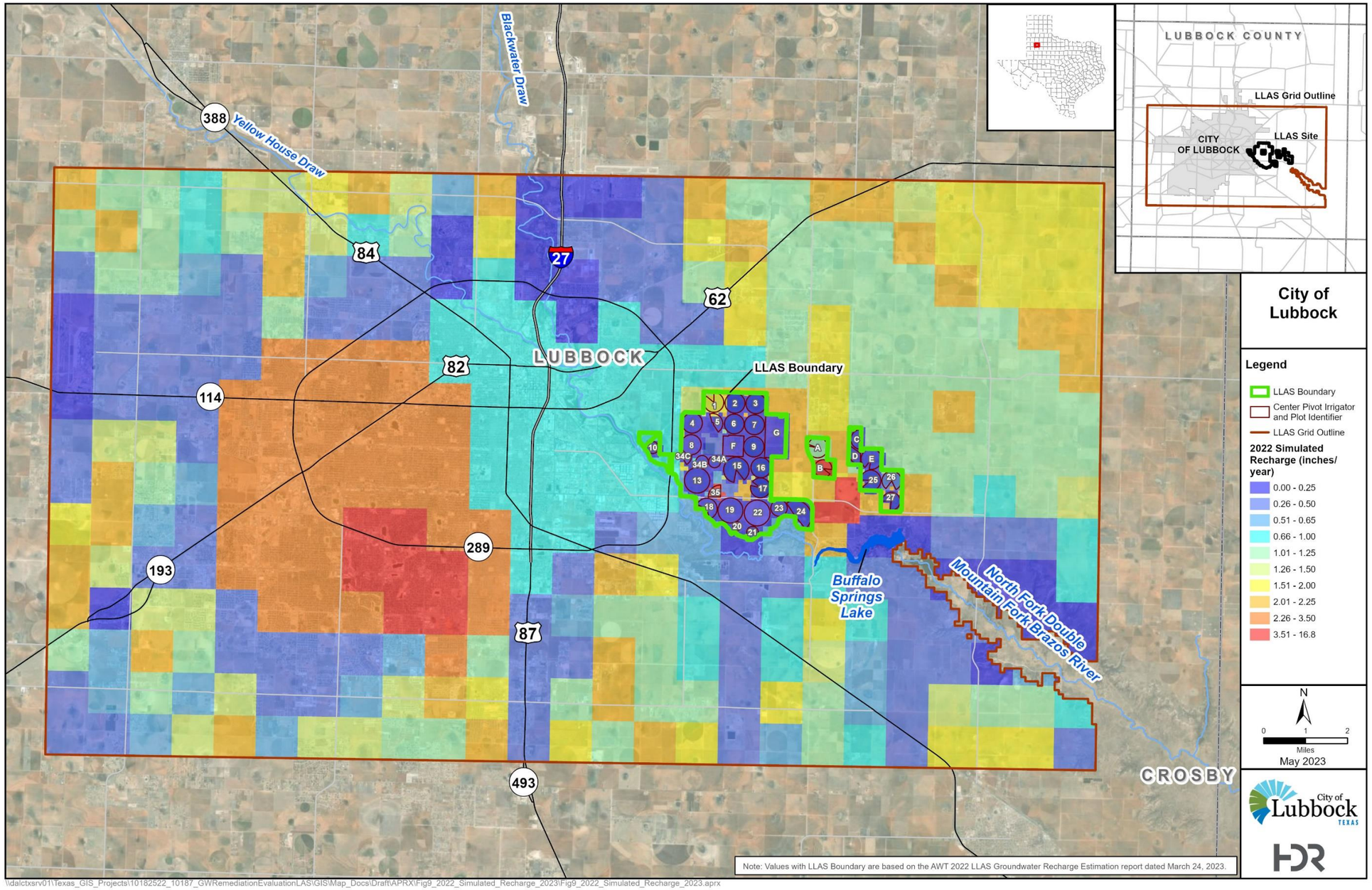


Figure 9. 2022 Simulated Recharge

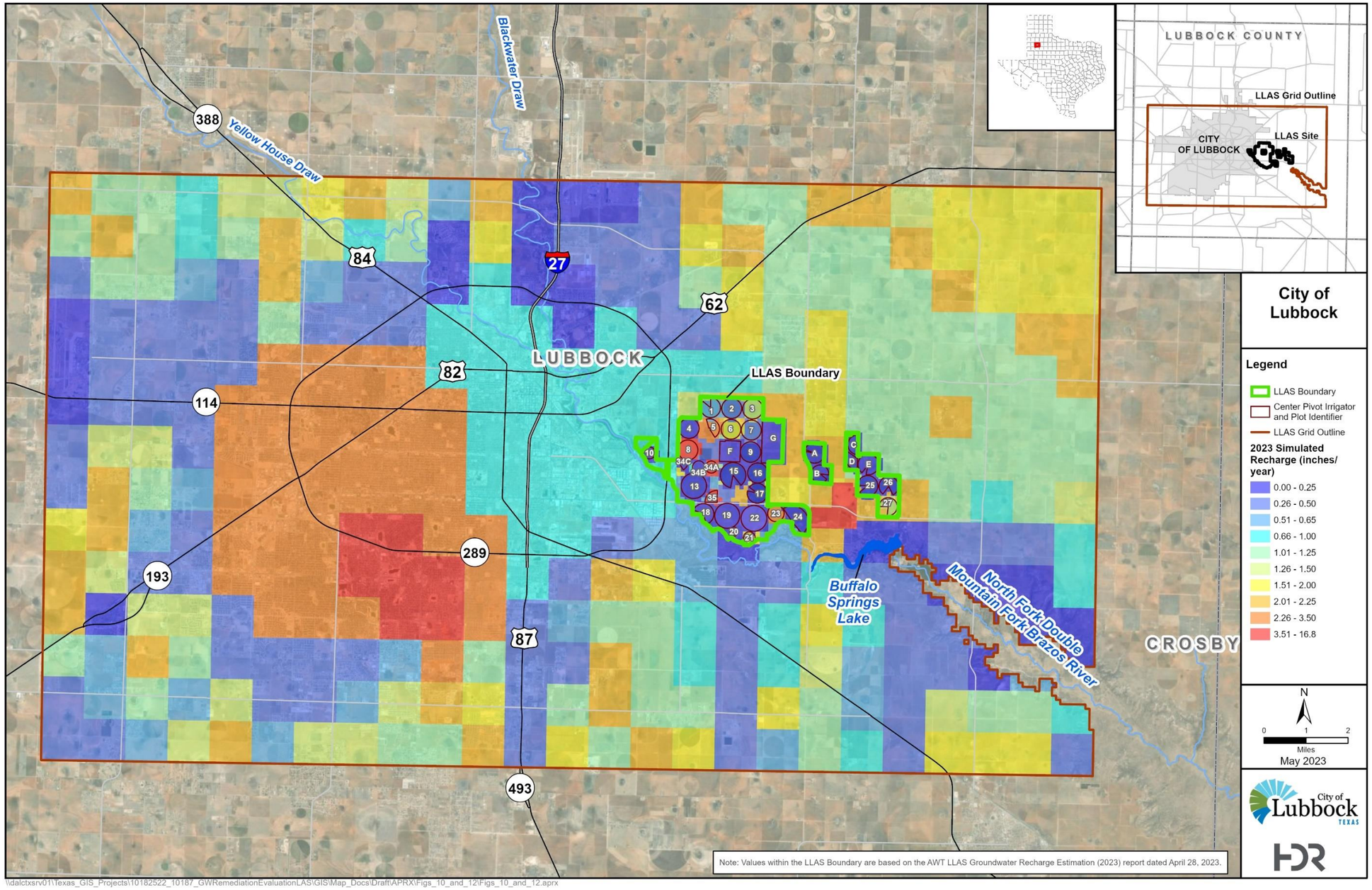


Figure 10. 2023 Simulated Recharge

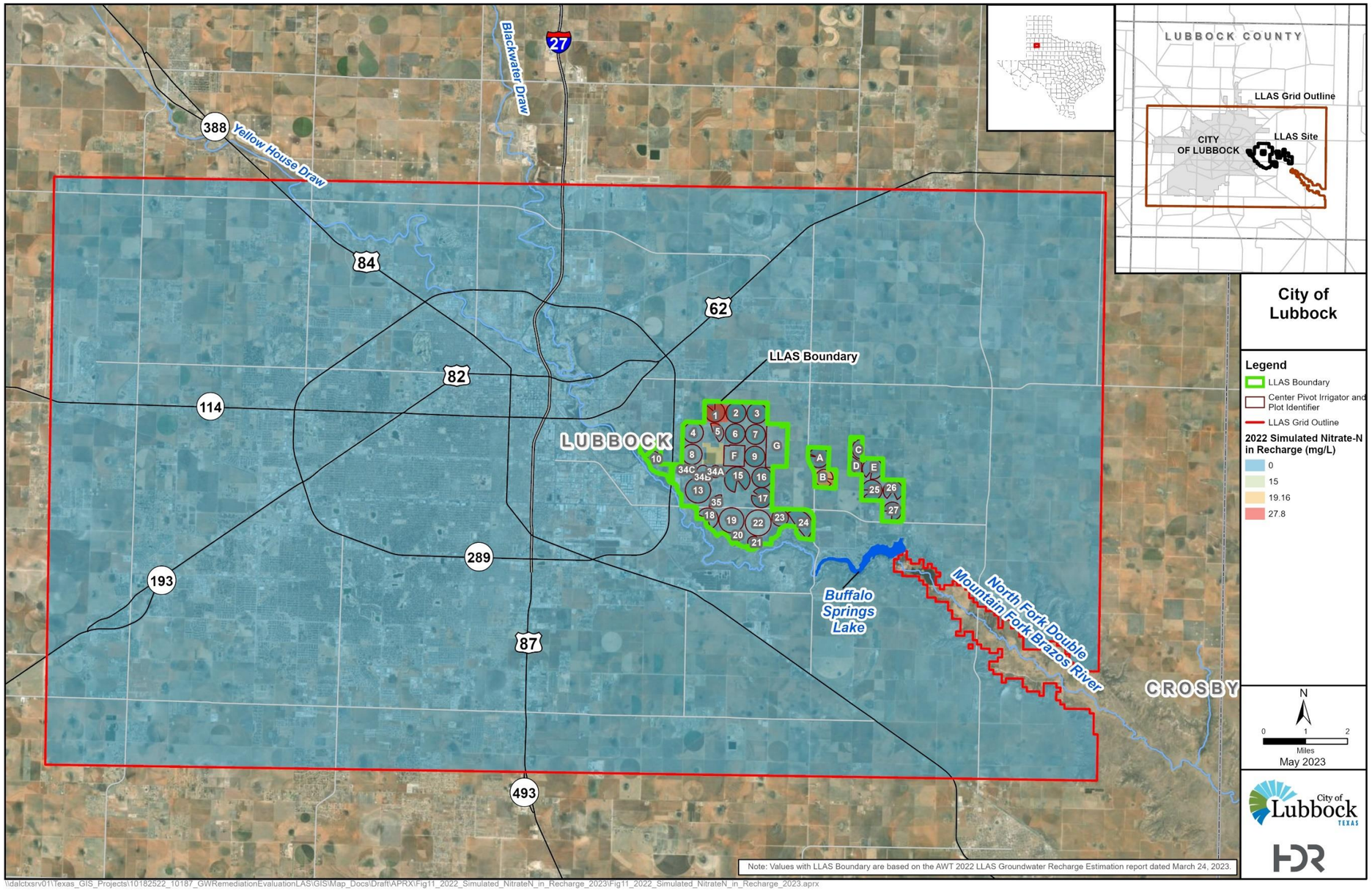


Figure 11. 2022 Simulated Nitrate-N in Recharge

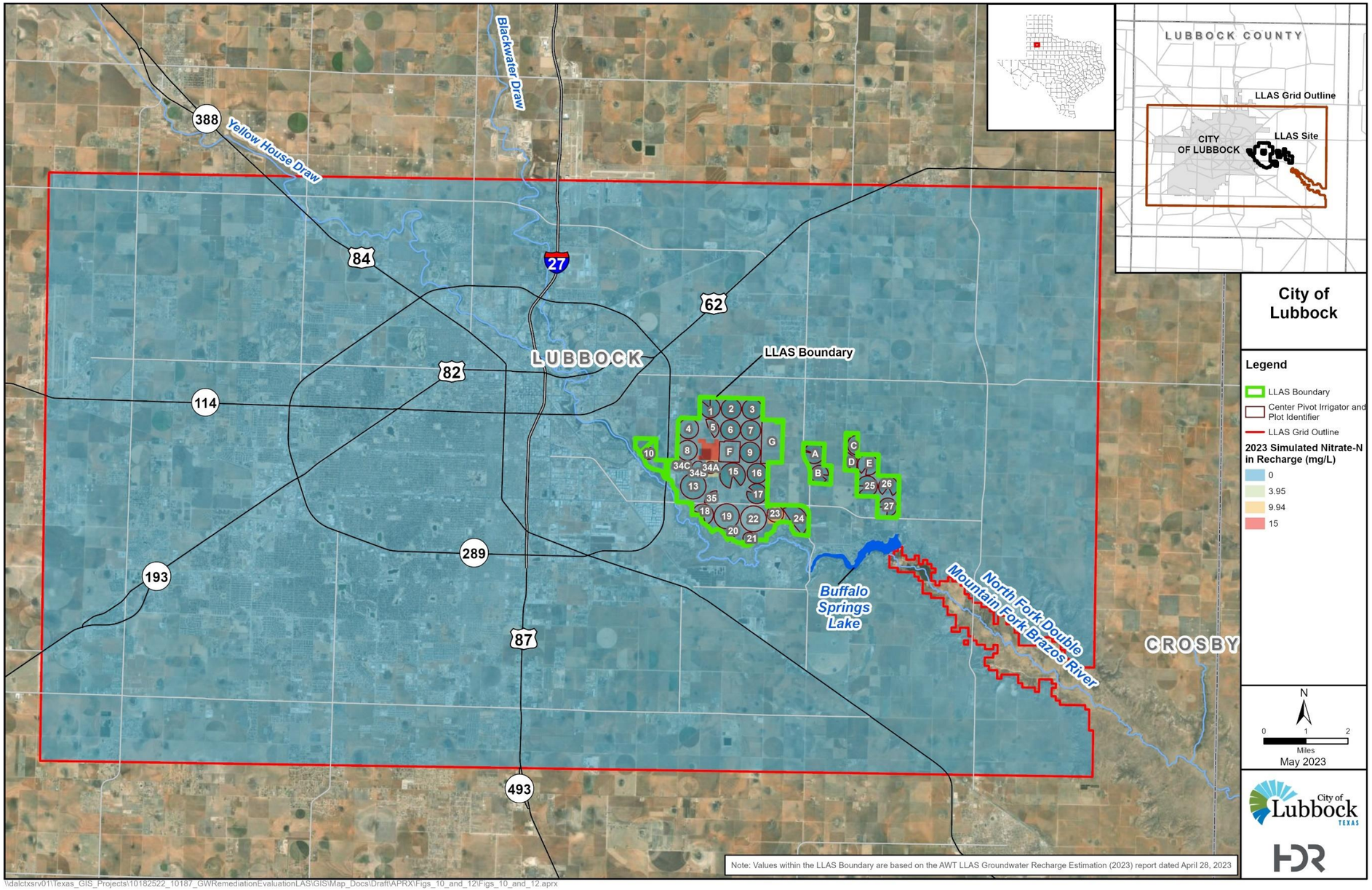


Figure 12. 2023 Simulated Nitrate-N in Recharge

4.5.4 Boundary Conditions

The 2023 model constant head boundaries located on the model perimeter were revised to match water levels from the High Plains Aquifer System (HPAS) GAM, which superseded the Southern Ogallala GAM. The overlapping timeframe for the HPAS GAM and the LLAS model is from 2000 to 2012. The constant head boundaries for the LLAS model were updated for the overlapping period. The 2012 water level values from the HPAS GAM were carried forward for the 2012 to 2023 period.

4.5.5 Pumping

In annual updates prior to 2021, pumping rates at CL wells were updated based on individual flow-metered pumping records provided by from the City. However, in 2021, flow meters were unreliable for estimating individual well pumping rates. To update rates for 2021 and 2022, total pumping from each month during 2021 and 2022, respectively, was compared to the previous year's totals (summed for each month for individual wells). That ratio of individual well rates compared to total monthly rates for the previous year was then applied to estimate the individual pumping well rates for individual 2021 and 2022 estimates. The same procedure was followed for generating pumping rates for January and February 2023. Stress periods in the model are monthly and, as a result, the total pumping volume for each month is spread over the corresponding month. The total pumping rates per year over time used in the 2023 model is shown in **Error! Reference source not found.**. **Error! Reference source not found.** shows the locations of CL wells and the average 2022 pumping rates for each well in the inset table.

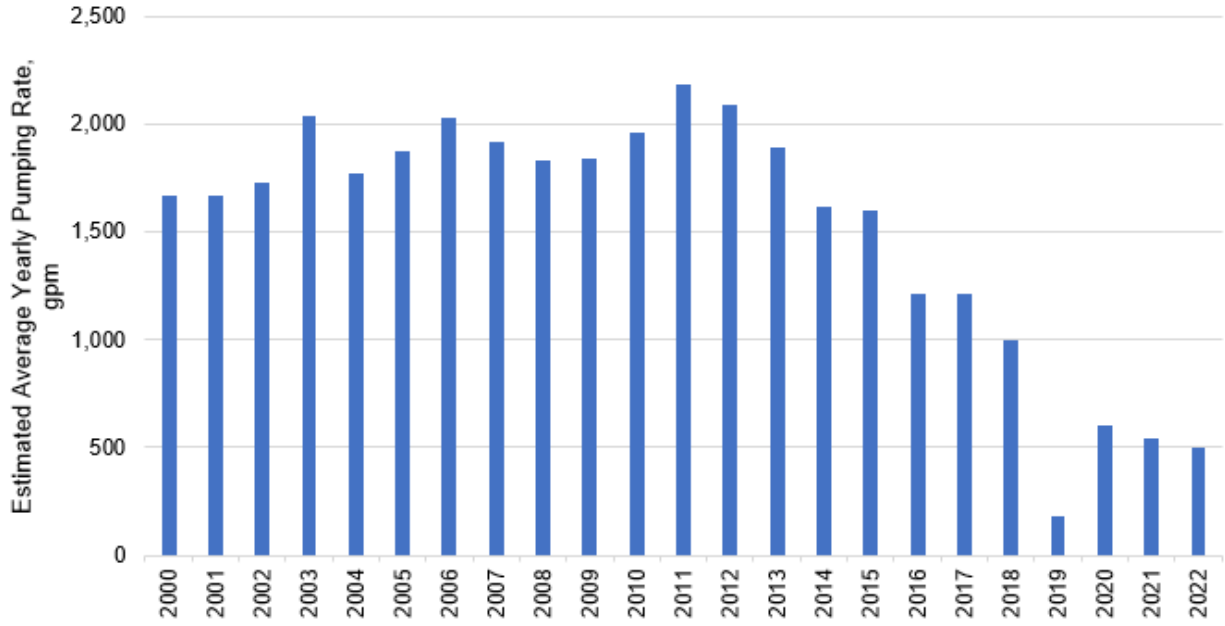
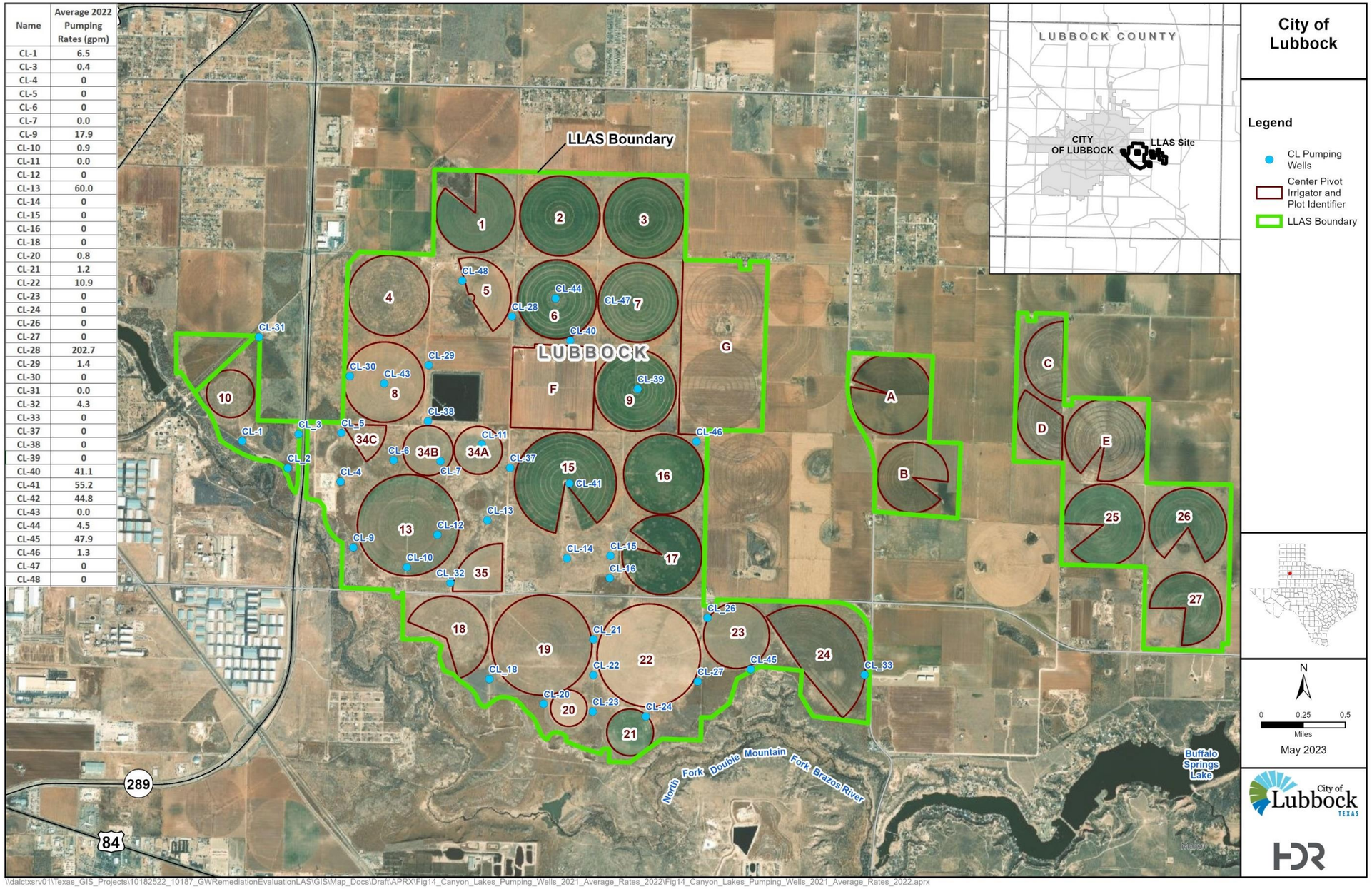


Figure 13. Estimated average yearly pumping rates for CL wells

Name	Average 2022 Pumping Rates (gpm)
CL-1	6.5
CL-3	0.4
CL-4	0
CL-5	0
CL-6	0
CL-7	0.0
CL-9	17.9
CL-10	0.9
CL-11	0.0
CL-12	0
CL-13	60.0
CL-14	0
CL-15	0
CL-16	0
CL-18	0
CL-20	0.8
CL-21	1.2
CL-22	10.9
CL-23	0
CL-24	0
CL-26	0
CL-27	0
CL-28	202.7
CL-29	1.4
CL-30	0
CL-31	0.0
CL-32	4.3
CL-33	0
CL-37	0
CL-38	0
CL-39	0
CL-40	41.1
CL-41	55.2
CL-42	44.8
CL-43	0.0
CL-44	4.5
CL-45	47.9
CL-46	1.3
CL-47	0
CL-48	0



\\dalctxsrv01\Texas_GIS_Projects\10182522_10187_GWRemediationEvaluationLAS\GIS\Map_Docs\Draft\APRX\Fig14_Canyon_Lakes_Pumping_Wells_2021_Average_Rates_2022\Fig14_Canyon_Lakes_Pumping_Wells_2021_Average_Rates_2022.aprx

Figure 14. Locations of CL Pumping Wells and 2022 Average Pumping Rates

4.6 5-year Predictive Model Development

The 5-year predictive model simulation timeframe is from January 2023 through December 2027. The 2023 groundwater model was used as a basis for the 5-year predictive model, where the December 2022 nitrate-N and groundwater levels were used as the initial condition. Pumping rates, as developed and described in the previous section for the historical model for 2022, were repeated for each year from January 2023 through December 2027. The estimated recharge and nitrate-N application rates documented in the AWT April 28, 2022, memo for the LLAS areas were used for the entire 5-year predictive period. Boundary conditions used in the 2022 time period were carried forward for the entire 5-year predictive period.

4.7 Model Results

4.7.1 2023 Model

Results of the 2023 model include the spatial distribution and time series of estimated water levels and nitrate-N concentrations. The spatial distribution of water levels and nitrate-N concentrations for December 2022, shown in **Error! Reference source not found.** and **Error! Reference source not found.**, respectively.

While model calibration was not carried out, the observed and simulated water levels and nitrate-N values were compared. Overall, the 2023 model results match reasonably well to the observed water level and nitrate-N values in the LLAS area including the 2022 readings. Observed versus modeled water levels at select wells are shown in **Error! Reference source not found.**.

Water levels have been declining from 2000 but began to stabilize around 2016 in most areas. This stabilization is likely due to decreased pumping. Modeled water levels appear to be slightly underpredicting in some locations beginning in about 2015. The reason for this could be that actual recharge is higher during this timeframe than was reported by AWT and assumed in the model. Also, pumping is reduced in the model from the measured values due to water levels in the well dropping below the “pumping level” as specified in the model from previous versions. Presumably, the pumping level corresponds to the bottom of the well or the lowest elevation above the pump intake (i.e., the well going dry due to pumping); however, these pumping levels should be verified.

Observed and modeled nitrate-N values at select wells that are close to highly concentrated areas of the nitrate-N plume within the LLAS boundary are shown in **Error! Reference source not found.**. In general, nitrate-N levels have declined since 2000; however, there are some wells that showed nitrate-N levels at their lowest values in 2010 but increasing slightly since then. These wells were on the edge of the LLAS where higher concentrated plumes located upgradient are moving through the monitoring point.

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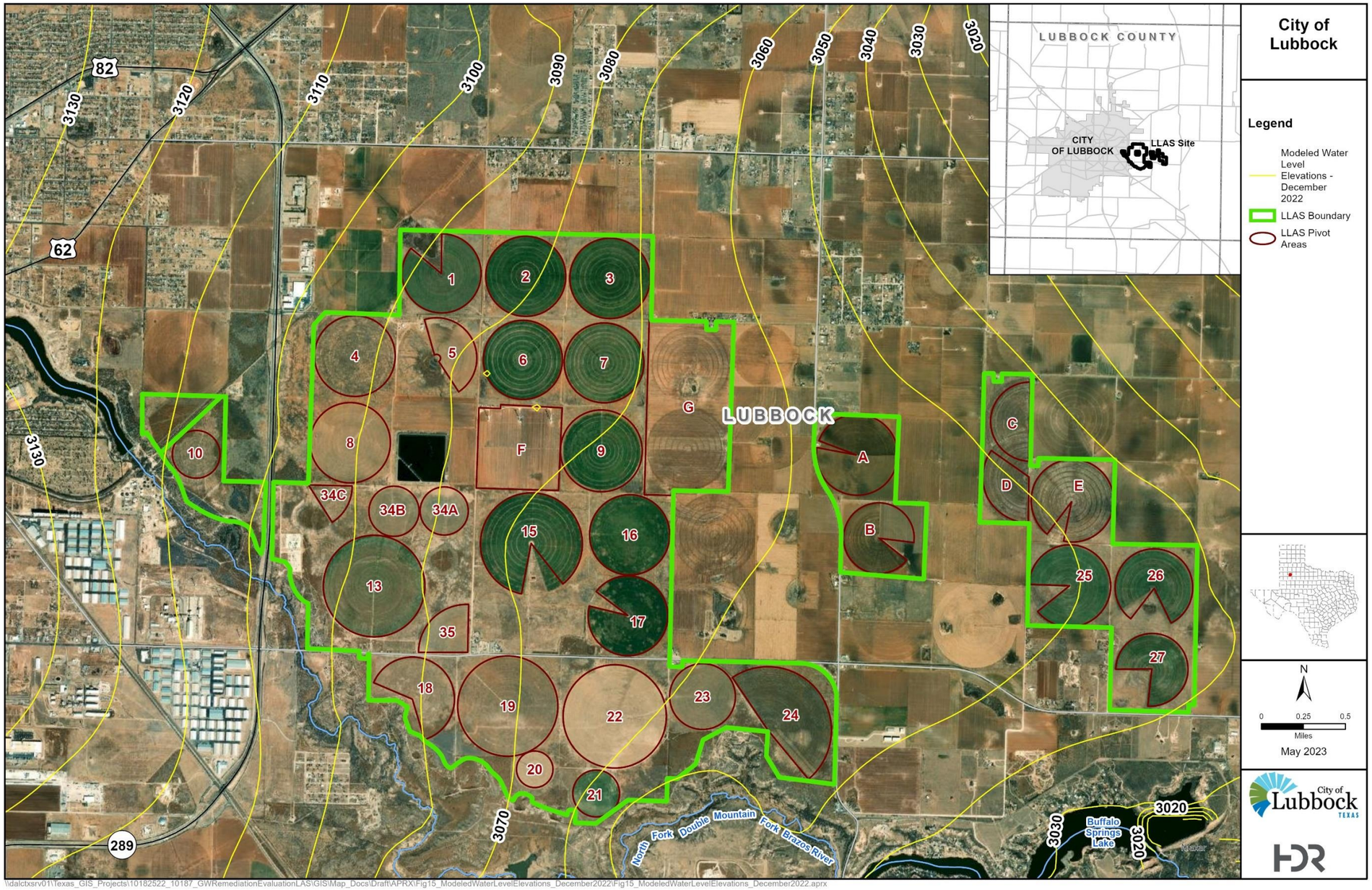

Figure 15. Modeled December 2022 Water Level Elevations

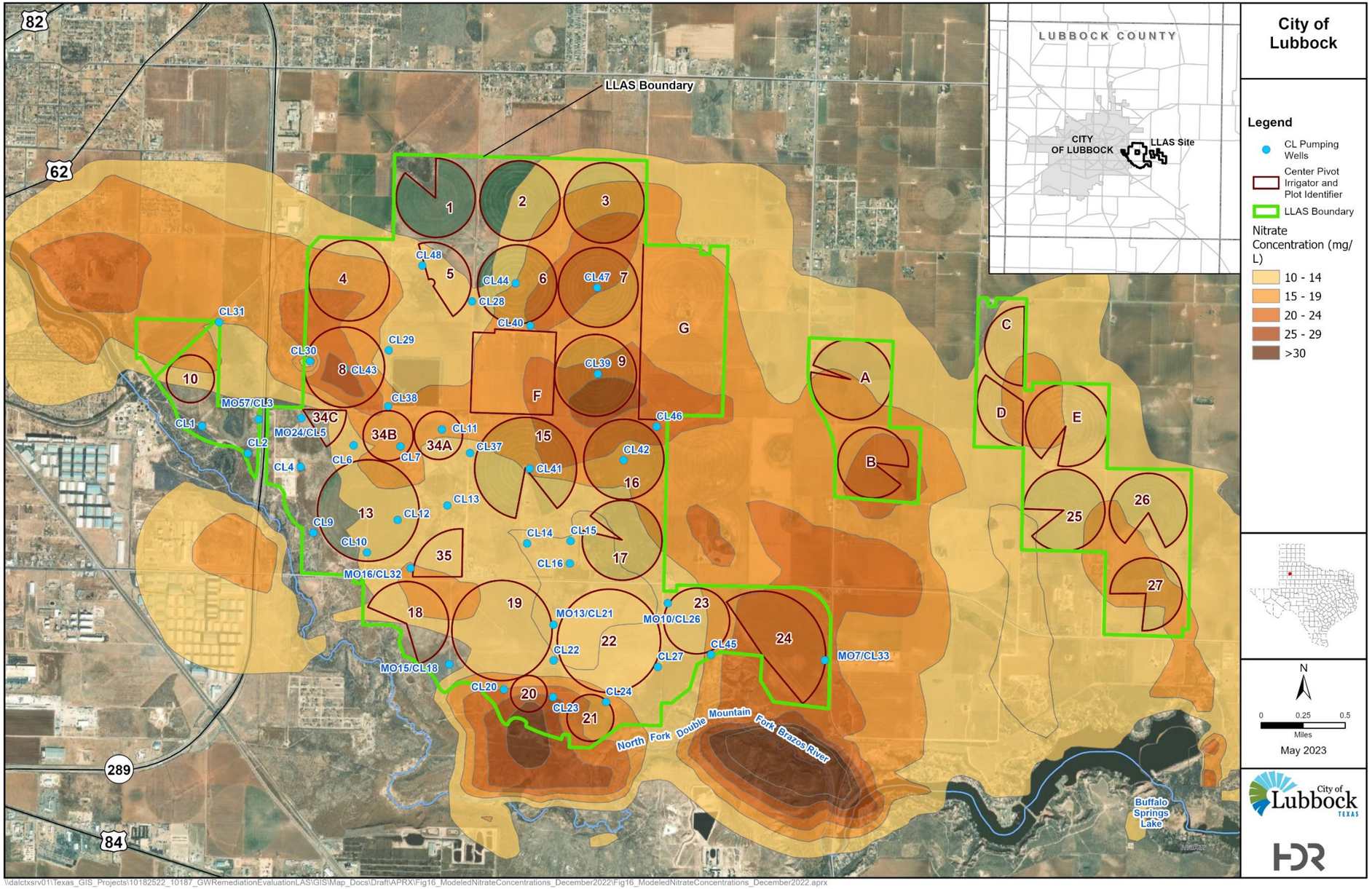

Figure 16. Modeled Nitrate-N December 2022 Concentrations

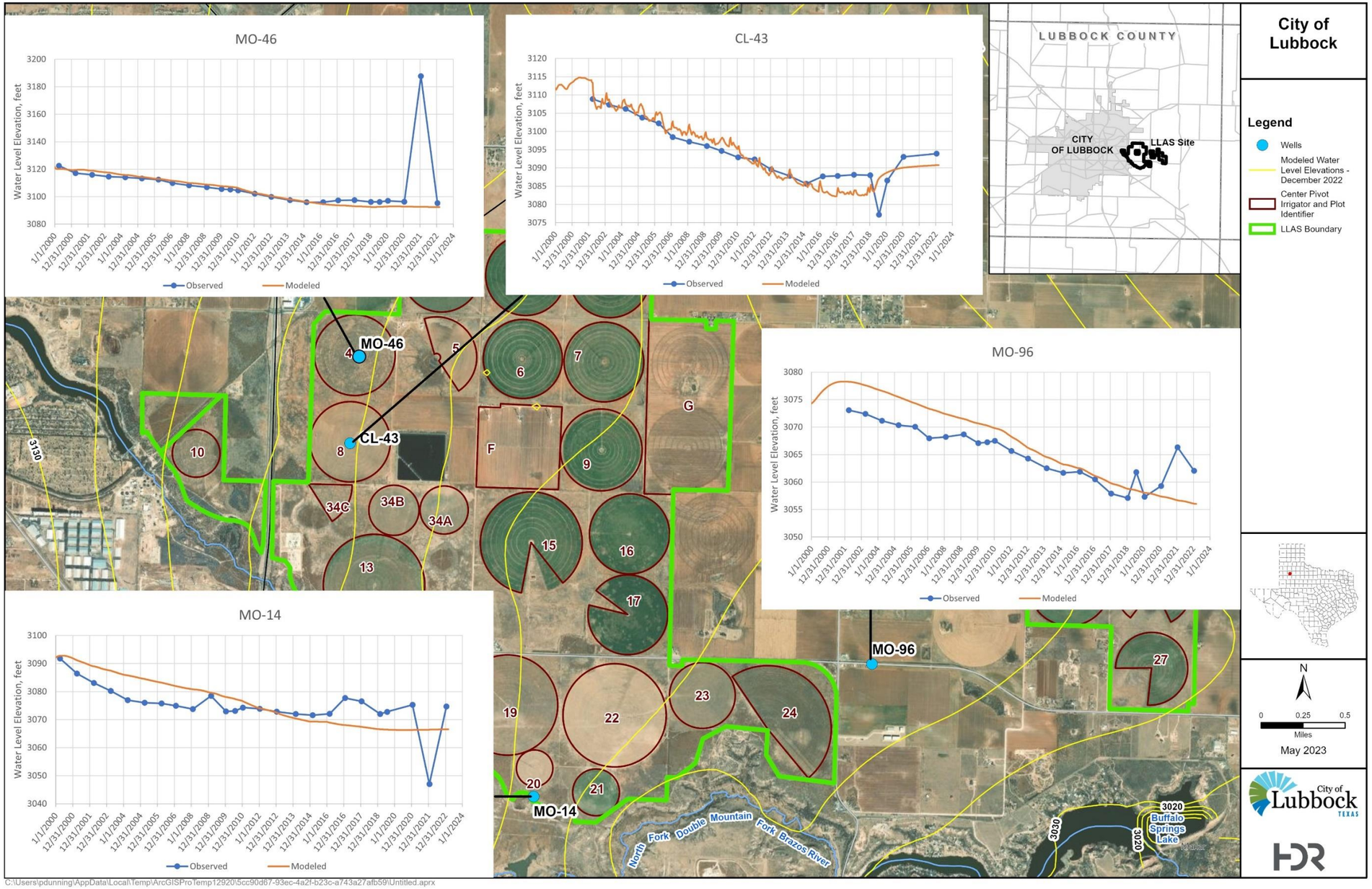

Figure 17. Observed versus modeled water levels at select wells

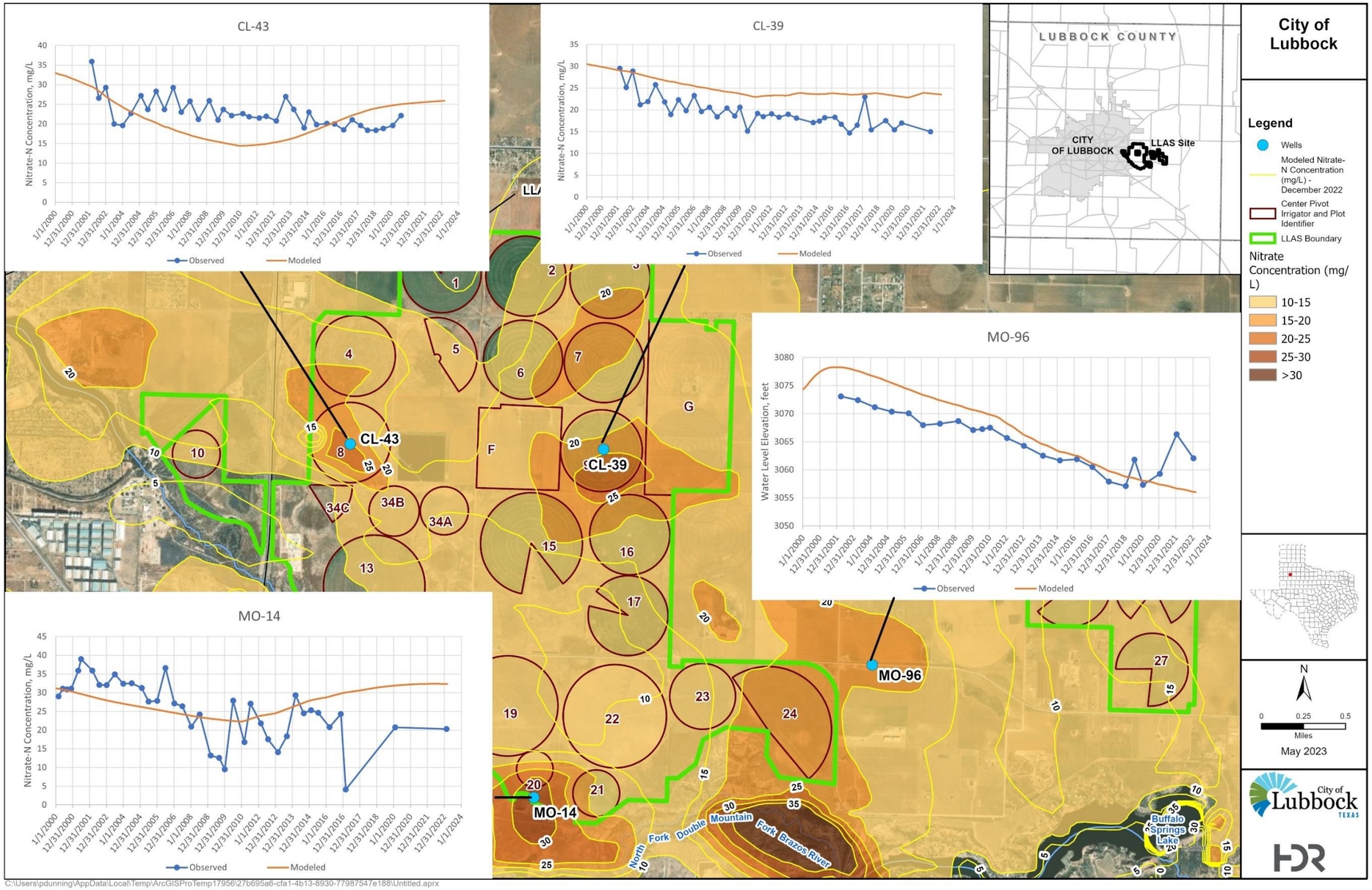

Figure 18. Observed versus modeled nitrate-N at select wells

4.7.2 5-year Predictive Model

The 5-year predictive model resulting water level elevations for December 2023 and December 2027 are shown in **Error! Reference source not found.** and **Error! Reference source not found.**, respectively. The 5-year predictive model resulting nitrate-N levels for December 2023 and December 2027 are shown in **Error! Reference source not found.** and **Error! Reference source not found.**, respectively.

The predictive model includes an input of 2,675 kilograms (kg) of nitrate-N applied via effluent in LLAS for the 5-year period (2023 – 2027). However, 63,482 kg of nitrate-N is extracted from CL wells for the 5-year predictive model. Given that the extracted nitrate-N is greater than the nitrate-N applied via effluent, the predicted nitrate-N concentrations are anticipated to decrease. **Error! Reference source not found.** shows the decrease in nitrate-N over time.

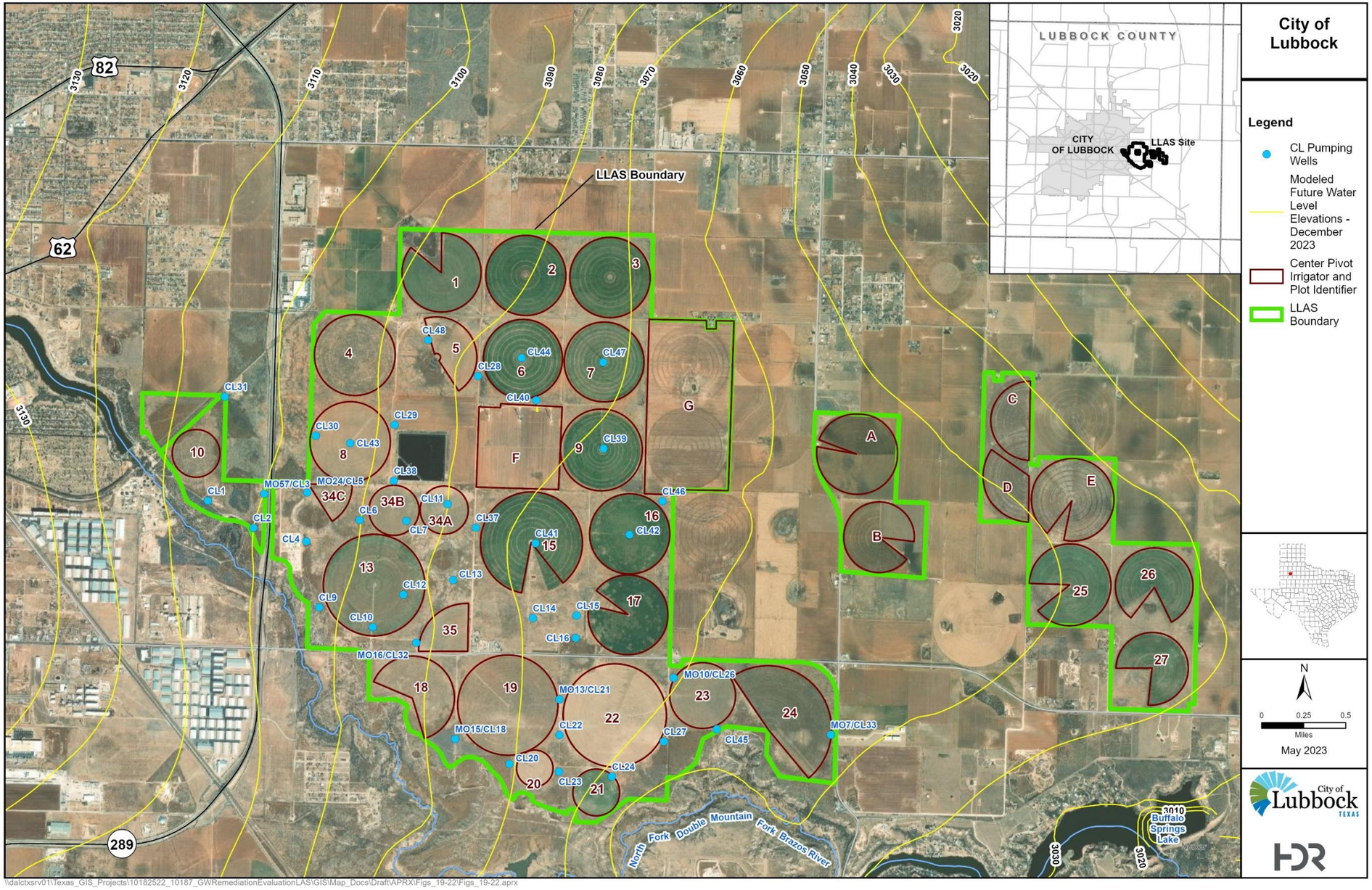

Figure 19. Modeled Future Water Level Elevations – December 2023

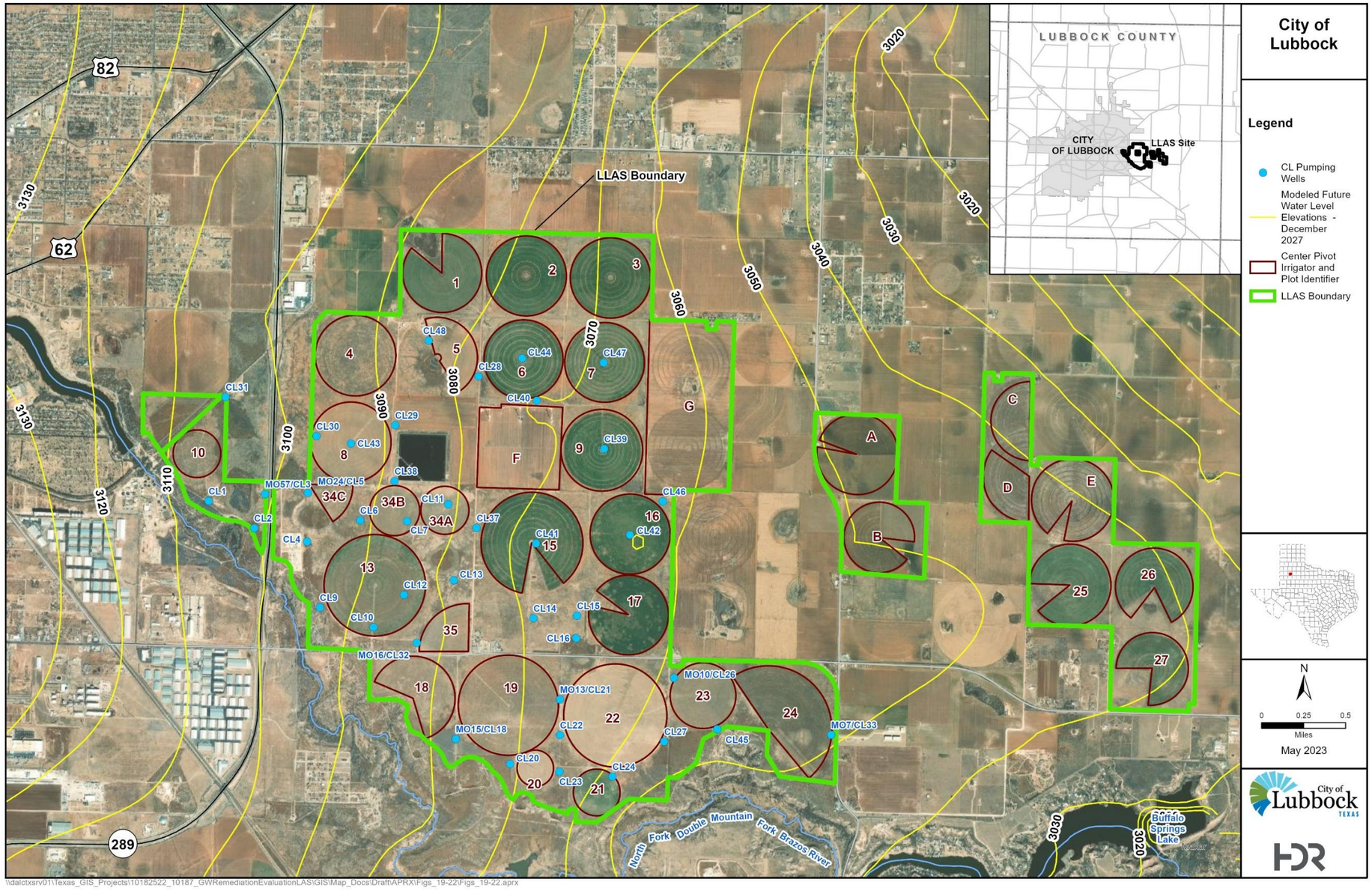

Figure 20. Modeled Future Water Level Elevations – December 2027

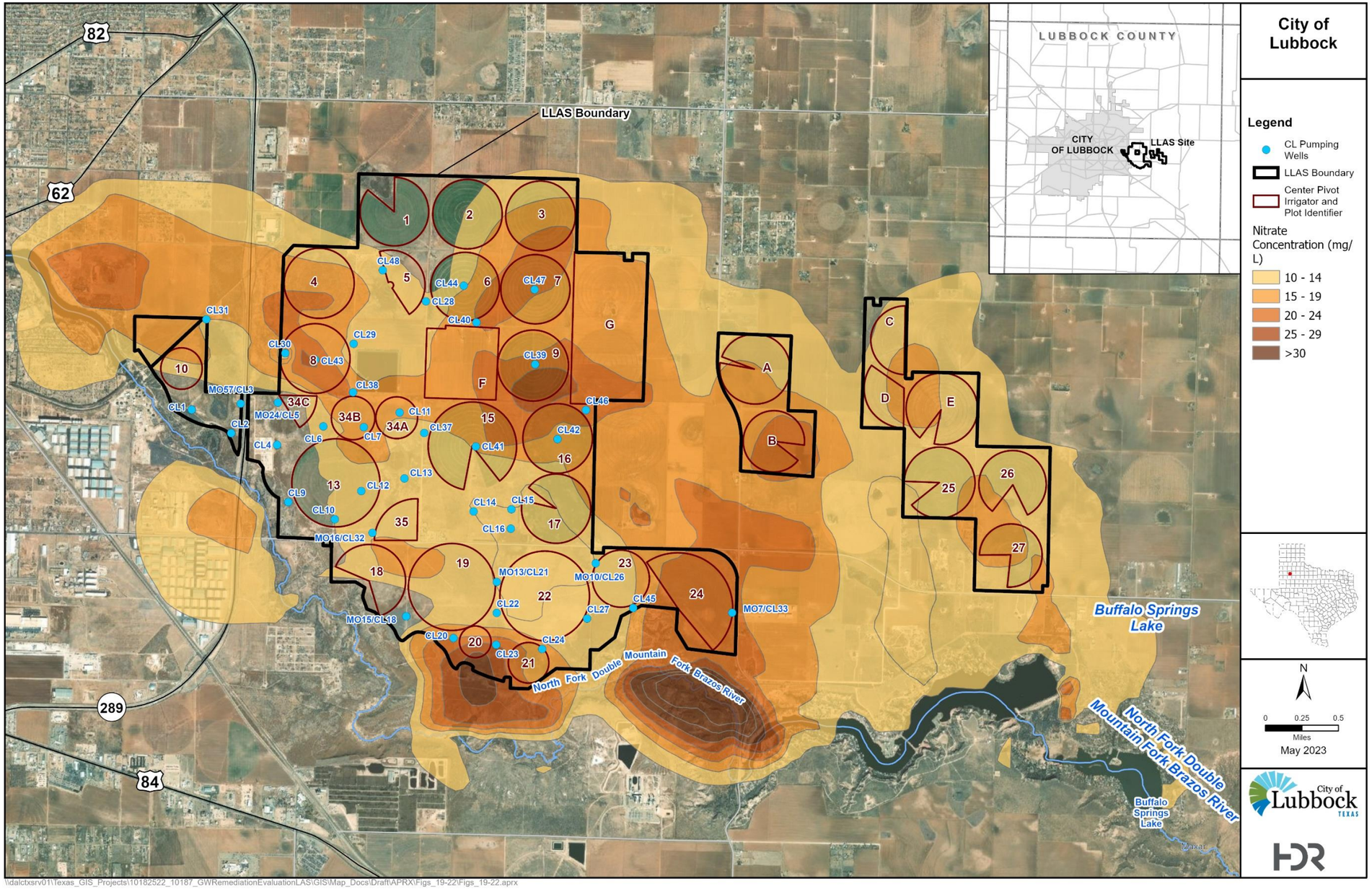

Figure 21. Modeled Nitrate-N levels – December 2023

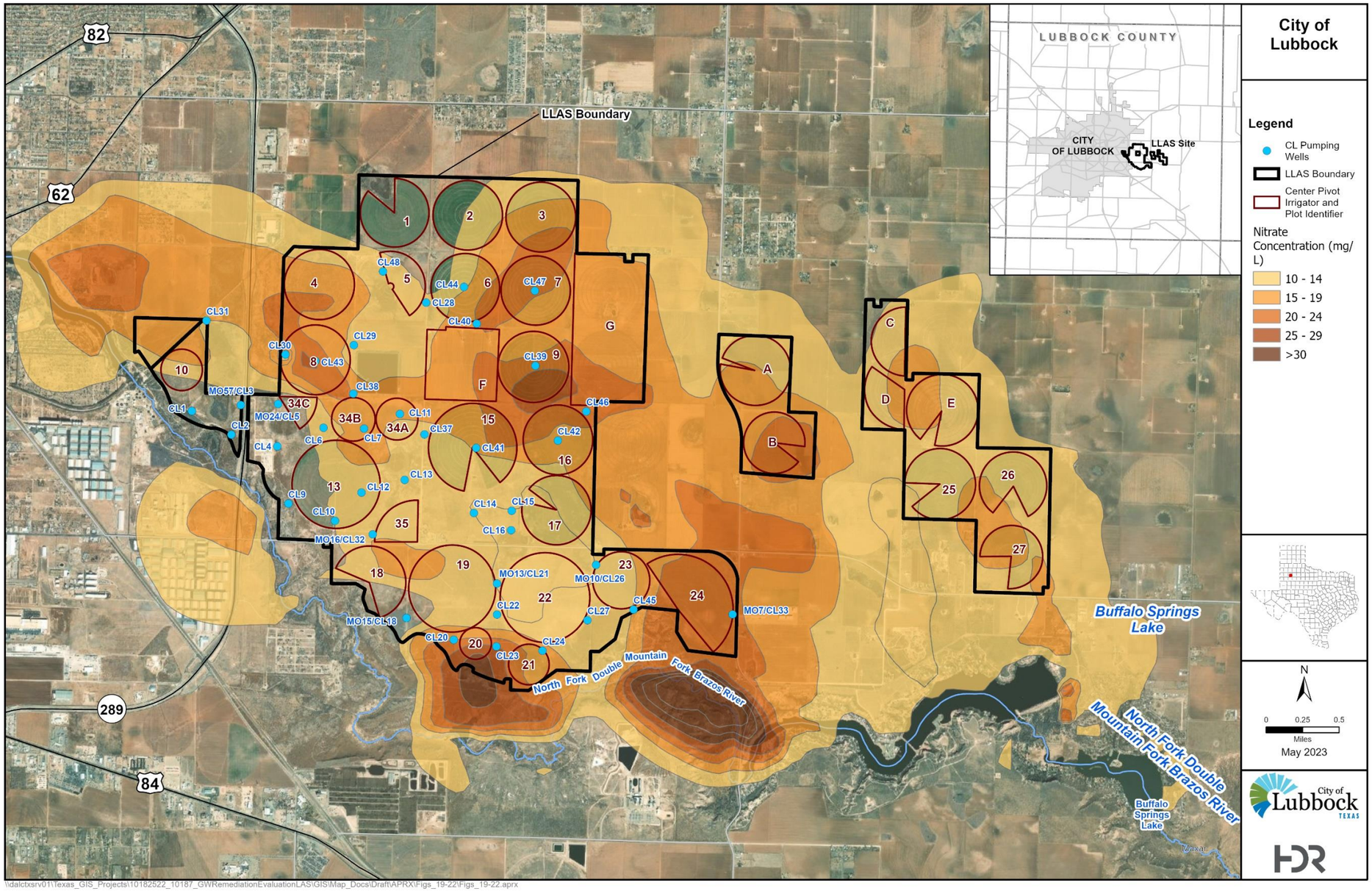

Figure 22. Model Future Nitrate-N levels – December 2027

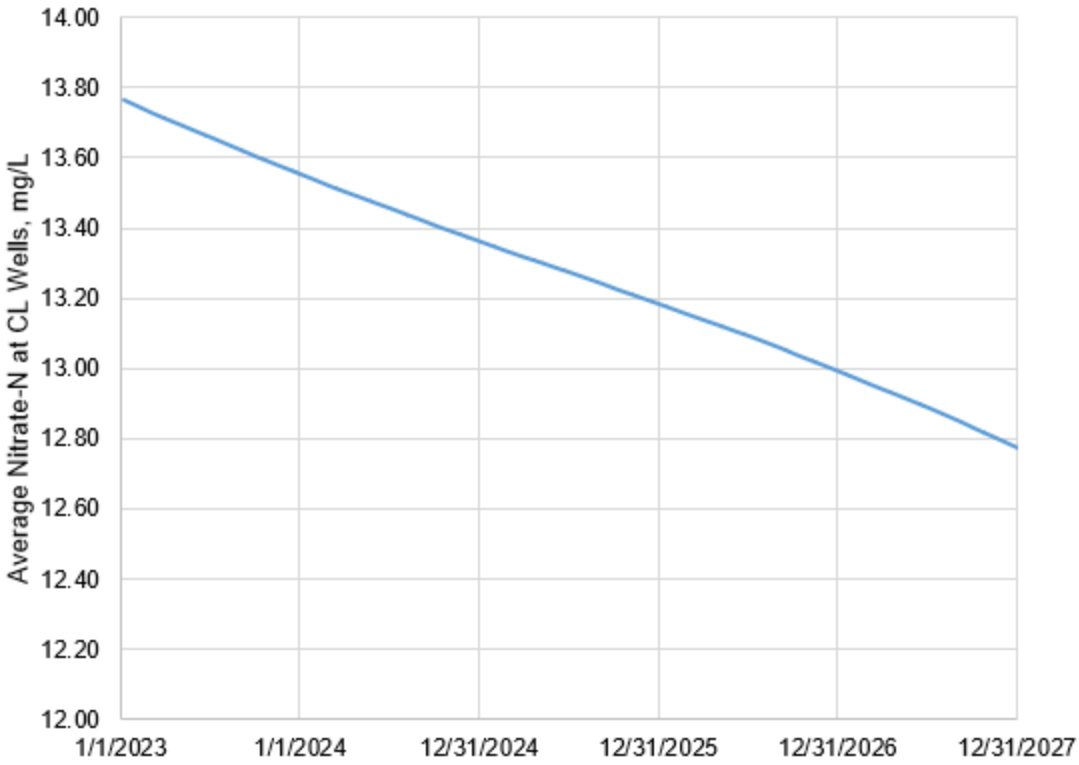

Figure 23. Model Estimated Nitrate Extraction by CL wells from January 2023 through December 2027

4.8 Recommendations

The end of the annual reporting period is to the end of February of each year, while the annual report is due by the end of May. Shortening the reporting period to a calendar year so that analysis could begin sooner after the final data collection would allow more time for further analysis and data verification prior to the required date for submitting the annual report to TCEQ.

Pumping and recharge record keeping is critical to estimations of concentration within the LLAS boundary. The more detailed or higher level of confidence in the accuracy of the data will provide better model predictions.

Model recalibration prior to or in the next year's annual update is recommended to allow for an improved match between simulated and observed water levels and nitrate-N concentrations over time. In addition, the recalibrated model would provide a better basis for the 5-year future model predictions.

5 Groundwater Volumes Routed to Other Locations

[TPDES Permit Other Requirement 18d]

As described in Other Requirement No. 18d of TPDES Permit WQ0010353002, the volume of groundwater routed through the JBLS and the volume of groundwater routed for irrigation at other locations are included in this section.

The estimated groundwater volumes recovered by the CL groundwater recovery wells and routed through the JBLS and other locations are included in Appendix D, Table 1.

In 2014 and 2015, the City began reworking and upgrading the supervisory control and database acquisition (SCADA) system on the CL recovery wells to assist in recording and controlling the amount of groundwater pumped from each well. The SCADA system is programmed to control pumping of individual wells. The CL recovery wells are grouped into priority categories and are controlled by the water level in the ground storage tank and/or by programmed recharge periods for low-flow wells to allow for adequate time for the wells to recharge before the pumps are restarted.

5.1.1 Volume Routed through Jim Bertram Lake System

As shown in Appendix D, Table 1, of the 264.8 million total gallons pumped into the ground storage tank and pumped out by the booster pump in 2022, a reported 0.3 million gallons were used to irrigate the cemetery and 257.6 million gallons was discharged to the JBLS.

The JBLS is a series of shallow, man-made lakes with abundant wetland vegetation. The lakes and associated wetlands use the nitrate-N in the produced water. Past sampling results have shown that when water leaves JBLS Lake 6, the average annual nitrate-N is less than 1 mg/L, with monthly levels ranging from <0.002 mg/L to 1.37 mg/L, with greater nitrate-N concentrations generally observed in the winter months.

As shown in Appendix D, Table 1, the average annual groundwater production rate being pumped from the ground storage tank in 2022 by the booster pump was approximately 504 gpm. Total annual groundwater production is depicted in Figure 24.

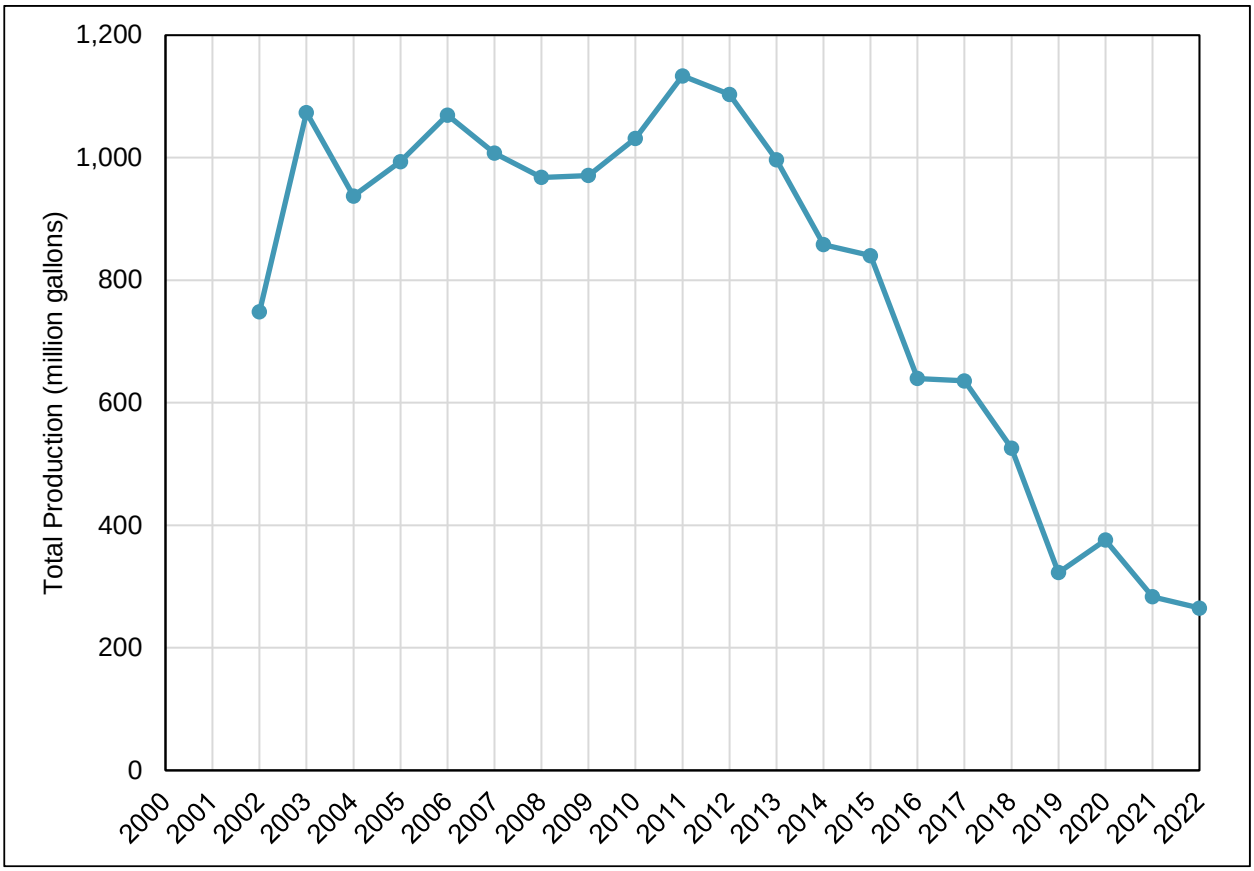

Figure 24. LLAS Yearly Total Groundwater Production (million gallons)

6 In Situ Groundwater Remediation Activities

[TPDES Permit Other Requirement 18e]

In situ groundwater remediation activities, as described in Other Requirement No. 18e, are not applicable for this annual report.

7 Alterations to Plans based on Models

[TPDES Permit Other Requirement 18f]

As described in Other Requirement No. 18f of TPDES Permit WQ0010353002, alteration to the cropping and water application plans resulting from water and nitrogen balance models are included in this section.

7.1 Land Application Site Operations

The SEWRP discharges reclaimed water to the storage reservoir and then the reservoir transfers water to the LLAS. The LLAS is divided into plots and the water is sent to specific irrigation plots with center pivots. Plots include L1 through L10, L13, L15 through L28, L34A, L34B, L34C, and L35. Plot

L47 is no longer used. Most of the plots are adjacent to one another in an area surrounding the storage reservoir and extending westward inside Highway Loop 289 at Plot L10. Exceptions include plots L25, L26, and L27, which are located in the far eastern portion of the site to the north of Buffalo Springs Lake.

The contract plots include plots A, B, C, D, and E (located to the west and north of plots L25 through L27), and plots F and G (located to the east of storage reservoir). The plots range in size from 21 acres (L34C) to 325 acres (Contract Plot G).

Crops are managed using the *Crop Management Plan for the City of Lubbock's Land Application Site (LLAS)*[14]. Treated wastewater effluent application is performed in accordance with a water balance model developed by AWT that accounts for both crop water and nitrogen needs, as well as rainfall amount and residual values of nitrogen in the soil.

Crops are primarily a combination of cool and warm season grasses, which the City periodically removes by haying. Crops are primarily cotton on the contract plots, where supplemental fertilizer, including manure, is sometimes applied. The water balance model accounts for both crop water and nitrogen needs, as well as rainfall amounts and residual values of nitrogen in the soil. The goal is to meet weekly crop nitrogen requirements and prevent over-application that may result in nitrogen leaching to groundwater. Application to a particular plot occurs only when the crop needs both nitrogen and water. The City continues to follow the cropping and water balance as developed by AWT, and there have been no significant alterations.

7.2 Treated Wastewater Effluent Application

A summary of the total gallons of water applied to each of the LLAS and contract plots is shown in Appendix E, Table 1. Approximately 1.163 billion gallons, or 3,569 acre-feet, of treated wastewater effluent was applied to the LLAS plots and approximately 193 million gallons, or 595 acre-feet, of treated wastewater effluent was applied to the contract plots in 2021. The differences in annual applications by contract users are typically the result of total precipitation received each year.

As shown in Appendix E, Table 1 and Figure 1, the LLAS plots include plots L1 through L10, L13, L15 through L28, L34A, L34B, L34C, and L35. The LLAS plots are located approximately adjacent to one another in an area surrounding the LLAS effluent storage reservoir and extending westward inside Highway Loop 289 at plot L10, except for LLAS plots L25, L26, and L27, which are located in the far eastern portion of the site to the north of Buffalo Springs Lake. The contract plots include plots A, B, C, D, and E, located to the west and north of the LLAS plots L25 through L27, and plots F and G, located to the east of LLAS effluent storage reservoir.

In the 2019 TPDES permit renewal, the City reduced its total irrigable area from 5,900 to 5,634 acres. The area removed included the following:

- Plot 4 - 151.6 acres removed; 116 of those acres are under pivot.
- Plot 18, 114.2 acres removed; 80 of those acres are under pivot.

Individual plots range in size from 21 acres (L34C) to 325 acres (contract plot G). On a per-acre basis in 2021, the treated wastewater effluent applied to the approximately 2,660 acres at the LLAS

[14] AWT. 2013. City of Lubbock. Crop Management Plan for the City of Lubbock's Land Application Site (LLAS), July 29, 2013.

resulted in approximately 437,493 gallons per acre (gal/ac). The treated wastewater effluent applied to the contract plots resulted in approximately 211,707 gal/ac in 2021.

The total annual amount of approximately 1.36 billion gallons, or 4,165 acre-feet, applied to the LLAS and contract plots in 2021 was less than the annual amounts applied in every year, except 2018 when a total of approximately 1.36 billion gallons of effluent was applied. The total amount of effluent applied to the contract plots in 2021 was less than the annual amounts applied in every year from 2002 through 2020, except for the volumes applied in 2004, 2006, 2007, 2015, and 2017.

8 Recommended Adjustments to the Remediation System

[TPDES Permit Other Requirement 18g]

As described in Other Requirement No. 18g of TPDES Permit WQ0010353002, recommended adjustments to the remediation system based on experiences learned from past activities are included in this section.

1. Groundwater levels measured and recorded during the semi-annual sampling events normally conducted in the late summer/early autumn should be used to prepare groundwater gradient maps during the summer months to evaluate groundwater flow conditions during operation of the CL recovery wells and off-site irrigation wells operated during the growing season.

2. Continued use of water level and groundwater elevation data of state-registered water wells monitored annually by the HPWD is recommended to expand the groundwater elevation database. Based on these results, additional sampling and/or installation of additional wells may be recommended to evaluate groundwater conditions near areas with elevated groundwater nitrate-N concentrations.

3. As part of the City's regular maintenance, the metering and pumping mechanisms, and related infrastructure should be maintained and repaired to improve the accuracy of the pumping data. This information should be systematically reviewed monthly and supplemented with measurements of pumping water levels in CL recovery wells to improve nitrate-N recovery and provide hydraulic control of nitrate-N migration in the groundwater. This data can be used in future groundwater model updates. The local LLAS groundwater flow and transport model can be used to evaluate alternative pumping strategies for control of nitrate-N migration in the groundwater. Consideration should be given to focus efforts and prioritize CL recovery wells based on groundwater availability and nitrate-N mass recovery and hydraulic control of nitrate-N migration in the groundwater.

4. To offset the reduction in pumping capacity in certain areas of the site, additional groundwater recovery efforts should be expanded to areas to the northern, eastern, and southeastern portions of the LLAS. The City is working toward establishing electrical service and constructing pipelines to collect groundwater from these areas.

5. The LLAS SCADA system is programmed to control pumping of individual wells. Though the CL recovery wells are grouped into priority categories and are controlled by the water level in the ground storage tank and programmed for recharge periods for lower producing well, improvements to the SCADA system could enhance nitrate-N recovery and provide for greater hydraulic control of nitrate-N migration in the groundwater.

9 Summary Discussion

Following is a summary of the key conclusions and recommendations from the 2023 semi-annual sampling, the 2023 groundwater recovery activities, and the 2023 3annual sampling, and other historical data.

1. A total of approximately 1.42 billion gallons, or 4,345 acre-feet, of treated wastewater effluent (or approximately 3.88 MGD) was applied to the LLAS and contract plots in 2022.
2. Approximately 264.8 million gallons, or 813 acre-feet, of groundwater (or approximately 0.73 MGD) were recovered from the CL remediation wells beneath the LLAS in 2022. Of the total of 283.1 million gallons recovered and pumped to the ground storage tank, a reported 0.3 million gallons were used to irrigate the cemetery and 257.6 million gallons was discharged to the JBLS. Groundwater production from the CL recovery wells has eliminated the groundwater mound that previously existed underneath the LLAS. The estimated mass of recovered nitrate-N in the groundwater pumped to the ground storage tank and discharged to the JBLS and cemetery was calculated to be approximately 44,256 pounds in 2022.
3. Despite the reduced volume of groundwater recovered in 2022, groundwater levels measured during the annual measurements in January indicate that groundwater levels are continuing to decline, and the decline is centered to the south and east of the LLAS reservoir, as a result of groundwater recovery efforts from the CL recovery wells. Static water levels measured in January 2023 indicate that the historical groundwater mound centered in the area of the LLAS reservoir has been eliminated and groundwater levels have been lowered by more than 56 feet since 1991. However, groundwater levels have rebounded somewhat in areas to the northeast of the LLAS reservoir. The average groundwater level in seven wells near land application plots 14 through 17 to the southeast of the LLAS reservoir have declined about 42 feet since 1991. However, based on groundwater level measurements in areas downgradient, or otherwise beyond the influence of existing groundwater recovery efforts, not all areas of the existing nitrate-N plume are hydraulically controlled by the CL recovery wells.
4. The calculated average nitrate-N concentrations in the CL recovery wells and the MO monitoring wells were less than historical values over the past 15 years.
5. Individual monitoring wells at the LLAS property exhibit decreasing trends, particularly on the western and northwestern portions of the LLAS. In addition, individual wells in the southeast-central portion of the LLAS exhibit nitrate-N concentrations less than 10 mg/L and may be related in part to natural in situ denitrification.
6. The results of the updated groundwater model indicate that nitrate recovery is expected to continue over the next 5-year prediction interval.

7. Extensive areas to the north and east of the LLAS are used for agricultural purposes. As reported in the 1989 LLAS Groundwater Remediation Plan, groundwater with elevated nitrate-N has been identified in areas surrounding the LLAS, which does not appear to have been related to past LLAS operations. Other possible sources include past fertilizer applications, septic tank releases, barnyard operations, or oil and gas operations.

A

Data Tables for Section 2 – Static Water Level Elevations

Well	MP	6/30/1991	3/31/1993	3/31/1994	3/31/1995	3/31/1997	3/31/1998	3/31/1999	3/31/2000	3/31/2001	3/31/2002	3/31/2003	3/31/2004	3/31/2005	3/31/2006	1/31/2007
MO 1	3138.90	3074.60	3075.90	3077.40	3073.80	3073.75	3074.99	3073.46	3072.54	3071.32	3069.68	3067.87	3066.93	3066.66	3066.33	3064.86
MO 2	3138.30	3075.20	3077.30	3077.50	3074.90	3075.50	3076.16	3075.30	3072.32	3071.66	3068.98	3067.04	3065.73	3065.07	3064.60	3063.23
MO 3	3133.30	3068.00	3069.55	3070.90	3067.90	3067.00	3067.13	3065.10	3063.16	3061.48	3060.33	3058.91	3057.77	3057.89	3057.70	3056.09
MO 4	3132.20	3071.50	3074.95	3076.10	3073.00	3073.20	3072.95	3071.32	3068.70	3067.06	3065.51	3063.48	3061.85	3062.39	3061.34	3059.49
MO 5	3129.30	3061.50	3063.30	3067.00	3065.30	3064.70	3064.59	3063.61	3062.16	3060.68	3059.08	3056.59	3054.59	3053.25	3052.44	3051.29
MO 6	3126.40	3048.40	3049.65	3054.70	3053.60	3053.85	3053.72	3052.20	3051.54	3049.44	3048.06	3046.38	3044.82	3043.81	3042.99	3042.02
MO 7 CL 33	3145.46	3067.92	3072.56	--	3063.21	--	3071.53	3070.40	3072.04	3071.15	3069.83	3067.87	3067.30	3066.15	3065.74	3063.76
MO 8	3143.90	3062.80	3062.90	3064.50	3062.40	3061.47	3063.07	3064.05	3065.22	3062.94	3062.41	3061.70	3060.79	3060.28	3060.07	3058.44
MO 9	3141.80	--	3079.55	3082.70	3080.60	3081.30	3083.89	3081.80	3082.11	3078.31	3076.26	3072.35	3070.75	3069.81	3069.34	3068.77
MO 10 CL 26	3152.3	3089.13	3111.33	3099.33	3088.73	3096.83	3100.93	3091.64	3090.97	3090.28	3085.99	3083.78	3081.36	3080.76	3079.73	3077.31
MO 11	3128.20	3079.70	3080.70	3081.10	3081.60	3081.20	3083.20	3080.90	3080.88	3074.48	3072.66	3071.30	3069.28	3069.39	3068.87	3067.67
MO 12 CL 25	3151.50	3102.62	3120.92	3099.22	3098.52	3099.12	3104.17	3097.63	3097.49	3090.88	3087.06	3084.66	3081.70	3081.38	3080.06	3077.60
MO 13 CL 21	3154.46	3100.99	3123.44	3106.19	3107.09	3111.39	3114.29	3112.29	--	3098.34	3093.17	3091.09	3087.75	3087.17	3085.50	3082.54
MO 14	3148.70	3090.50	3090.45	3091.10	3088.90	3090.95	3094.05	3091.47	3091.82	3086.39	3083.08	3080.19	3076.97	3076.04	3075.77	3074.94
MO 15 CL 18	3160.05	3112.16	3129.06	3115.16	3100.06	3100.05	3105.50	3104.76	--	3093.10	3089.46	3088.73	3086.91	3086.96	3085.29	3084.26
MO 16 CL 32	3164.20	3134.76	3132.61	3106.86	3107.16	3108.86	3125.24	3115.66	3109.85	3107.94	3108.37	3107.98	3104.31	3099.72	3094.27	3095.67
MO 17	3165.70	3142.90	3132.20	3125.50	3122.00	3118.10	3124.20	3117.82	3116.80	3113.03	3109.47	3108.22	3106.02	3103.66	3101.86	3098.40
MO 18	3164.20	3142.80	3129.20	3118.90	3118.20	3113.40	3125.10	3113.16	3111.48	3110.28	3109.20	3108.46	3104.71	3100.60	3097.46	3095.87
MO 19	3154.20	3123.50	3123.60	3122.20	3116.20	3119.00	3122.31	3119.22	3116.08	3109.85	3105.32	3102.17	3098.37	3095.38	3093.43	3090.72
MO 20	3150.20	3108.40	3111.20	3111.30	3111.00	3111.20	3114.80	3110.89	3109.23	3104.32	3099.88	3096.44	3092.48	3090.93	3089.11	3086.25
MO 21	3162.00	3112.90	3116.40	3115.10	3114.00	3112.10	3114.65	3114.96	3113.13	3109.66	3106.74	3099.39	3096.93	3094.68	3091.11	3089.39
MO 22	3165.80	3103.40	3106.20	3107.80	3105.70	3104.80	3105.85	3106.24	3107.43	3104.47	3102.33	3098.88	3095.95	3094.15	3092.52	3089.41
MO 23	3165.10	3130.40	3130.10	3123.20	3119.00	3121.59	3123.89	3121.89	3117.78	3112.56	3110.65	3105.42	3101.51	3098.38	3095.93	3093.50
MO 24 CL 5	3167.86	3134.25	3106.90	3127.80	3121.50	3113.30	3122.11	3118.20	3112.81	3110.07	3110.23	3109.36	3106.71	3104.89	3103.15	3099.55
MO 25	3184.20	3142.80	3135.20	3128.80	3124.50	3119.10	3122.38	3115.82	3115.19	3111.70	3110.46	3107.61	3106.54	3104.19	3102.30	3098.83
MO 26	3192.80	3139.40	3137.30	3119.50	3124.30	3113.15	3106.08	3116.51	3109.98	3110.91	3104.50	3103.51	3103.86	3101.94	3100.20	3097.56
MO 27	3191.60	3138.40	3135.10	3124.30	3124.80	3118.45	3110.00	3116.60	3112.22	3110.70	3105.42	3104.74	3104.32	3102.45	3100.72	3098.52
MO 28	3190.70	3137.60	3133.70	3127.60	3124.50	3120.60	3115.06	3117.22	3115.70	3110.81	3108.14	3107.11	3105.64	3103.79	3101.88	3099.90
MO 29	3189.70	3137.70	3133.20	3127.20	3124.60	3121.70	3117.66	3117.39	3117.27	3110.85	3110.02	3108.79	3106.71	3104.84	3102.88	3101.07
MO 30	3187.30	3135.60	3130.05	3126.50	3123.70	3121.20	3118.05	3117.30	3117.18	3110.98	3110.94	3109.48	3107.10	3105.15	3103.13	3101.30
MO 31	3185.00	3138.10	3131.75	3127.90	3124.00	3121.00	3119.57	3118.50	3118.23	3111.59	3111.04	3109.02	3106.18	3103.98	3101.73	3099.56
MO 32	3181.30	3140.70	3134.80	3128.30	3122.90	3121.30	3121.69	3119.40	3116.94	3112.32	3111.08	3108.13	3104.71	3102.17	3099.79	3096.98
MO 33	3178.50	3141.70	3135.00	3128.60	3123.50	3118.50	3121.70	3119.93	3116.97	3112.51	3111.40	3108.12	3104.35	3101.58	3099.20	3096.29
MO 34	3180.00	3142.00	3138.25	3129.90	3123.30	3121.80	3122.35	3119.98	3117.03	3112.38	3110.92	3107.41	3104.05	3101.44	3098.83	3095.83
MO 35	3179.90	3143.40	3139.65	3130.70	3124.10	3120.60	3122.41	3119.77	3117.03	3112.29	3110.63	3106.88	3103.98	3101.49	3098.72	3095.63
MO 36	3178.80	3143.50	3144.30	3131.70	3124.20	3120.80	3122.39	3118.97	3116.72	3112.14	3110.30	3106.21	3104.00	3101.68	3098.83	3095.62
MO 37	3185.00	3143.90	3143.25	3130.50	3124.40	3119.90	3120.75	3118.66	3116.24	3111.81	3109.43	3105.78	3104.00	3101.72	3099.02	3095.93
MO 38	3189.30	3142.30	3132.70	3127.90	3123.90	3119.30	3117.25	3117.88	3115.56	3111.48	3108.03	3105.27	3104.02	3101.80	3099.47	3096.54
MO 39	3183.20	3122.45	3122.45	3118.70	3117.20	3113.00	3117.08	3116.87	3117.52	3113.82	3112.33	3106.68	3103.58	3101.62	3098.82	3096.17
MO 43	3193.00	3116.60	3113.40	3116.00	3115.70	3116.05	3126.96	3117.50	3118.77	3114.50	3113.38	3110.93	3107.85	3105.41	3104.20	3100.97
MO 44	3198.70	3118.00	3126.20	3120.90	3121.50	3122.20	3118.70	3117.12	3116.17	3113.14	3115.19	3111.00	3108.75	3107.02	3105.01	3103.96
MO 45	3187.00	3130.00	3127.75	3128.30	3126.90	3127.50	3123.94	3120.54	3120.26	3115.42	3116.09	3114.89	3113.61	3112.61	3111.36	3109.39
MO 46	3201.30	3140.00	3140.05	3133.50	3130.30	3128.30	3127.91	3123.53	3122.50	3117.08	3115.99	3114.68	3114.10	3113.33	3112.41	3109.85
MO 47	3199.80	3130.80	3131.80	3132.00	3128.20	3126.10	3126.80	3123.59	3122.60	3118.97	3118.04	3117.07	3116.24	3116.53	3115.65	3113.15
MO 48	3174.20	3125.20	3128.20	3129.10	3128.30	3127.85	3129.49	3125.95	3125.70	3122.04	3120.50	3119.22	3118.23	3117.96	3117.27	3116.07
MO 49	3172.80	3126.10	3128.55	3130.80	3129.60	3131.85	3131.09	3126.64	3126.54	3121.81	3120.41	3118.60	3117.52	3116.63	3115.56	3113.59
MO 50	3201.00	3117.90	3124.00	3126.00	3125.80	3127.80	3128.19	3129.34	3128.56	3124.32	3123.42	3121.05	3118.86	3117.01	3116.12	3113.56
MO 51	3189.8	3100.10	3108.80	3111.90	3110.20	3113.28	3115.05	3115.92	3115.04	3113.46	3112.95	3110.89	3108.84	3107.57	3107.22	3105.24
MO 52	3194	3101.40	3108.00	3109.90	3107.20	3109.70	3113.78	3113.04	3112.78	3110.77	3109.56	3107.14	3104.87	3103.37	3102.92	3100.63
MO 53	3188.70	3100.00	3104.70	3107.60	3105.00	3106.77	3108.70	3109.99	3111.50	3107.80	3106.55	3104.23	3102.08	3100.54	3099.82	3097.70
MO 57 CL 3	3166.68	3128.65	3123.90	3126.45	3122.05	--	--	--	3112.57	3111.00	3110.21	3110.62	3107.65	3107.44	3105.74	3103.16
MO 58	3172.80	3127.20	3123.20	3123.80	3122.10	3120.84	3120.84	3120.30	3121.43	3118.38	3117.86	3117.68	3117.27	3117.25	3116.76	3116.48
MO 59	3184.90	3136.30	3135.80	3135.50	3133.90	3133.95	3131.56	3130.01	3131.04	3127.63	3126.78	3126.53	3126.02	3126.64	3126.46	3125.59
MO 60	3172.40	3136.30	3136.40	3134.90	3133.00	3132.62	3132.40	3131.55	3132.69	3129.30	3128.79	3128.76	3128.31	3128.84	3128.34	3128.00

MO 61	3175.30	--	3134.30	3132.20	3131.30	3131.80	3132.11	3130.95	3133.06	3130.67	3129.31	3128.96	3128.19	3132.73	3131.41	3130.28
MO 62	3178.40	--	3139.40	3136.40	3136.20	3135.77	3136.40	3136.09	3137.53	3134.77	3133.88	3133.36	3132.49	3136.29	3135.27	3134.15
MO 63	3146.10	3124.80	3138.10	3135.80	3135.40	3135.10	3135.19	3134.27	3135.04	3133.85	3133.98	3133.09	3133.63	3134.19	3133.05	3133.29
MO 64	3162.46	--	--	--	--	--	--	--	--	3145.01	3143.70	3145.44	3144.55	3147.07	3145.05	3145.64
MO 65	3197.20	--	--	--	--	--	--	--	--	3150.94	3150.28	3151.09	3150.25	3151.98	3150.54	3150.76
MO 66	3161.50	--	--	--	--	--	--	--	--	3151.16	3150.63	3151.54	3149.92	3152.71	3150.52	3151.09
MO 75	3190.70	--	--	--	--	--	--	--	--	3175.54	3174.81	3175.59	3174.30	3176.46	3174.98	3174.79
MO 76	3195.30	--	--	--	--	--	--	--	--	3174.94	3174.40	3174.70	3173.99	3175.01	3174.33	3174.08
MO 77	3198.10	--	--	--	--	--	--	--	--	3174.38	3174.01	3174.13	3173.42	3174.49	3173.76	3173.36
MO 78	3180.60	--	--	--	--	--	--	--	--	3170.40	3169.96	3170.20	3169.98	3170.67	3169.91	3169.81
MO 79	3183.96	--	--	--	--	--	--	--	--	3167.33	3166.77	3166.92	3166.57	3167.22	3166.14	3166.08
MO 80	--	--	--	--	--	--	--	--	--	3158.92	3155.67	3156.25	3158.92	3159.09	3156.90	3157.17
MO 81	3153.56	--	--	--	--	--	--	--	--	3149.60	3148.75	3149.54	3149.23	3150.91	3149.84	3149.87
MO 82	3147.90	--	--	--	--	--	--	--	--	3138.12	3137.63	3137.80	3137.80	3138.92	3137.75	3138.14
MO 83	3142.60	3135.20	3133.85	3134.70	3134.00	3134.40	3134.42	3133.75	3134.50	3132.44	3132.13	3132.29	3132.23	3133.05	3132.16	3132.23
MO 84	3155.90	3133.80	3127.65	3135.80	3134.60	3134.37	3134.49	3133.75	3134.86	3132.08	3131.86	3131.95	3131.90	3132.25	3131.82	3131.75
MO 85	3151.80	3124.60	3133.55	3134.30	3134.70	3133.82	3134.00	3133.49	3134.40	3131.69	3131.52	3131.40	3131.40	3131.93	3131.58	3131.42
MO 86	3134.60	--	3125.60	3124.20	3123.50	3123.30	3123.19	3122.60	3123.50	3121.13	3120.84	3120.57	3120.69	3120.66	3120.30	3120.16
MO 87	3179.90	--	--	--	--	--	--	--	--	--	3112.51	3108.24	3104.14	3100.87	3098.67	3095.66
MO 88	3166.89	--	--	--	--	--	--	--	--	--	3098.17	3096.41	3094.87	3094.00	3093.32	3091.20
MO 89	3163.74	--	--	--	--	--	--	--	--	--	3098.57	3096.90	3095.02	3094.33	3093.29	3090.96
MO 90	3155.27	--	--	--	--	--	--	--	--	--	3072.24	3071.08	3070.63	3070.79	3070.95	3069.66
MO 91	3138.31	--	--	--	--	--	--	--	--	--	3074.87	3073.84	3073.00	3072.61	3072.26	3071.31
MO 92	3144.83	--	--	--	--	--	--	--	--	--	3062.33	3060.69	3060.90	3060.94	3060.60	3057.78
MO 93	3136.79	--	--	--	--	--	--	--	--	--	3060.89	3059.15	3059.04	3058.95	3058.59	3056.54
MO 94	3128.72	--	--	--	--	--	--	--	--	--	3053.93	3052.30	3051.02	3050.08	3049.20	3048.15
MO 95	3134.55	--	--	--	--	--	--	--	--	--	3066.90	3066.50	3065.98	3065.81	3065.44	3064.22
MO 96	3142.91	--	--	--	--	--	--	--	--	--	3073.07	3072.40	3071.13	3070.37	3070.06	3067.97
Fowler	--	3018.62	3020.47	3024.22	3016.32	3016.44	3021.62	3019.64	3018.64	3018.57	3017.62	3016.60	3016.41	3017.77	--	--
CL 1	3168.38	--	--	--	--	--	--	--	3113.13	3111.75	3111.26	3109.01	3108.44	3108.28	3106.51	3107.04
CL 2	3163.24	--	--	--	--	--	--	--	3110.29	3109.50	3108.82	3109.29	3107.73	3107.65	3106.50	3105.17
CL 4	3166.18	--	--	--	--	--	--	--	--	3110.14	3109.22	3108.59	3106.03	3104.77	3103.15	3099.94
CL 6	3170.15	--	--	--	--	--	--	--	3114.31	3112.66	3111.01	3108.65	3105.73	3103.15	3100.46	3096.56
CL 7	3174.04	--	--	--	--	--	--	--	3115.34	3113.12	3110.98	3108.28	3104.37	3101.63	3098.90	3095.34
CL 9	3160.62	--	--	--	--	--	--	--	3107.46	3105.93	3101.97	3102.14	3102.28	3100.09	3098.41	3096.71
CL 10	3166.1	--	--	--	--	--	--	--	3110.60	3112.11	3108.31	3107.44	3103.45	3098.98	3097.11	3092.51
CL 11	3174.7	--	--	--	--	--	--	--	3114.51	3112.75	3111.49	3108.11	3103.92	3101.01	3098.67	3095.66
CL 12	3167.08	--	--	--	--	--	--	--	3114.19	3119.11	3111.10	3109.41	3105.61	3101.25	3098.43	3094.81
CL 13	3163.78	--	--	--	--	--	--	--	3120.61	3112.17	3110.26	3108.42	3104.01	3100.69	3098.75	3095.24
CL 14	3151.52	--	--	--	--	--	--	--	3112.32	3108.47	3103.22	3100.54	3097.05	3094.30	3092.42	3089.70
CL 15	3148.32	--	--	--	--	--	--	--	--	3105.16	3099.02	3097.74	3094.22	3092.32	3089.61	3087.08
CL 16	3146.08	--	--	--	--	--	--	--	3109.44	3103.64	3097.61	3095.80	3092.12	3090.64	3088.51	3085.77
CL 20	3162.22	--	--	--	--	--	--	--	3098.81	3091.14	3088.25	3084.22	3082.16	3081.41	3080.86	3079.43
CL 22	3156.92	--	--	--	--	--	--	--	3099.96	3093.19	3087.87	3086.64	3083.48	3083.09	3081.67	3078.82
CL 23	3152.36	--	--	--	--	--	--	--	3094.58	3089.21	3084.76	3079.77	3077.59	3076.79	3075.79	3074.63
CL 24	3146.54	--	--	--	--	--	--	--	--	3079.65	3076.16	3073.94	3072.35	3072.29	3071.59	3069.76
CL 27	3138.5	--	--	--	--	--	--	--	3083.57	3079.25	3077.48	3076.15	3073.33	3073.65	3072.81	3071.18
CL 28	3196.42	--	--	--	--	--	--	--	--	3108.37	3114.05	3111.76	3109.71	3107.95	3106.04	3105.00
CL 29	3192.58	--	--	--	--	--	--	--	3107.35	3110.92	3112.43	3103.63	3104.02	3102.12	3100.49	3097.92
CL 30	3182.94	--	--	--	--	--	--	--	3104.34	3111.41	3111.86	3110.61	3109.24	3106.72	3105.61	3102.03
CL 31	3180.44	--	--	--	--	--	--	--	3120.78	3119.12	3116.97	3116.62	3115.25	3114.19	3112.84	3111.92
CL 34	3133.48	--	--	--	--	--	--	--	3067.00	3069.10	3067.33	3065.11	3063.44	3062.71	3062.14	3060.81
CL 35	3135.48	--	--	--	--	--	--	--	3061.96	3063.90	3062.22	3060.68	3059.58	3059.85	3059.34	3057.58
CL 36	3139.62	--	--	--	--	--	--	--	3069.32	3071.37	3069.80	3068.05	3067.13	3066.90	3066.60	3065.13
CL 37	3165.48	--	--	--	--	--	--	--	3112.43	3112.83	3111.47	3108.08	3103.70	3100.51	3098.31	3095.40
CL 38	3179.29	--	--	--	--	--	--	--	--	--	3108.90	3105.85	3103.75	3101.43	3098.62	3095.37
CL 39	3183.32	--	--	--	--	--	--	--	--	--	3111.01	3106.43	3103.28	3101.32	3098.61	3095.91
CL 40	3192.75	--	--	--	--	--	--	--	--	--	3113.13	3107.65	3105.83	3104.31	3101.88	3100.08
CL 41	3166.38	--	--	--	--	--	--	--	--	--	3109.76	3105.09	3101.17	3098.12	3095.68	3093.15

CL 42	3161.82	--	--	--	--	--	--	--	--	--	3106.10	3098.88	3096.38	3094.20	3090.64	3088.85
CL 43	3184.12	--	--	--	--	--	--	--	--	--	3108.88	3107.31	3106.17	3103.81	3102.20	3098.43
CL 44	3198.86	--	--	--	--	--	--	--	--	--	3114.45	3110.95	3108.64	3106.91	3104.99	3103.90
CL 45	3141.3	--	--	--	--	--	--	--	--	--	3075.39	3072.19	3070.52	3069.65	3069.12	3068.57
CL 46	3164.62	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3089.45
CL 47	3193.92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3100.79
CL 48	3187.26	--	--	--	--	--	--	--	--	--	--	--	--	--	--	3109.57
N of Plot 15	3180.4	--	--	--	--	--	--	--	--	3113.48	3112.42	3108.39	3104.34	3101.10	3098.81	3095.83
N of Schoppa	3190.0	--	--	--	--	--	--	--	--	--	3112.13	3106.77	3104.95	3102.85	3100.40	3098.75
NE of Plot 6	3200.08	--	--	--	--	--	--	--	--	--	3116.16	3113.51	3111.00	3107.60	3106.21	3104.10
Plot 7	3199.0	--	--	--	--	--	--	--	--	3115.08	3114.62	3111.22	3108.65	3106.49	3105.08	3102.55
Plot 7 - 9	3185.5	--	--	--	--	--	--	--	--	--	3108.18	3104.09	3100.96	3099.04	3097.26	3094.59

Values in red font are suspect

Well	1/31/2008	2/28/2009	1/1/2010	7/1/2010	1/1/2011	7/1/2011	1/31/2012	7/1/2012	1/31/2013	7/1/2013	2/28/2014	7/1/2014	1/31/2015	7/1/2015	2/28/2016	7/1/2016	1/25/2017
MO 1	3064.93	3065.24	3065.11	3065.4	3066.45	3066.03	3064.82	3064.46	3063.42	3062.83	3062.28	3061.41	3061.25	3061.76	3062.39	3062.52	3062.20
MO 2	3062.77	3063.17	3063.42	3063.62	3065.39	3065.2	3064.1	3063.53	3062.54	3061.99	3061.34	3060.81	3060.35	3060.67	3061.63	3061.77	3061.70
MO 3	3055.97	3056.75	3056.44	3056.54	3058.02	3057.84	3056.75	3056.49	3055.51	3055.07	3054.60	3053.75	3053.63	3053.73	3054.40	3054.44	3054.70
MO 4	3059.01	3059.86	3059.39	3059.82	3061.86	3061.43	3060.21	3059.75	3058.81	3058.35	3057.84	3057.32	3056.8	3056.99	3058.04	3058.29	3059.00
MO 5	3050.42	3050.10	3050.34	3050.47	3052.5	3052.76	3052.52	3051.99	3051.33	3050.85	3050.29	3049.59	3049.13	3049.41	3049.99	3049.65	3049.00
MO 6	3041.49	3041.04	3040.88	3040.91	3042.29	3041.27	3042.2	3042.28	3041.78	3041.55	3041.09	3039.04	3040.16	3040.02	3040.17	3038.95	3040.20
MO 7 CL 33	3063.52	3063.76	3063.28	3062.46	3062.53	3051.38	3060.2	3048.66	3059.26	3049.99	3058.91	3049.29	3057.85	3049	3057.38	3048.31	3057.46
MO 8	3057.91	3058.52	3057.85	3057.94	3057.54	3056.87	3056.2	3056.16	3055.41	3055.33	3054.82	3054.45	3054.39	3054.47	3053.91	3053.95	3054.60
MO 9	3067.02	3066.17	3065.46	3066.76	3066.75	3067.19	3066.57	3066.43	3066.05	3064.54	3065.09	3060.23	3063.4	3061.3	3062.59	3059.78	3064.40
MO 10 CL 26	3075.83	3075.74	3074.99	3068.75	3075.09	3070.24	3074.39	3065.41	3072.9	3065.32	3071.55	3064.78	3069.53	3069.38	3069.30	3069.3	3054.62
MO 11	3066.72	3066.87	3065.87	3065.91	3066.1	3065.62	3065.88	3065.65	3065.46	3065.23	3064.77	3064.15	3063.43	3063.34	3062.66	3062.78	3066.20
MO 12 CL 25	3076.10	3075.23	3075.15	--	3075.5	--	3074.85	--	3073.44	--	3071.94	--	3070.62	--	3069.96	--	3070.70
MO 13 CL 21	3081.26	3079.96	3080.03	3073.57	3080.37	3071.06	3078.92	3075.98	3077.54	3060.85	3075.64	3059.72	3074.32	3068.85	3072.73	3058.83	3072.46
MO 14	3073.77	3078.45	3072.92	3073.11	3074.31	3074.48	3073.85	3073.52	3072.82	3072.43	3072.00	3071.61	3071.61	3053.69	3072.07	3072.8	3077.70
MO 15 CL 18	3084.32	3084.13	3084.35	3063.75	3084.03	--	3083.23	3083.2	3082.71	3062.14	3082.38	3054.45	--	3081.83	3085.15	3082.46	3081.05
MO 16 CL 32	3095.64	3094.74	3092.86	3089.87	3090.04	3086.87	3089.68	3088.15	3088.49	3086.30	3085.15	3082.30	3084.94	3084.12	3085.70	3076.15	3074.80
MO 17	3096.80	3095.26	3094.10	3093.91	3093.78	3093.49	3092.82	3092.29	3091.43	3090.49	3090.04	3089.61	3089.15	3088.88	3088.86	3089.37	3090.80
MO 18	3094.70	3093.76	3091.43	3090.4	3089.68	3088.86	3088.2	3087.65	3089.46	3085.82	3084.40	3083.31	3082.68	3082.25	3081.78	3081.79	3082.20
MO 19	3088.76	3087.65	3085.11	3084.55	3084.51	3083.97	3083.58	3082.95	3081.58	3079.79	3079.19	3077.84	3076.27	3075.01	3074.28	3074.64	3074.64
MO 20	3085.25	3083.34	3081.52	3081.35	3081.79	3081.32	3080.49	3080.18	3078.63	3077.26	3075.96	3075.15	3074.26	3073.67	3073.36	3073.49	3073.40
MO 21	3088.54	3086.44	3084.20	3080.14	3083.51	3082.22	3082.39	3079.4	3080.41	3074.74	3076.98	3071.70	3074.08	3069.29	3073.60	3069.39	3073.00
MO 22	3088.46	3087.33	3085.41	3085.08	3085.34	3083.78	3081.64	3080.84	3080.06	3076.70	3077.70	3072.66	3074.91	3072.1	3073.95	3070.05	3074.30
MO 23	3091.47	3089.06	3087.14	3081.69	3085.2	3084.2	3083.94	3079.36	3082.01	3076.69	3080.64	3075.48	3076.82	3070.65	3074.43	3071.45	3072.80
MO 24 CL 5	3098.17	3097.34	3096.26	3083.27	3094.69	3094.05	3093.72	3084.19	3091.78	3090.77	3090.70	3081.50	3090	3095.74	3090.30	3090.44	3090.16
MO 25	3097.67	3096.44	3094.96	3089.23	3093.5	3087.49	3092.85	3084.06	3090.09	3081.54	3088.03	3086.70	3086.3	3082.53	3088.17	3083.44	3087.80
MO 26	3096.07	3094.48	3093.65	3090.78	3091.22	3088.62	3090.65	3089.35	3088.8	3087.31	3086.39	3085.79	3084.95	3084.68	3084.78	3085.24	3093.50
MO 27	3096.76	3095.11	3094.03	3092.66	3091.82	3090.57	3090.89	3090.08	3089.03	3087.71	3086.52	3085.82	3084.93	3084.49	3084.37	3084.84	3085.90
MO 28	3097.81	3096.14	3094.64	3093.86	3092.59	3091.85	3091.11	3090.58	3089.13	3087.91	3086.51	3085.71	3084.8	3084.52	3083.88	3084.17	3085.70
MO 29	3098.84	3097.00	3095.21	3094.65	3093.3	3092.56	3091.42	3090.88	3089.17	3088.03	3086.49	3085.59	3084.67	3084.29	3083.52	3083.57	3100.70
MO 30	3099.03	3097.18	3095.27	3094.71	3093.3	3092.58	3091.37	3090.73	3088.92	3087.77	3086.17	3085.23	3083.37	3083.97	3083.14	3083.06	3087.30
MO 31	3097.28	3095.43	3093.53	3092.9	3091.51	3090.94	3089.89	3089.19	3087.6	3086.39	3084.98	3084.05	3083.22	3082.55	3081.85	3081.96	3086.40
MO 32	3094.46	3092.52	3090.30	3088.55	3088.35	3087.09	3087.2	3084.98	3084.64	3082.69	3082.60	3080.34	3079.85	3078.67	3079.26	3079.02	3082.00
MO 33	3093.70	3091.75	3089.99	3088.14	3087.92	3086.59	3086.87	3084.32	3084.45	3082.38	3082.04	3079.54	3079.46	3078.05	3079.07	3078.53	3079.80
MO 34	3093.34	3091.38	--	3088.34	3087.77	3086.55	3086.96	3084.8	3084.41	3082.07	3081.90	3080.14	3079.75	3078.82	3079.62	3079.78	3081.00
MO 35	3093.25	3091.28	3089.54	3087.89	3087.81	3084.3	3087.24	3085.32	3084.55	3081.42	3081.73	3080.08	3080.15	3079	3080.04	3080.86	3082.00
MO 36	3093.38	3091.83	3089.88	3084.91	3088.26	3083.33	3087.82	3085.13	3084.98	3076.14	3082.13	3076.29	3080.9	3076.94	3081.12	3081.48	3083.10
MO 37	3093.90	3092.12	3090.63	3088.79	3088.79	3086.99	3088.33	3086.65	3085.82	3082.62	3083.05	3081.42	3081.89	3080.68	3081.95	3082.87	3083.00
MO 38	3094.70	3093.06	3091.83	3090.31	3090.01	3088.38	3089.29	3087.74	3087.01	3084.60	3084.27	3083.46	3083.01	3082.51	3083.07	3083.81	3084.90
MO 39	3095.04	3092.71	3090.31	3083.37	3091.69	3083.22	3087.61	3080.49	3086.59	3084.55	3082.45	3076.33	3079.82	3075.6	3077.90	3079.76	3081.00
MO 43	3099.22	3097.53	3095.43	3090.29	3094.49	3085.18	3091	3082.47	3089.4	3086.44	3086.25	3079.19	3083.51	3078.27	3082.89	3079.03	3082.50
MO 44	3101.41	3099.42	3096.51	3094.35	3095.85	3087.03	3092.85	3085.06	3090.06	3081.84	3086.63	3080.48	3084.38	3079.77	3082.42	3079.38	3085.00
MO 45	3106.86	3105.93	3104.08	3101.45	3103.29	3097.78	3100.38	3097.41	3097.79	3092.96	3094.06	3087.98	3091.8	3087.1	3090.61	3090.47	3091.80
MO 46	3108.18	3106.83	3105.51	3105.31	3104.55	3103.97	3102.2	3101.58	3099.83	3098.77	3097.48	3096.55	3095.94	3095.72	3095.96	3096.26	3097.30
MO 47	3112.53	3111.72	3110.21	3110.69	3109.45	3107.24	3106.46	3105.89	3104.24	3102.48	3102.79	3100.26	3101.68	3102.34	3102.39	3101.72	3102.40
MO 48	3115.15	3116.75	3114.45	3113.92	3115.3	3112.69	3110.7	3109.57	3108.01	3106.15	3106.10	3104.35	3104.32	3104.81	3104.99	3103.19	3103.60
MO 49	3111.64	3111.38	3109.63	3109.21	3110.25	3108.96	3107.09	3106	3103.99	3102.22	3100.61	3098.86	3098.14	3097.59	3097.85	3096.99	3098.30
MO 50	3111.55	3109.84	3108.25	3107.82	3108.25	3107.2	3106.07	3104.82	3102.99	3102.02	3099.28	3096.39	3095.24	3094.25	3093.34	3092.77	3094.20
MO 51	3104.78	3103.29	3102.13	3102.3	3102.4	3097.47	3099.76	3098.58	3097.65	3096.38	3096.16	3087.93	3092.39	3092.69	3092.28	3087.83	3091.90
MO 52	3100.65	3098.65	3097.52	3097.61	3098.48	3095.45	3095.01	3093.81	3092.55	3091.10	3090.85	3088.12	3088.44	3087.64	3087.09	3086.86	3087.00
MO 53	3096.99	3095.67	3094.33	3094.16	3094.23	3092.58	3091.64	3090.65	3089.54	3088.13	3087.59	3085.26	3084.73	3084.86	3083.94	3083.59	3085.60
MO 57 CL 3	3101.98	3101.90	3099.48	3089.33	3100.22	3086.76	3097.65	3083.26	3094.36	3083.79	3096.63	3095.67	3096.62	3095.87	3096.78	3083.62	3085.48
MO 58	3116.35	3116.33	3115.79	3115.92	3116.15	3115.65	3115.59	3115.27	3115.19	3115.06	3114.43	3114.52	3114.88	3115.61	3114.98	3114.89	3115.60
MO 59	3125.60	3126.17	3124.75	3125.39	3125.78	3125.18	3123.44	3123.25	3121.98	3121.35	3121.09	3120.51	3120.72	3121.8	3121.87	3121.83	3121.70
MO 60	3127.99	3128.82	3127.78	3128.36	3128.39	3127.74	3127.19	3126.89	3126.57	3126.30	3126.02	3125.84	--	3126.68	3126.48	3126.34	3126.80

MO 61	3131.10	3133.51	3131.78	3133.73	3134.19	3132.25	3130.56	3130.45	3129.46	3129.58	3128.74	3129.07	3130.6	3133.12	3131.99	3131.59	3132.00
MO 62	3134.95	3137.09	3135.81	3137.25	3138.11	3136.38	3132.6	3134.37	3133.32	3133.37	3132.46	3132.78	3134.24	3136.4	3135.82	3135.24	3135.60
MO 63	3133.41	3133.58	3133.96	3134.33	3134.04	3132.7	3133.1	3132.68	3133.62	3133.30	3133.01	3133.86	3134.27	3134.07	3133.53	3133.85	3134.20
MO 64	3144.91	3145.39	3144.76	3144.57	3152.14	3143.18	3144.67	3143.64	3143.6	3144.96	3144.73	3142.60	3144.5	3145.99	3145.03	3143.23	3144.66
MO 65	3150.75	3151.94	3150.31	3172.57	3151.75	3150.29	3149.98	3150.28	3150.09	3149.92	3147.61	3151.53	3150.3	3151.59	3151.11	3149.84	3150.70
MO 66	3150.66	3151.58	3150.28	3151.43	3151.2	3149.91	3149.78	3149.52	3149.84	3149.90	3149.04	3149.21	3150.11	3151.75	3150.77	3149.7	3149.90
MO 75	3175.55	3175.41	3174.91	3176.52	3174.55	3176.02	3174.19	3174.61	3173.53	3174.74	3172.90	3174.57	3174.45	3177.49	3175.52	3175.46	3176.00
MO 76	3174.82	3175.09	3174.62	3175.22	3175.07	3174.81	3174.04	3173.84	3171.75	3173.57	3173.52	3173.81	3174.24	3176.08	3175.32	3175.18	3176.10
MO 77	3174.03	3174.30	3173.87	3174.51	3174.72	3173.87	3173.16	3172.96	3171.14	3172.34	3171.81	3172.84	3172.68	3174.55	3173.84	3173.81	3173.90
MO 78	3170.21	3170.38	3170.01	3170.58	3170.48	3170.04	3169.65	3169.52	3169.43	3169.37	3169.04	3169.38	3169.47	3170.61	3170.04	3169.74	3170.20
MO 79	3166.21	3166.26	3166.13	3167.05	3166.42	3166.41	3166.06	3166.36	3165.82	3166.51	3165.66	3163.39	3165.94	3167.43	3166.32	3166.52	3166.06
MO 80	3158.02	3157.47	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 81	3149.85	3149.97	--	3127.82	3149.34	3125.79	3139.05	3148.56	3148.95	3149.02	3148.89	3146.63	3149.01	3148.93	3149.39	3126.71	3125.36
MO 82	3137.86	3138.17	3138.12	3137.91	3138.69	3137.08	3137.94	3137.46	3138.07	3137.71	3138.13	3137.48	3138.33	3138.8	3138.44	3137.38	3133.60
MO 83	3132.23	3132.27	3132.31	3132.36	3132.39	3131.72	3132.11	3131.81	3132.29	3132.15	3132.05	3131.93	3132.26	3133.57	3132.24	3132.19	3132.70
MO 84	3131.93	3131.89	3131.87	3132.03	3132.11	3131.4	3131.73	3131.6	3131.73	3131.78	3131.88	3131.57	3131.79	3132.62	3131.85	3131.74	3132.90
MO 85	3131.56	3131.96	3131.66	3131.93	3132.19	3131.26	3131.47	3131.31	3131.38	3131.27	3129.62	3131.09	3131.52	3131.84	3131.67	3131.47	3132.50
MO 86	3120.16	3120.45	3120.10	3119.74	3120.3	3119.73	3119.98	3119.77	3119.8	3119.87	3119.58	3119.50	3119.86	3120.81	3119.83	3119.67	3120.60
MO 87	3093.70	3091.65	3089.97	3086.49	3087.84	3087.05	3086.74	3085.41	3084.1	3082.49	3087.06	3080.28	3079.04	3077.72	3076.78	3076.63	3076.20
MO 88	3091.06	3090.70	3089.56	3089.41	3090.49	3088.41	3087.42	3086.45	3085.57	3084.16	3083.44	3082.29	3081.68	3081.39	3080.85	3080.57	3080.89
MO 89	3090.97	3090.88	3088.99	3088.94	3090.04	3088.68	3086.96	3086.15	3084.78	3083.76	3082.48	3081.27	3080.64	3080.57	3080.08	3079.85	3079.54
MO 90	3070.30	3070.83	3070.61	3071.3	3072.25	3071.45	3069.85	3069.47	3068.07	3067.34	3066.60	3065.86	3065.19	3065.66	3065.52	3066.2	3066.47
MO 91	3072.32	3072.73	3071.58	3073	3073.66	3073.03	3071.59	3070.92	3069.71	3068.91	3068.01	3067.27	3066.9	3067.69	3067.98	3067.8	3070.41
MO 92	3059.89	3061.34	3060.42	3060.93	3062.16	3057.94	3058.19	3058.18	3056.72	3064.21	3056.82	3052.88	3054.83	3055.73	3055.66	3053.98	3068.13
MO 93	3057.51	3058.94	3057.86	3056.4	3059.7	3044.96	3056.95	3050.93	3055.78	3055.34	3055.69	3035.41	3054.02	3053.86	3054.61	3042.96	3054.79
MO 94	3048.26	3048.97	3048.25	3048.28	3051.84	3051.07	3050.11	3049.6	3048.81	3048.21	3047.59	3046.96	3046.59	3045.76	3046.49	3046.21	3047.92
MO 95	3064.79	3066.23	3064.22	3065.13	3067.93	3067.41	3066.18	3065.23	3063.61	3063.14	3060.85	3061.64	3062.2	3061.47	3062.30	3061.68	3062.95
MO 96	3068.22	3068.66	3067.07	3067.25	3067.51	3066.44	3065.67	3065.02	3064.26	3062.86	3062.53	3062.12	3061.68	3062.01	3061.89	3061.79	3060.51
Fowler	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CL 1	3106.28	3107.53	3105.82	3093.72	3106.64	3094.42	3105.85	3093.04	3105.46	3093.17	3104.43	3092.80	3103.95	3091.57	3107.34	3094.46	3102.78
CL 2	3104.17	3104.96	3103.11	3103.65	3104.21	3102.89	3102.24	3099.7	3101.06	3100.64	3100.62	3163.00	3097.92	3102.66	3102.24	3101.78	3101.24
CL 4	3098.63	3097.86	3096.47	3080.95	3095.32	3083.28	3094.7	3080.11	3092.84	3080.36	3092.26	3091.50	3091.9	3094.62	3092.39	3092.49	3092.58
CL 6	3094.51	3092.91	3091.69	3075.07	3089.72	3073.12	3089.67	3088.07	3087.06	3073.62	3084.90	3077.60	3083.93	3079.78	3084.71	3070.73	3070.45
CL 7	3093.02	3090.83	3088.82	3085.08	3087.65	3086.85	3087.07	3085.2	3084.75	3066.09	3081.85	3064.19	3079.81	3075.73	3080.37	3077.42	3081.04
CL 9	3095.84	3095.57	3093.70	3072.54	3094.03	3095.39	3093.76	3074.41	3092.51	3073.10	3095.23	3080.86	3092.17	3081.23	3093.34	3094.01	3094.22
CL 10	3091.38	3090.59	3086.30	3059.3	3086.08	3063.9	3087.18	3079.02	3085.43	3049.65	3085.05	3051.52	3084.42	3071.6	3083.10	3048.63	3084.00
CL 11	3093.13	3091.19	--	3077.64	3087.19	3071.99	3086.02	3068.05	3082.89	3079.55	3081.37	3062.25	3079.02	3061.79	3078.65	3063.19	3017.9
CL 12	3093.00	3091.68	3089.50	3047.83	3088.8	3088.33	3087.1	3082.66	3086.15	3042.75	3083.11	3039.26	3081.7	3067.68	3080.80	3068.39	3089.18
CL 13	3093.10	3091.38	--	--	--	--	3085.35	3069.96	3083.01	3070.17	3071.04	3079.08	3079.86	--	3077.69	3063.13	3077.18
CL 14	3087.54	3086.76	3084.33	3084.01	3084.09	3080.95	3083.12	3081.72	3081.44	3077.37	3078.82	3058.47	3075.81	3073.36	3074.06	3074.58	3074.62
CL 15	3085.69	3084.31	3081.63	3080.77	3081.81	3079.54	3081.66	3067.77	3080.23	3062.36	3077.33	3064.75	3074.99	3065.41	3073.42	3070.55	3073.72
CL 16	3084.24	3083.20	3080.75	3080.72	3081.26	3072.95	3080.56	3072.57	3079.35	3077.23	3076.75	3075.38	3074.77	3073.76	3073.19	3073.25	3071.08
CL 20	3079.27	3078.67	3078.41	3073.99	3080.04	3079.57	3080.2	3078.96	3078.5	3078.04	3076.60	3075.85	3076.46	3081.79	3075.87	3076.34	3084.62
CL 22	3077.50	3076.48	3077.33	3064.44	3077.71	3061.02	3076.36	3061.02	3074.73	3061.03	3073.35	3068.65	3072.18	3062.2	3070.71	3062.89	3071.02
CL 23	3073.94	3072.37	3073.41	3069.84	3073.75	3072.53	3073.67	3071.51	3072.27	3072.18	3071.50	3087.60	3070.03	3064.71	3071.35	3071.91	3072.36
CL 24	3068.87	3068.80	3067.94	--	3068.32	--	3068.15	3067.34	3067.08	3066.31	3066.90	--	3065.32	3059.73	3064.85	3059.5	3066.44
CL 27	3069.62	3069.50	3068.34	3060.66	3068.74	3053.58	3068.79	3066.18	3068.47	3067.58	3067.23	3049.90	3064.7	3047.44	3064.29	3064.89	3066.50
CL 28	3102.58	3100.84	3097.71	3096.61	3096.2	3064.64	3093.92	3068.56	3089.4	3060.03	3086.73	3026.20	3084.29	3081.24	3082.13	3061.31	3085.32
CL 29	3096.52	3095.88	3094.34	3077.17	3091.95	3055.68	3091.4	3039.58	3089.81	3090.26	3087.42	3086.68	3085.83	3068.83	3085.73	3086.16	3086.58
CL 30	3101.35	3100.12	3099.02	3091.83	3097.11	3087.44	3096.44	3086.93	3093.45	3092.25	3090.42	3091.29	3091.5	3091.47	3092.33	3091.94	3093.84
CL 31	3110.99	3109.46	3107.04	3102.13	3106.82	3090.01	3106.01	3091.53	3105.58	3092.50	3105.15	3100.04	3105.15	3094.66	3104.08	3100.42	3103.64
CL 34	3060.02	3060.29	3060.46	3060.57	3062.8	3062.77	3061.88	3061.33	3060.38	3059.69	3059.09	3056.44	3058.08	3057.9	3059.07	3059.18	3058.68
CL 35	3057.51	3058.70	3060.84	3058.01	3059.99	3059.37	3058.19	3057.96	3056.9	3056.54	3056.02	3053.16	3055.05	3055.08	3056.16	3056.2	3056.18
CL 36	3065.26	3065.57	3064.74	3065.12	3066.08	3065.56	3065.18	3064.66	3063.59	3062.96	3062.50	3059.20	3061.39	3062	3062.62	3062.68	3063.02
CL 37	3092.89	3090.86	3088.83	3085.76	3086.75	3083.29	3085.39	3069.19	3082.76	3081.15	3081.08	3054.70	3077.25	3074.75	3076.15	3065.44	3067.18
CL 38	3093.11	3091.28	3089.63	3076.02	3087.83	3074.56	3087.53	3086.13	3084.7	3062.71	3082.09	3063.20	3080.84	3068.68	3080.98	3079.39	3082.59
CL 39	3094.75	3092.49	3090.06	3059.36	3091.45	3070.99	3087.4	3069.22	3086.28	3089.28	3082.38	3066.92	3079.69	3064.54	3077.96	3079.61	3104.02
CL 40	3098.23	3096.11	3092.90	3079.09	3092.48	3072.19	3089.13	3071.33	3087.2	3071.03	3083.90	3081.98	3081.9	3066.87	3079.82	3080.18	3081.75
CL 41	3091.21	3088.67	3086.69	3068.97	3084.91	3080.76	3083.67	3068.67	3081.56	3065.09	3080.33	3064.37	3076.4	3061.45	3074.12	3059.69	3073.98

CL 42	3087.97	3085.86	3083.57	3074.71	3083.03	3080.19	3081.93	3075.41	3079.86	3069.32	3076.51	3065.35	3073.63	3063.21	3073.23	3063.6	3073.02
CL 43	3097.22	3096.03	3094.67	3083.91	3092.91	3081.81	3092.35	--	3089.61	3072.60	3087.83	3086.07	3085.7	3075.97	3087.71	3077.2	3087.82
CL 44	3101.36	3099.36	3096.47	3089.2	3095.87	3070.38	3092.78	3068.97	3089.75	3067.26	3086.45	3069.59	3084.14	3069.84	3082.17	3071.24	3085.96
CL 45	3066.89	3065.92	3064.67	3066.33	3066.53	3067.1	3066.38	--	3065.92	3062.06	3064.86	3059.07	3063.23	3047.52	3062.44	3024.35	3064.00
CL 46	3088.46	3087.17	3085.30	3080.3	3085.13	3083.8	3081.65	3072.71	3080	3078.76	3077.60	3041.70	3074.85	3039.97	3073.92	3035.92	3073.82
CL 47	3099.15	3097.38	3095.35	3081.33	3094.57	3072.71	3090.83	3077.36	3089.37	3087.06	3086.38	3065.78	3083.81	3067.2	3082.61	3068.97	3083.42
CL 48	3107.05	3106.10	3104.20	3098.48	3103.51	3091.44	3100.56	3094.64	3097.93	3089.31	3094.40	3079.64	3091.98	3081.56	3090.81	3090.71	3091.96
N of Plot 15	3093.75	3091.74	3089.94	3088.31	3087.79	3087.5	3086.49	3085.29	3084	3082.35	3081.79	3080.09	3078.9	3077.63	3076.59	3076.09	3074.10
N of Schoppa	3096.78	3094.29	3091.66	3090.2	3090.88	3086.52	3087.6	3084.85	3085.54	3081.40	3082.32	--	3080.32	3078.11	3078.06	3073.33	3077.20
NE of Plot 6	3101.86	3100.07	3098.03	3097.15	3097.13	3095.13	3094.67	3092.98	3092.3	3089.73	3088.88	3086.28	3085.88	3084.66	3084.07	3083.47	3087.58
Plot 7	3100.62	3098.67	3096.39	3095.04	3095.6	3092.68	3092.36	3090.34	3090.34	3087.73	3087.15	3083.40	3084.57	3083.05	3083.00	3082.68	3084.75
Plot 7 - 9	3092.96	3091.08	3088.73	3087.98	3088.46	3086.73	3085.14	3083.76	3083.31	3081.11	3079.91	3077.66	3077.61	3076.69	3075.98	3076.51	3078.96

Values in red font are suspect.

Well	4/18/2017 (Selected Re-Measure)	9/1/2017*	1/16/2018	5/8/2018 (Selected Re-measures)	6/21/2018	6/29/2018 (Selected Re-measures)	7/10/2018*	7/18/2018	8/6/2018 (Selected Re-measures)	8/22/2018 (Selected Re-measures)	9/24/2018 and 9/25/2018	10/17/2018	1/15/2019	2/22/2019 (Selected Re-measures)
MO 1	--	3063.1	3062.6	--	--	--	3062.6	--	--	--	--	--	3064.5	--
MO 2	--	3061.4	3061.3	--	--	--	3061.9	--	--	--	--	--	3063	--
MO 3	--	3056.5	3053.7	--	--	--	3054.8	--	--	--	--	--	3055.8	--
MO 4	--	3057.7	3057.5	--	--	--	3058.4	--	--	--	--	--	3059.6	--
MO 5	--	3048.6	3048.3	--	--	--	3047.9	--	--	--	--	--	3050.1	--
MO 6	--	3038.1	3039.5	--	--	--	3039.3	--	--	--	--	--	3041.3	--
MO 7 CL 33	--	3047.66	3058.56	--	--	--	3057.56	--	--	--	--	--	3045.36	--
MO 8	--	3054.2	3054.2	--	--	--	3055.2	--	--	--	--	--	3056.2	--
MO 9	--	3064.6	3064.1	--	--	--	3057.9	--	--	--	--	--	3063	--
MO 10 CL 26	3069.10	3069.1	3069.2	--	--	--	3068.9	--	--	--	--	--	3067.7	--
MO 11	--	3065.4	3064.1	--	--	--	3063.8	--	--	--	--	--	3063.6	--
MO 12 CL 25	--	3070.2	3070	--	--	--	3069.7	--	--	--	--	--	3068.7	--
MO 13 CL 21	--	3057.86	3072.36	--	--	--	3072.06	--	--	--	--	--	3072.06	--
MO 14	--	3072.69	3076.5	--	--	--	3077.1	--	--	--	--	--	3038.1	3072.0
MO 15 CL 18	--	3076.35	3081.55	--	--	--	3081.15	--	--	--	--	--	3080.85	--
MO 16 CL 32	--	3056.4	3082.8	--	--	--	3074	--	--	--	--	--	3081.5	--
MO 17	--	3090.9	3089.9	--	--	--	3089.4	--	--	--	--	--	3076.5	3090.4
MO 18	--	3079.9	3076.4	--	--	--	3075.8	--	--	--	--	--	3067.9	3081.1
MO 19	--	3073.99	3069.9	--	--	--	3069.6	--	--	--	--	--	3074	--
MO 20	--	3071.9	3073	--	--	--	3072.7	--	--	--	--	--	3071.9	--
MO 21	--	3069.6	3069	--	--	--	3069.2	--	--	--	--	--	3079.8	3069.0
MO 22	--	3069.3	3072.7	--	--	--	3072	--	--	--	--	--	3071.5	--
MO 23	--	3071.6	3074.3	--	--	--	3073.7	--	--	--	--	--	3075.8	--
MO 24 CL 5	--	3089.76	--	--	--	--	--	--	--	--	--	--	3090.86	--
MO 25	--	3083.4	3088.5	--	--	--	3087.8	3087.7	--	3084.74	3085.04	3084.99	3088.4	--
MO 26	3086.50	3083.7	3086.7	--	3086.91	--	3085.6	3086.9	--	3086.8	3086.79	3086.74	3086.4	--
MO 27	--	3079.7	3086.4	--	3086.67	--	3085.8	3086.5	--	3086.35	3086.39	3086.28	3085.8	--
MO 28	--	3086.2	3086	--	3086.24	--	3086.5	3086.1	--	3085.83	3085.82	3085.70	3085.2	--
MO 29	3086.30	3083.9	3084.8	--	3086.99	--	3086	3087	--	3086.41	3086.33	3086.23	3084.5	--
MO 30	--	3084.3	3084.7	--	3084.67	--	3086.5	3084.4	--	3084.07	3083.98	3084.94	3083.9	--
MO 31	--	3077.4	3083.1	--	3084.57	--	3083.7	3084.3	--	3084.19	3084.21	3084.11	3083.1	--
MO 32	--	3080	3080	--	3079.92	--	3080.9	3080.0	--	3080.09	3080.32	3080.42	3081.4	--
MO 33	--	3080	3080.1	--	3079.69	--	3079.7	3079.9	--	3079.91	3080.21	3080.34	3081.2	--
MO 34	--	3078.6	3080.8	--	3080.81	--	3080.4	3080.9	--	3081.00	3081.14	3081.31	3082	--
MO 35	--	3080.2	3081.5	--	3081.85	--	3081.3	3081.8	--	3081.88	3082.11	3082.16	3082.8	--
MO 36	--	3079.6	3082.9	--	3083.2	--	3083.1	3083.2	--	3083.22	3083.48	3083.51	3084	--
MO 37	--	3083.3	3084.5	--	3084.77	--	3082.3	3084.7	--	3084.67	3084.9	3084.94	3084.6	--
MO 38	--	3084.7	3085	--	--	--	3084.6	3085.1	--	3085.12	3085.27	3085.23	3085.2	--
MO 39	--	3075.3	3080.5	--	--	3080.37	3080.6	3078.5	--	3074.67	3074.29	3074.26	3078.8	--
MO 43	--	3079.3	3083	--	--	3083.22	3082.2	3083.2	--	3082.71	3080.28	3080.12	3081.8	--
MO 44	--	3082.11	3085.3	--	--	3081.91	3084.8	3083.7	--	3084.29	3080.66	3081.09	3084.1	--
MO 45	--	3093.4	3093.6	--	--	3092.8	3092.4	3092.7	--	3092.27	3092.28	3092.32	3091.7	--
MO 46	--	3097.36	3097.5	--	--	--	3097.1	--	--	--	--	--	3096.2	--
MO 47	--	3102.48	3102.8	--	--	--	3102.2	--	--	--	--	--	3101.8	--
MO 48	--	3105.6	3104.1	--	--	--	3103.9	--	--	--	--	--	3101	--
MO 49	--	3098.2	3098.5	--	--	--	3098	--	--	--	--	--	3096.2	--
MO 50	--	3092.3	3094.3	--	--	--	3094.2	--	--	--	--	--	3092	--
MO 51	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 52	--	3087.8	--	--	--	--	--	--	--	--	--	--	--	--
MO 53	--	3083	3082.7	--	--	--	3082.3	--	--	--	--	--	3081.4	--
MO 57 CL 3	--	3085.08	3089.08	--	--	--	3103.08	--	--	--	--	--	3089.18	--
MO 58	--	3116.3	3115.7	--	--	--	3115.5	--	--	--	--	--	3113.1	--
MO 59	--	3121.56	3121.6	--	--	--	3121.1	--	--	--	--	--	3121.1	--
MO 60	--	3127.05	3126.2	--	--	--	3127.2	--	--	--	--	--	3125.5	--

MO 61	--	3132.4	3131.8	--	--	--	3131.5	--	--	--	--	--	3131.5	--
MO 62	--	3136	3135.4	--	--	--	3135.6	--	--	--	--	--	3134.2	--
MO 63	--	3134.4	3134.4	--	--	--	3031.9	--	--	--	--	--	3132.3	--
MO 64	--	3144.66	3145.56	--	--	--	3146.06	--	--	--	--	--	3145.1	--
MO 65	--	3141.6	3150.9	--	--	--	3150	--	--	--	--	--	3150.7	--
MO 66	--	3114.7	3116.3	--	--	--	3115.1	--	--	--	--	--	3115.2	--
MO 75	--	3166.5	3175.2	--	--	--	3174.5	--	--	--	--	--	3174.5	--
MO 76	--	3166.1	3175.6	--	--	--	3175.7	--	--	--	--	--	3175.2	--
MO 77	--	3174.5	3174.3	--	--	--	3173.9	--	--	--	--	--	3173.7	--
MO 78	--	3170.5	3170.4	--	--	--	3170.2	--	--	--	--	--	3169	--
MO 79	--	3166.76	3166.16	--	--	--	3166.36	--	--	--	--	--	3166.26	--
MO 80	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 81	--	--	3107.26	--	--	--	3124.16	--	--	--	--	--	3105.76	--
MO 82	--	3133.3	3132.6	--	--	--	3132.7	--	--	--	--	--	3131.5	--
MO 83	--	3132.7	3132.6	--	--	--	3132.5	--	--	--	--	--	3131.9	--
MO 84	--	3132.8	3131.7	--	--	--	3132.7	--	--	--	--	--	3131.1	--
MO 85	--	3131.7	3131.6	--	--	--	3131.3	--	--	--	--	--	3131.2	--
MO 86	--	3121	3119.8	--	--	--	3120.3	--	--	--	--	--	3119.4	--
MO 87	--	3076.42	3076.1	--	--	--	3076.1	--	--	--	--	--	3075.7	--
MO 88	--	3079.77	3079.79	--	--	--	3079.49	--	--	--	--	--	3078.29	--
MO 89	--	3079.1	3078.94	--	--	--	3079.14	--	--	--	--	--	3078.44	--
MO 90	--	3066.37	3066.67	--	--	--	3066.47	--	--	--	--	--	3066.17	--
MO 91	--	3067.61	3067.51	--	--	--	3068.91	--	--	--	--	--	3067.01	--
MO 92	--	3056.83	3057.33	--	--	--	3058.13	--	--	--	--	--	3056.93	--
MO 93	--	3052.49	3055.09	--	--	--	3054.99	--	--	--	--	--	3054.39	--
MO 94	--	3045.91	3045.82	--	--	--	3047.12	--	--	--	--	--	3045.12	--
MO 95	--	3061.65	3061.65	--	--	--	3062.75	--	--	--	--	--	3061.75	--
MO 96	--	3061.61	3057.91	--	--	--	3056.61	--	--	--	--	--	3057.11	--
Fowler	--	--	--	--	--	--	--	--	--	--	--	--	--	--
CL 1	--	3103.18	3106.78	--	--	--	3107.08	--	--	--	--	--	3106.28	--
CL 2	--	3102.14	3101.14	--	--	--	3099.84	--	--	--	--	--	3101.84	--
CL 4	--	3091.78	3091.98	--	--	--	3091.38	--	--	--	--	--	3092.58	--
CL 6	--	3071.85	3084.35	--	--	--	3081.85	--	--	--	--	--	3084.25	--
CL 7	--	3077.34	3080.54	--	--	--	3079.94	--	--	--	--	--	3081.54	--
CL 9	--	3076.32	3090.92	--	--	--	3093.02	--	--	--	--	--	3089.52	--
CL 10	--	3057.6	3086	--	--	--	3085.8	--	--	--	--	--	3086.3	--
CL 11	3078.50	3074.5	3077.6	--	--	--	3076.3	--	--	--	--	--	3080.2	--
CL 12	3081.88	3072.78	3080.58	--	--	--	3080.58	--	--	--	--	--	3080.18	--
CL 13	--	3060.08	3076.18	--	--	--	3075.38	--	--	--	--	--	3075.88	--
CL 14	--	3067.62	3073.22	--	--	--	3072.32	--	--	--	--	--	3073.62	--
CL 15	--	3070.02	3072.82	--	--	--	3071.72	--	--	--	--	--	3073.42	--
CL 16	--	3071.28	3069.88	--	--	--	3069.68	--	--	--	--	--	3072.58	--
CL 20	--	3078.32	3081.92	--	--	--	3081.12	--	--	--	--	--	3074.82	--
CL 22	--	3063.52	3069.12	--	--	--	3067.72	--	--	--	--	--	3070.72	--
CL 23	--	3071.76	3071.46	--	--	--	3069.26	--	--	--	--	--	3070.66	--
CL 24	--	3065.54	3066.14	--	--	--	3065.94	--	--	--	--	--	3066.14	--
CL 27	--	3066.6	3066.3	--	--	--	3065.9	--	--	--	--	--	3065.7	--
CL 28	--	3087.12	3086.32	--	--	--	3083.82	--	--	--	--	--	3085.02	--
CL 29	--	3085.78	3086.88	--	--	--	3086.48	--	--	--	--	--	3086.68	--
CL 30	--	3089.04	3092.54	--	--	--	3091.64	--	--	--	--	--	3092.94	--
CL 31	--	3103.94	3105.54	--	--	--	3106.54	--	--	--	--	--	3105.04	--
CL 34	--	3035.38	3057.78	--	--	--	3057.18	--	--	--	--	--	3057.18	--
CL 35	--	3057.28	3036.68	3054.88	--	--	3034.98	--	--	--	--	--	3037.58	--
CL 36	--	3065.72	3062.32	--	--	--	3061.02	--	--	--	--	--	3061.72	--
CL 37	--	3046.18	3075.48	--	--	--	3067.18	--	--	--	--	--	3078.18	--
CL 38	--	3080.69	3082.49	--	--	--	3080.89	--	--	--	--	--	3083.89	--
CL 39	3080.12	3053.52	3105.12	3078.02	--	--	3099.92	--	3087.02	--	--	--	3078.02	--
CL 40	--	3069.75	3081.95	--	--	--	3080.55	--	--	--	--	--	3081.35	--
CL 41	--	3058.88	3073.38	--	--	--	3069.18	--	--	--	--	--	3075.48	--

CL 42	--	3064.52	3064.02	--	--	--	3069.32	--	--	--	--	--	3070.12	--
CL 43	--	3078.42	3088.12	--	--	--	3085.72	--	--	--	--	--	3088.02	--
CL 44	--	3082.56	3084.46	--	--	--	3082.76	--	--	--	--	--	3083.76	--
CL 45	--	3063.4	3063.9	--	--	--	3043.2	--	--	--	--	--	3061.9	--
CL 46	--	3050.92	3072.32	--	--	--	3067.82	--	--	--	--	--	3071.32	--
CL 47	--	3076.02	3088.02	--	--	--	3084.42	--	--	--	--	--	3088.42	--
CL 48	--	3093.76	3090.46	--	--	--	3090.66	--	--	--	--	--	3088.56	--
N of Plot 15	--	3075.91	3075.9	--	--	--	3075.1	--	--	--	--	--	3074.6	--
N of Schoppa	--	3078.4	3086.3	--	--	--	3087.4	--	--	--	--	--	3087.4	3080.5
NE of Plot 6	--	3082.68	3089.58	--	--	--	--	--	--	--	--	--	3089.18	--
Plot 7	--	3082.89	3090.35	--	--	--	3090.85	--	--	--	--	--	3091.05	3082.8
Plot 7 - 9	--	3076.86	3067.26	3075.76	--	--	3072.86	--	--	3076.97	3076.64	3076.41	3066.56	3077.10

Values in red font a

Well	3/18/2019	4/15/2019	5/17/2019	6/14/2019	7/16/2019	7/25/2019	1/23/2020	1/20/2021	1/18/2022	1/18/2023	Well
MO 1	--	--	--	--	--	3062.52	3064.50	3058.92	3060.35	3057.38	MO 1
MO 2	--	--	--	--	--	3061.77	3063.00	3057.94	3059.73	3056.11	MO 2
MO 3	--	--	--	--	--	3054.44	3055.80	3051.73	3044.81	3050.54	MO 3
MO 4	--	--	--	--	--	3058.29	3059.60	3054.64	3038.89	3052.29	MO 4
MO 5	--	--	--	--	--	3049.65	3050.10	3046.24	3042.53	3044.88	MO 5
MO 6	--	--	--	--	--	3038.95	3041.30	3037.58	3035.99	3036.43	MO 6
MO 7 CL 33	--	--	--	--	--	3048.31	3059.32	3058.12	3053.64	3055.17	MO 7 CL 33
MO 8	--	--	--	--	--	3053.95	3056.20	3053.47	3041.00	3054.67	MO 8
MO 9	--	--	--	--	--	3059.78	3063.00	3059.68	3039.28	3061.19	MO 9
MO 10 CL 26	--	--	--	--	--	3069.3	3067.91	3067.18	3047.79	3066.44	MO 10 CL 26
MO 11	--	--	--	--	--	3062.78	3063.60	3062.86	3025.96	3062.63	MO 11
MO 12 CL 25	--	--	--	--	--	3069.84	3068.70	3068.85	3048.75	3068.31	MO 12 CL 25
MO 13 CL 21	--	--	--	--	--	3058.83	3072.06	3071.9	3071.25	3056.34	MO 13 CL 21
MO 14	--	--	--	--	--	3072.8	3038.10	3075.28	3047.05	3074.71	MO 14
MO 15 CL 18	--	--	--	--	--	3082.46	3080.86	3079.74	3061.93	3078.19	MO 15 CL 18
MO 16 CL 32	--	--	--	--	--	3076.15	3078.05	3081.25	3083.59	3083.43	MO 16 CL 32
MO 17	--	--	--	--	--	3089.4	3076.50	3090.72	3066.94	3092.42	MO 17
MO 18	--	--	--	--	--	3081.8	3067.90	3081.44	3067.58	3082.42	MO 18
MO 19	--	--	--	--	--	3074.64	3074.00	3075.23	3060.21	3076.22	MO 19
MO 20	--	--	--	--	--	3073.49	3072.30	3071.83	3055.87	3062.41	MO 20
MO 21	--	--	--	--	--	3069.4	3072.75	3072.36	3068.87	3071.44	MO 21
MO 22	--	--	--	--	--	3070.05	3072.94	3072.29	3075.08	3072.19	MO 22
MO 23	--	--	--	--	--	3071.45	3085.05	3076.64	3078.87	3077.22	MO 23
MO 24 CL 5	--	--	--	--	--	3090.44	3090.86	3094.08	3085.15	3095.68	MO 24 CL 5
MO 25	3085.72	3085.81	3089.46	3089.70	3088.86	3083.44	3101.93	3081.98	3084.38	3094.74	MO 25
MO 26	3087.32	3087.46	3087.51	3087.70	3087.81	3085.24	3088.09	3088.84	3088.48	3090.76	MO 26
MO 27	3086.8	3087.00	3087.13	3087.31	3087.37	3084.84	3087.35	3088.15	3079.3	3089.06	MO 27
MO 28	3086.37	3086.53	3086.66	3086.89	3086.98	3084.17	3086.62	3085.74	3072.91	3072.25	MO 28
MO 29	3087.03	3087.18	3087.37	3087.58	3087.73	3083.57	3085.89	3085.11	3091.25	3086.63	MO 29
MO 30	3084.81	3084.97	3085.06	3085.40	3085.52	3083.06	3085.50	3084.23	3082.21	3085.41	MO 30
MO 31	3085.02	3085.22	3085.37	3085.65	3085.70	3081.96	3085.89	3079.44	3087.08	3086.01	MO 31
MO 32	3082.08	3082.31	3082.58	3082.83	3082.74	3079.02	3084.00	3084.26	3106.99	3084.66	MO 32
MO 33	3082.29	3082.52	3082.76	3082.98	3083.17	3078.53	3083.70	3083.98	3099.79	3084.29	MO 33
MO 34	3083.02	3083.26	3083.58	3083.82	3083.92	3079.78	3084.63	3085.24	3069.25	3085.74	MO 34
MO 35	3083.59	3083.89	3084.11	3084.40	3084.59	3080.86	3085.53	3086.45	--	3086.88	MO 35
MO 36	3084.59	3084.83	3082.17	3085.23	3085.67	3081.48	3087.00	3088.06	--	3087.14	MO 36
MO 37	3085.89	3086.06	3086.37	3086.60	3086.86	3082.87	3087.20	3088.54	3075.76	3089.34	MO 37
MO 38	3086.04	3088.26	3086.43	3086.76	3086.96	3083.81	3087.68	3089.11	3131.8	3089.99	MO 38
MO 39	3079.17	3079.38	3079.49	3079.70	3079.77	3079.76	3079.68	3079.19	3118.74	3096.95	MO 39
MO 43	3082.5	3082.75	3082.97	3083.10	3083.09	3079.03	3081.80	3081.14	3146.6	3080.18	MO 43
MO 44	3082.87	3083.12	3085.51	3085.69	3083.54	3079.38	3084.83	3081.48	3154.41	3080.27	MO 44
MO 45	3093.06	3093.27	3093.37	3093.46	3093.30	3090.47	3075.95	3089.44	3143.28	3088.54	MO 45
MO 46	--	--	--	--	--	3096.26	3097.08	3096.29	3187.75	3095.36	MO 46
MO 47	--	--	--	--	--	3101.72	3102.49	3101.14	--	3101.89	MO 47
MO 48	--	--	--	--	--	3103.19	3102.34	3099.55	--	3082.93	MO 48
MO 49	--	--	--	--	--	3096.99	3096.98	3094.85	3125.96	3073.67	MO 49
MO 50	--	--	--	--	--	3092.77	3092.84	3093.38	3184.16	3094.75	MO 50
MO 51	--	--	--	--	--	3087.83	--	--	3169.88	3085.43	MO 51
MO 52	--	--	--	--	--	3086.86	--	--	3169.11	3097.67	MO 52
MO 53	--	--	--	--	--	3083.59	3080.55	3079.79	3177.79	3080.79	MO 53
MO 57 CL 3	--	--	--	--	--	3083.62	3089.18	3098.97	3085.87	3100.85	MO 57 CL 3
MO 58	--	--	--	--	--	3114.89	3172.80	3115.10	3154.71	3115.37	MO 58
MO 59	--	--	--	--	--	3121.83	3120.99	3120.26	--	3119.92	MO 59
MO 60	--	--	--	--	--	3126.34	3126.33	3085.88	--	3125.78	MO 60

MO 61	--	--	--	--	--	3131.59	3132.87	3130.59	3165.58	3129.91	MO 61
MO 62	--	--	--	--	--	3135.24	3135.29	3134.04	3167.97	3133.42	MO 62
MO 63	--	--	--	--	--	3133.85	3134.35	3134.39	3121.86	3133.09	MO 63
MO 64	--	--	--	--	--	3143.23	3145.83	3143.51	3142.15	3157.21	MO 64
MO 65	--	--	--	--	--	3149.84	3150.99	3150.10	--	3149.36	MO 65
MO 66	--	--	--	--	--	3149.7	3115.60	3149.57	--	3148.63	MO 66
MO 75	--	--	--	--	--	3175.46	3174.05	3173.64	3099.27	3170.76	MO 75
MO 76	--	--	--	--	--	3175.18	3175.60	3175.12	3106.61	3106.61	MO 76
MO 77	--	--	--	--	--	3173.81	3173.73	3173.09	3104.62	3173.35	MO 77
MO 78	--	--	--	--	--	3169.74	3169.95	3169.53	3105.13	3169.64	MO 78
MO 79	--	--	--	--	--	3166.52	3167.12	3165.79	3091.89	3165.69	MO 79
MO 80	--	--	--	--	--	--	--	--	--	--	MO 80
MO 81	--	--	--	--	--	3126.71	3153.56	--	3068.07	--	MO 81
MO 82	--	--	--	--	--	3137.38	3138.20	3138.16	3069.85	3138.16	MO 82
MO 83	--	--	--	--	--	3132.19	3132.33	3132.24	3056.96	3132.12	MO 83
MO 84	--	--	--	--	--	3131.74	3131.85	3131.73	3095.36	3131.68	MO 84
MO 85	--	--	--	--	--	3131.47	3133.35	3131.08	--	3131.22	MO 85
MO 86	--	--	--	--	--	3119.67	3120.05	3119.78	3067.89	3119.81	MO 86
MO 87	--	--	--	--	--	3076.63	3073.65	3077.25	--	3112.13	MO 87
MO 88	--	--	--	--	--	3080.57	3076.99	3076.04	3093.93	3100.18	MO 88
MO 89	--	--	--	--	--	3079.85	3076.54	3075.67	3085.78	3163.74	MO 89
MO 90	--	--	--	--	--	3066.2	3063.76	3061.53	3068.07	3082.31	MO 90
MO 91	--	--	--	--	--	3067.8	3065.22	3063.70	3042.22	3060.35	MO 91
MO 92	--	--	--	--	--	3053.98	3055.33	3053.41	3065.77	3054.72	MO 92
MO 93	--	--	--	--	--	3042.96	3053.12	3052.00	3046.08	3049.86	MO 93
MO 94	--	--	--	--	--	3046.21	3044.35	3043.53	3046.01	3042.34	MO 94
MO 95	--	--	--	--	--	3061.68	3061.57	3058.09	3049.78	3053.79	MO 95
MO 96	--	--	--	--	--	3061.79	3057.31	3059.27	3066.32	3062.04	MO 96
Fowler	--	--	--	--	--	--	--	--	--	--	Fowler
CL 1	--	--	--	--	--	3094.46	3104.48	3106.39	3093.44	3108.42	CL 1
CL 2	--	--	--	--	--	3101.78	3101.84	3101.50	--	3103.13	CL 2
CL 4	--	--	--	--	--	3092.49	3092.58	3093.54	3077.53	3095.92	CL 4
CL 6	--	--	--	--	--	3070.73	3084.25	3090.02	3082.91	3090.87	CL 6
CL 7	--	--	--	--	--	3077.42	3081.54	3086.19	3091.07	3087.32	CL 7
CL 9	--	--	--	--	--	3094.01	3089.52	3091.19	--	3077.42	CL 9
CL 10	--	--	--	--	--	3048.63	3086.58	3086.54	3083.09	3088.09	CL 10
CL 11	--	--	--	--	--	3063.19	3082.78	3081.97	3100.46	3083.49	CL 11
CL 12	--	--	--	--	--	3068.39	3083.03	3083.65	3046.66	3084.32	CL 12
CL 13	--	--	--	--	--	3063.13	3078.54	3082.75	3061.52	3080.70	CL 13
CL 14	--	--	--	--	--	3074.58	3074.72	3077.76	3053.41	3075.27	CL 14
CL 15	--	--	--	--	--	3070.55	3073.41	3073.69	3075.83	3069.99	CL 15
CL 16	--	--	--	--	--	3073.25	3073.70	3072.20	3063.61	3066.96	CL 16
CL 20	--	--	--	--	--	3076.34	3121.46	3121.33	--	3079.75	CL 20
CL 22	--	--	--	--	--	3062.89	3070.27	3070.39	3075.71	3067.55	CL 22
CL 23	--	--	--	--	--	3071.91	3070.41	3070.23	3067.41	3069.15	CL 23
CL 24	--	--	--	--	--	3059.5	3065.83	3065.17	3054.87	3065.33	CL 24
CL 27	--	--	--	--	--	3064.89	3065.2	3064.58	--	3064.88	CL 27
CL 28	--	--	--	--	--	3061.31	3083.91	3078.08	3107.93	3074.64	CL 28
CL 29	--	--	--	--	--	3086.16	3088.74	3090.51	3103.77	3083.46	CL 29
CL 30	--	--	--	--	--	3091.94	3094.93	3095.90	3090.97	3097.51	CL 30
CL 31	--	--	--	--	--	3100.42	3105.2	3107.42	3062.25	3108.13	CL 31
CL 34	--	--	--	--	--	3059.18	3051.22	--	3020.27	--	CL 34
CL 35	--	--	--	--	--	3056.2	3053.88	3053.23	--	--	CL 35
CL 36	--	--	--	--	--	3062.68	3060.42	3059.11	3038.51	--	CL 36
CL 37	--	--	--	--	--	3065.44	3080.67	3080.87	3052.83	3067.31	CL 37
CL 38	--	--	--	--	--	3079.39	3086.46	3087.91	3061.28	3083.81	CL 38
CL 39	--	--	--	--	--	3079.61	3079.28	3079.16	3065.95	3099.52	CL 39
CL 40	--	--	--	--	--	3080.18	3081.5	--	3082.7	3075.5	CL 40
CL 41	--	--	--	--	--	3059.69	3077.46	3057.38	3059.15	3074.03	CL 41

CL 42	--	--	--	--	--	3063.6	3072.14	3072.81	--	3070.57	CL 42
CL 43	--	--	--	--	--	3077.2	3086.59	3093.05	--	3093.95	CL 43
CL 44	--	--	--	--	--	3071.24	3084.5	3081.25	--	3079.64	CL 44
CL 45	--	--	--	--	--	3024.35	3061.4	3059.52	--	3051.35	CL 45
CL 46	--	--	--	--	--	3035.92	3072.96	3072.49	--	3070.49	CL 46
CL 47	--	--	--	--	--	3068.97	3087.67	--	--	3080.14	CL 47
CL 48	--	--	--	--	--	3090.71	3088.56	3089.90	--	3089.34	CL 48
N of Plot 15	--	--	--	--	--	3076.09	3078.5	3078.50	--	3078.76	N of Plot 15
N of Schoppa	--	--	--	--	--	3073.3	3079.8	3077.79	--	3076.29	N of Schoppa
NE of Plot 6	--	--	--	--	--	3083.47	3089.18	--	--	3086.37	NE of Plot 6
Plot 7	--	--	--	--	--	3082.7	3083.1	3081.94	--	3080.93	Plot 7
Plot 7 - 9	3077.03	3076.36	3077.28	3078.02	3077.46	3076.51	3076.6	3074.80	--	3074.67	Plot 7 - 9
Values in red font a											

County	State Well Number	Latitude	Longitude	Land Surface Elevation	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Lubbock	2317901	33.628579	-101.917	3,234.00	3,164.64	3,164.96	3,163.82	3,167.39	3,167.94	3,167.44	3,169.46	3,167.54	3,165.45	3,167.64
Lubbock	2318703	33.629168	-101.8457	3,239.00	3,155.63	3,155.03	3,154.09	3,155.00	3,155.83	3,153.85	3,155.27	3,152.03	3,150.81	3,150.60
Lubbock	2318704	33.636944	-101.8705	3,233.00	3,145.55	3,145.02	3,143.72	3,145.45	3,145.94	3,144.32	3,145.32	3,144.16	3,142.41	3,141.18
Lubbock	2318712	33.654556	-101.839	3,235.00	3,140.30	3,139.71	3,138.60	3,139.88	3,140.51	3,139.95	3,140.22	3,139.28	3,137.97	3,137.14
Lubbock	2318802	33.646817	-101.7928	3,220.00	3,113.95	3,113.29	3,110.74	3,110.93	3,111.14	3,108.35	3,107.69	--	3,110.20	3,106.02
Lubbock	2319707	33.66535	-101.7384	3,204.00	--	--	--	3,049.26	3,048.36	3,046.85	3,046.27	3,044.91	3,042.24	3,039.16
Lubbock	2319906	33.647273	-101.6669	3,174.00	2,992.10	2,990.96	2,989.09	2,990.46	2,990.22	2,989.20	2,987.86	2,985.36	2,984.25	2,982.41
Lubbock	2320701	33.652939	-101.6248	3,172.00	2,968.12	2,967.63	2,964.40	2,964.95	2,963.62	2,961.44	2,959.98	2,959.83	2,957.00	2,956.45
Lubbock	2325304	33.592555	-101.8991	3,228.00	--	--	--	--	--	--	--	--	--	--
Lubbock	2325904	33.511915	-101.8862	3,229.00	--	--	3,196.40	3,198.15	3,199.06	3,197.52	3,199.77	3,195.78	3,193.97	3,192.82
Lubbock	2325908	33.536287	-101.9046	3,228.00	3,217.85	3,216.98	3,216.68	3,216.54	3,217.58	3,216.04	3,217.03	3,215.17	3,213.90	3,212.87
Lubbock	2326199**	33.618784	-101.8354	3,205.00	--	--	--	--	--	--	--	--	--	--
Lubbock	2326207	33.584945	-101.8058	3,186.00	3,130.61	3,130.73	3,129.94	3,129.91	3,129.24	3,128.46	3,129.13	3,127.70	3,126.37	3,125.21
Lubbock	2326301	33.609673	-101.7693	3,192.00	3,101.55	3,102.62	3,101.92	3,102.13	3,102.01	3,101.51	3,101.96	3,100.63	3,100.08	3,098.96
Lubbock	2326404	33.579216	-101.8717	3,212.00	3,181.95	3,181.84	--	--	--	3,181.89	3,182.83	3,180.90	3,179.74	3,178.88
Lubbock	2326604	33.541365	-101.7874	3,156.00	3,103.88	3,105.25	3,104.48	3,105.91	3,107.71	3,106.60	3,110.57	3,107.41	3,105.48	3,104.70
Lubbock	2326802	33.522263	-101.8163	3,172.00	3,107.82	3,110.45	3,108.67	3,111.67	3,113.54	3,111.66	3,114.59	3,111.91	3,109.74	3,107.46
Lubbock	2327102	33.586935	-101.7314	3,155.00	3,071.60	3,071.40	3,069.12	3,070.35	3,072.94	3,071.35	3,071.07	3,068.36	3,067.26	3,063.51
Lubbock	2327109*	33.584789	-101.7142	3,146.00	--	--	--	--	--	--	--	--	--	--
Lubbock	2327207	33.623842	-101.6797	3,154.00	3,026.72	3,025.46	3,018.04	3,021.64	3,021.28	3,017.55	3,016.14	3,014.53	3,013.54	3,012.51
Lubbock	2327211	33.601054	-101.6788	3,143.00	3,028.22	3,027.58	3,021.92	3,024.90	3,018.03	3,017.46	3,017.21	--	3,010.55	3,007.84
Lubbock	2327213	33.588029	-101.6852	3,142.00	--	3,025.98	3,020.48	3,024.23	3,025.08	3,021.20	3,020.67	3,017.28	3,015.26	3,012.62
Lubbock	2327302	33.609326	-101.6384	3,142.00	3,055.16	3,054.60	3,053.42	3,054.50	3,055.02	3,054.86	3,057.74	3,057.03	3,055.36	3,053.64
Lubbock	2327402	33.544851	-101.7282	3,143.00	3,067.31	3,066.75	3,065.44	3,065.52	3,065.27	3,064.61	3,064.49	3,062.10	3,060.18	--
Lubbock	2327601	33.571646	-101.6474	3,127.00	3,033.22	3,033.27	3,031.42	3,032.03	3,033.00	3,031.73	3,033.67	3,032.75	3,030.49	3,027.81
Lubbock	2327603	33.548309	-101.6535	3,112.00	3,022.79	3,023.70	3,022.11	3,022.58	3,023.53	3,022.70	3,023.46	3,022.52	3,020.23	3,021.14
Lubbock	2327721	33.517669	-101.7283	3,139.00	3,038.43	3,037.94	3,036.52	3,037.86	3,038.29	3,037.01	3,038.73	3,036.81	3,036.86	3,035.40
Lubbock	2327811	33.518596	-101.6976	3,127.00	--	--	--	--	--	--	3,039.77	3,039.45	3,037.84	3,034.74
Lubbock	2328203	33.609382	-101.5815	3,152.00	2,971.34	2,966.75	2,960.54	2,963.08	2,961.20	2,957.60	2,955.80	2,952.03	2,949.96	2,950.90
Lubbock	2328503	33.569609	-101.5834	3,129.00	3,033.23	3,032.68	3,031.87	3,031.48	3,031.33	3,030.57	3,030.65	3,030.22	3,029.85	3,029.22
Lubbock	2328703	33.538643	-101.5858	3,090.00	--	--	--	--	--	--	--	3,021.07	3,019.42	3,018.49

2015	2016	2017	2018	2019	2020	2021	2022	2023	State Well Number	HPWD Well ID
3,165.49	3,169.86	3,171.16	3,172.92	3,171.84	3,173.65	3,172.75	3,172.65	3,171.39	2317901	66667
3,152.26	3,154.42	3,154.54	--	--	--	--	--	--	2318703	66909
3,141.20	3,143.47	3,144.71	3,145.24	3,144.23	3,144.67	3,143.50	3,142.02	3,141.88	2318704	66879
3,136.94	3,138.93	--	--	--	3,136.86	3,136.12	3,137.20	3,137.77	2318712	63557
3,108.88	3,112.13	3,111.50	3,113.55	3,110.65	3,111.54	3,110.53	3,111.30	3,112.65	2318802	63515
3,039.88	3,042.00	3,041.68	3,041.25	3,039.99	3,040.23	3,041.13	3,041.31	3,041.85	2319707	62898
2,982.45	2,982.80	2,981.92	2,983.62	2,983.23	2,981.83	2,980.61	2,981.46	2,981.05	2319906	69206
2,954.16	2,954.65	2,953.54	2,954.18	2,952.92	--	--	--	--	2320701	67265
--	--	3,185.29	3,185.97	3,185.43	3,185.87	3,183.25	3,184.48	3,182.85	2325304	67546
3,193.93	3,196.84	3,196.83	3,196.35	--	--	--	--	--	2325904	67693
3,213.34	3,215.75	3,215.96	3,215.32	3,215.95	3,216.02	3,213.13	3,214.55	3,213.07	2325908	69207
--	--	--	--	3,155.09	3,155.50	3,154.12	3,154.45	3,153.80	2326199**	58424
3,124.82	3,125.47	3,124.65	3,124.46	3,123.89	3,124.15	3,123.50	3,123.14	3,122.05	2326207	63648
3,097.97	3,098.46	3,097.80	3,097.85	3,097.12	3,096.88	3,096.04	3,096.03	3,095.84	2326301	57767
3,178.93	3,181.69	3,181.10	3,181.65	3,181.28	--	--	--	--	2326404	63686
3,106.05	3,107.71	3,107.18	3,107.57	3,107.67	3,107.95	3,106.87	3,105.96	3,105.10	2326604	57991
3,108.45	3,112.21	3,111.59	3,113.01	3,111.53	3,113.22	3,111.08	3,112.10	3,110.27	2326802	60315
3,063.39	3,064.66	--	--	--	--	--	--	--	2327102	63451
--	--	--	3,055.13	3,052.98	3,051.44	3,050.07	3,050.45	3,049.04	2327109	63242
3,011.93	3,014.30	3,012.98	3,014.45	3,012.24	3,010.69	3,010.52	3,008.98	3,008.58	2327207	59299
3,008.00	3,007.73	3,008.49	3,008.93	3,008.44	3,007.31	3,003.22	3,001.55	2,999.37	2327211	58756
3,010.97	3,009.78	3,010.94	--	--	--	--	--	--	2327213	62444
3,052.73	3,056.56	3,056.52	3,056.17	3,054.52	3,054.48	3,053.26	--	--	2327302	67975
3,059.54	3,058.14	3,058.12	3,059.55	3,059.62	3,059.10	3,057.38	3,055.76	3,054.40	2327402	68100
3,026.03	3,027.75	3,028.38	3,027.18	3,026.04	3,024.44	3,022.28	3,023.15	3,021.45	2327601	68059
3,020.41	3,020.15	3,019.28	3,018.99	3,017.96	3,017.51	3,016.13	3,015.90	3,015.75	2327603	61294
3,034.83	3,035.96	3,036.35	3,037.90	3,037.55	3,038.41	3,037.07	3,037.65	3,035.61	2327721	63821
3,032.45	3,032.60	3,031.46	3,030.77	3,029.71	3,029.24	3,027.98	3,027.72	3,026.15	2327811	65098
2,950.07	2,950.72	2,950.18	2,950.78	2,948.94	2,949.02	2,947.99	2,948.53	2,948.20	2328203	61870
3,028.82	3,028.72	3,028.81	3,029.17	3,028.31	3,027.87	3,027.33	3,027.20	3,027.00	2328503	58092
3,018.82	3,020.53	3,020.63	3,020.18	3,018.35	3,017.01	3,015.27	3,014.71	3,012.94	2328703	65363

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Data Tables for Section 3 – Groundwater Quality Sampling Results

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 1	8/2/2011	10:03	7.2	18.91	2168	8.06	50
MO 1	2/1/2012	11:27	7.23	18.53	1451	4.88	46
MO 1	7/30/2012	0:00	7.1	18.96	2340	8.27	205
MO 1	2/19/2013	13:54	7.27	18.41	1557	5.74	153
MO 1	9/5/2013	12:31	7.03	19.15	2841	7.85	146
MO 1	3/1/2014	--	7.39	18.77	1585	5.98	96
MO 1	9/10/2014	13:26	7.07	19.5	2877	7.07	91
MO 1	2/12/2015	12:50	7.4	18.72	1755	6.36	34.2
MO 1	7/21/2015	15:09	7.41	19.24	1493	6.59	71.7
MO 1	3/7/2016	13:56	7.42	19.05	1497	6.85	77.5
MO 1	11/27/2016	9:30	7.3	18.7	1878	6.79	99.6
MO 1	3/12/2017	10:24	7.27	18.79	1783	6.74	86.9
MO 1	9/6/2017	11:11	7.89	20.51	1472	78.6%	106.1
MO 1	2/5/2018	12:41	7.46	18.87	18324*	0.255	80.2
MO 1	7/24/2018	11:48	7.44	20.17	2033	4.89	249
MO 1	2/20/2019	14:30	7.91	19.32	1616	7.16	-10
MO 1	7/22/2019	14:17	7.41	24.07	2389.6	7.29	175
MO 1	2/9/2020	15:53	7.94	18.62	1757.4	5.64	106
MO 1	8/12/2020	11:25	7.32	19.15	1863	5.15	694
MO 1	2/28/2021	15:20	7.28	18.32	1758	3.98	219
MO 1	8/3/2021	10:40	7.81	19.06	1684	3.55	27.1
MO 1	3/2/2022	10:30	7.07	18.88	1342	5.06	102.8
MO 1	7/12/2022	11:48	6.97	20.57	1734	6.49	63.1
MO 1	3/13/2023	8:45	7.92	18.53	1347	5.33	63.5
MO 2	8/2/2011	9:38	6.95	18.48	3430	7.57	99
MO 2	2/1/2012	10:56	6.88	18	2805	8.04	127
MO 2	7/30/2012	0:00	6.92	18.63	2895	8.05	202
MO 2	2/19/2013	13:28	6.98	18.08	2669	7.19	164
MO 2	9/5/2013	11:46	6.88	18.53	2873	7.22	150
MO 2	3/1/2014	--	7.08	18.3	2688	6.89	111
MO 2	9/10/2014	12:25	6.71	18.97	3667	6.25	87
MO 2	2/12/2015	12:27	7.01	18.11	3314	6.59	45.2
MO 2	7/21/2015	14:45	7	18.83	3636	7.31	84.4
MO 2	3/6/2016	13:27	7.01	18.53	3562	7.26	89.6
MO 2	11/27/2016	10:00	6.94	18.03	3200	6.97	178.2
MO 2	3/12/2017	10:04	6.99	18.26	3034	7.25	89.2
MO 2	9/6/2017	10:48	7.32	18.88	2441	7.41	118.8
MO 2	2/5/2018	11:49	7.19	18.22	170226*	0.003	71
MO 2	7/24/2018	12:15	7.11	18.3	3164	7.02	295
MO 2	2/21/2019	11:00	7.59	17.54	2848	6.88	107
MO 2	7/22/2019	14:26	7.18	19.15	2680	6.64	199.3
MO 2	2/9/2020	15:10	7.73	18.09	288	6.61	200.5
MO 2	8/12/2020	11:45	7.19	20.78	2894	6.52	727.5
MO 2	2/24/2021	14:30	7.35	19.89	2583	6.90	403
MO 2	8/3/2021	10:57	7.61	19.08	2886	6.91	31.9
MO 2	3/2/2022	12:00	6.65	18.39	2537	6.52	12.06
MO 2	7/12/2022	10:30	7.04	22.06	2424	6.78	82.4
MO 2	3/7/2023	12:00	7.63	18.38	2054	6.55	65.3
MO 3	8/2/2011	10:30	7.04	18.72	3637	6.9	44
MO 3	2/1/2012	11:55	6.92	18.28	3661	6.83	55
MO 3	7/30/2012	0:00	6.95	18.76	3722	7.07	208
MO 3	2/19/2013	12:36	6.88	18.4	3693	6.43	165
MO 3	9/5/2013	13:01	6.89	18.83	3927	6.67	151
MO 3	3/1/2014	--	7.05	18.57	3793	6.33	110
MO 3	10/2/2014	12:14	7.04	18.68	4410	6.19	89.2
MO 3	2/12/2015	13:15	7.01	18.7	4522	6.04	41.2
MO 3	7/23/2015	9:06	6.96	18.79	4554	6.66	85.7
MO 3	3/7/2016	14:21	6.99	18.79	4465	6.55	89.5
MO 3	11/21/2016	12:15	6.91	19.17	3952	6.17	100
MO 3	3/12/2017	10:50	6.93	18.57	4215	6.26	95.2
MO 3	9/6/2017	11:45	7.93	20.49	1433	68.8%	77.3
MO 3	2/5/2018	13:04	7.16	8.75	1853	14.2%	92.6
MO 3	7/24/2018	11:15	7.12	18.94	3895	6.42	255
MO 3	2/20/2019	14:00	7.57	18.39	4121	6.2	126
MO 3	7/22/2019	9:10	7.36	24.19	3840	5.82	167
MO 3	2/2/2020	12:47	7.73	18.48	3595	6.22	121.2
MO 3	8/12/2020	8:30	7.42	20.75	3594	6.19	574.6
MO 3	2/24/2021	11:00	7.19	18.41	3336	6.08	190.4
MO 3	8/3/2021	10:00	7.62	19.21	3539	6.17	27.1
MO 3	3/2/2022	13:00	7.04	20.6	3507	6.03	85.1
MO 3	7/12/2022	12:35	7.03	23.02	3064	8.73	69.3
MO 3	3/13/2023	9:15	8.10	18.46	1506	2.04	24.26

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 4	8/2/2011	10:55	6.89	17.78	4396	3.81	14
MO 4	2/1/2012	12:22	6.94	17.44	3237	3.5	22
MO 4	7/30/2012	0:00	6.96	17.85	3502	3.41	208
MO 4	2/19/2013	13:04	6.98	17.32	3396	2.1	146
MO 4	9/5/2013	11:16	6.86	17.8	3589	3.11	148
MO 4	3/1/2014	--	7.07	17.56	3396	3.71	99
MO 4	10/27/2014	15:08	6.9	17.9	3940	4.01	80.7
MO 4	2/18/2015	11:58	7.06	17.49	3662	3.78	83
MO 4	7/23/2015	9:27	7.11	17.73	3135	5.76	75.8
MO 4	3/8/2016	11:11	7.09	17.52	3602	3.93	86.8
MO 4	11/21/2016	11:50	6.97	18.39	3711	4.3	100.3
MO 4	3/12/2017	11:17	6.95	17.28	4023	3.15	82.2
MO 4	9/6/2017	10:23	7.27	17.68	2945	41.2%	101.4
MO 4	2/14/2018	8:55	7.57	17.23	15440*	26.3%	-43.2*
MO 4	7/24/2018	8:46	7.12	17.68	3515	2.45	271
MO 4	2/21/2019	13:00	7.69	17.63	3213	2.9	126.8
MO 4	7/22/2019	13:51	7.19	22.26	3515	7.38	180.2
MO 4	2/9/2020	13:10	7.71	17.43	3130	3.14	130.2
MO 4	8/12/2020	10:50	7.31	21.46	3503	2.76	679
MO 4	2/24/2021	14:00	7.21	18.39	2352	5.94	380.4
MO 4	8/3/2021	9:45	7.66	18.46	3022	4.33	52.27
MO 4	3/6/2022	8:30	7.17	16.87	3436	4.41	79.9
MO 4	7/12/2022	10:00	7.35	22.91	2524	6.13	82.3
MO 4	3/13/2023	9:30	7.67	16.83	2357	6.24	71.99
MO 5	8/2/2011	11:19	6.97	18.25	3549	7.85	36
MO 5	2/1/2012	12:49	6.86	17.74	3522	8.36	41
MO 5	7/30/2012	0:00	6.95	18.2	3511	8.17	204
MO 5	2/19/2013	14:18	6.91	17.67	3490	7.48	171
MO 5	9/5/2013	10:50	6.16	18.19	3459	7.65	154
MO 5	3/1/2014	--	7.02	18.06	3524	7.15	115
MO 5	10/2/2014	13:11	7.01	18.21	3942	7.12	86.7
MO 5	2/18/2015	13:00	6.98	18.08	3634	7.12	91.2
MO 5	7/23/2015	9:46	6.98	18.26	3719	7.73	83.1
MO 5	3/8/2016	11:37	6.99	18.12	3914	7.7	89.4
MO 5	11/21/2016	11:20	6.89	18.45	3260	7.34	68.9
MO 5	3/13/2017	11:34	6.93	17.89	3889	7.52	96.4
MO 5	9/6/2017	9:25	7.65	18.08	3185	90.8%	107.4
MO 5	2/14/2018	9:38	7.4	18.48	16127*	92.1%	-3.3*
MO 5	7/24/2018	8:00	7.05	18.07	3822	7.4%	205.1
MO 5	2/21/2019	14:00	7.54	18.2	3793	0.07	158.7
MO 5	7/22/2019	13:30	7.42	22.29	1678	2.43	179.5
MO 5	2/9/2020	14:40	7.69	17.99	3119	6.91	248.8
MO 5	8/12/2020	10:00	7.15	20.7	3612	7.09	577
MO 5	2/24/2021	13:31	7.37	19.72	3425	6.51	328
MO 5	8/3/2021	9:00	7.47	19.19	3460	8.47	59.7
MO 5	3/6/2022	9:15	7.48	17.41	3541	6.92	82.1
MO 5	7/12/2022	9:00	7.08	20.04	2698	6.82	95.9
MO 5	3/7/2023	11:30	7.55	18.61	2796	6.74	72.0
MO 6	8/2/2011	12:07	7.24	18.7	1717	7.88	32
MO 6	2/1/2012	13:12	7.15	18.42	2097	7.71	30
MO 6	7/30/2012	0:00	7.24	18.78	2307	7.71	204
MO 6	2/19/2013	14:40	7.19	18.21	2157	6.98	163
MO 6	9/5/2013	10:25	7.05	18.77	2258	7.36	149
MO 6	3/1/2014	--	7.23	18.7	2304	6.97	114
MO 6	10/2/2014	No Data					
MO 6	2/18/2015	13:21	7.22	18.52	2477	6.34	82.6
MO 6	7/23/2015	10:05	7.25	18.79	2180	6.92	74.8
MO 6	3/8/2016	No Data					
MO 6	11/21/2016	10:45	7.16	18.66	1883	6.26	168.1
MO 6	3/14/2017	8:43	7.24	1830	2109	6.35	92.9
MO 6	9/6/2017	8:48	7.86	18.64	1114	89.5%	57.6
MO 6	2/14/2018	10:30	7.34	18.68	155442*	89.8%	10.3
MO 6	7/24/2018	6:30	7.32	18.66	2543	6.46	171
MO 6	2/21/2019	13:30	7.76	18.97	2935	8.26	165
MO 6	7/22/2019	12:57	7.33	20.74	2497	10.08	181.4
MO 6	2/9/2020	13:40	7.98	18.57	1881	5.6	212.2
MO 6	8/12/2020	9:15	7.29	19.7	2123	6.75	553.6
MO 6	2/24/2021	11:15	7.35	18.35	2028	7.01	394.1
MO 6	8/3/2021	8:30	7.90	18.75	2146	6.80	44.6
MO 6	3/6/2022	11:00	7.37	17.72	2345	6.00	83.3
MO 6	7/12/2022	8:30	7.09	20.81	2362	6.23	86.5
MO 6	3/7/2023	10:30	7.65	18.51	2214	4.13	54.5

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 8	8/2/2011	13:44	6.7	19.15	4441	5.04	29
MO 8	2/2/2012	10:51	6.59	18.49	4501	4.84	66
MO 8	7/25/2012	0:00	6.7	19.22	4477	5.01	197
MO 8	3/3/2013	13:55	6.62	19.09	4411	4.76	193
MO 8	9/3/2013	12:51	6.58	19.19	4355	4.66	155
MO 8	3/1/2014	--	6.74	18.73	4367	4.46	125
MO 8	9/3/2014	10:36	6.9	19.27	4386	4.49	151
MO 8	2/10/2015	12:14	6.77	19.31	4462	4.17	96.5
MO 8	7/21/2015	11:34	6.75	19.32	4399	4.4	83.3
MO 8				19.29	4360	4.34	90.4
MO 8	11/30/2016	10:52	6.76	18.88	4540	4.14	102
MO 8	2/28/2017	9:10	7	18.84	4235	4.19	78.3
MO 8	8/16/2017	13:52	3.74	22.7	2630	80.8%	359.8
MO 8	2/20/2018	10:00	6.93	18.83	16996*	50.9%	-12*
MO 8	7/23/2018	10:30	6.85	19.55	3534	4.10	312
MO 8	2/13/2019	10:30	7.32	16.96	3908	4.03	56
MO 8	7/18/2019	8:01	6.94	21.15	3796	3.79	66.6
MO 8	2/2/2020	10:00	7.37	18.88	3517	3.68	133.9
MO 8	8/3/2020	8:30	6.95	19.54	2987	3.92	295.1
MO 8	3/8/2021	10:30	7.11	18.93	3416	4.04	336.2
MO 8	7/21/2021	10:00	7.12	19.62	3770	3.92	51.9
MO 8	3/1/2022	10:40	6.68	18.97	3745	4.01	88.4
MO 8	6/30/2022	7:50	7.38	20.26	3132	3.96	45.3
MO 8	3/14/2023	10:00	7.43	18.48	3184	4.05	48.87
MO 9	8/2/2011	13:14	6.8	18.2	3966	3.47	18
MO 9	2/1/2012	14:22	6.72	17.79	3966	3.55	17
MO 9	7/25/2012	0:00	6.78	18.13	3887	3.58	210
MO 9	3/3/2013	13:30	6.78	18.06	3872	3.63	185
MO 9	9/3/2013	12:26	6.73	18.23	3591	3.28	150
MO 9	3/1/2014	--	6.86	17.67	3754	3.37	110
MO 9	9/3/2014	13:41	6.81	18.36	3871	3.34	139
MO 9	2/10/2015	12:37	6.89	18.09	3822	2.99	85.6
MO 9	7/21/2015	11:58	6.88	18.19	3872	3.4	77.9
MO 9	3/6/2016	14:14	6.89	18.17	3936	3.75	85.5
MO 9	12/20/2016	10:15	6.83	17.85	3448	4.35	115.7
MO 9	2/22/2017	10:30	7.4	21.4	3019	6.52	76.3
MO 9	8/16/2017	13:59	7.53	20.73	3102	66.8%	77.4
MO 9	2/20/2018	10:15	7.00	18.12	16176*	52.8%	-5.7*
MO 9	7/23/2018	11:15	6.91	18.18	3763	4.3%	415
MO 9	2/13/2019	11:00	7.49	17.81	3852	6.86	74.1
MO 9	7/18/2019	8:27	7.06	20.84	4307	5.19	130.2
MO 9	2/2/2020	11:30	7.47	18.88	4021	4.2	170.7
MO 9	8/3/2020	9:00	6.93	20.77	3187	8.31	398
MO 9	3/8/2021	11:30	6.95	17.9	3667	3.91	330
MO 9	7/21/2021	11:00	7.34	18.23	4287	7.47	59.7
MO 9	3/1/2022	11:20	6.71	18.01	3969	3.68	93.9
MO 9	6/30/2022	8:15	7.49	20.86	1444	6.47	35.7
MO 9	3/14/2023	11:30	7.44	17.90	3533	3.77	44.70
MO 11	8/2/2011	14:13	6.88	18.46	3805	2.56	-8
MO 11	2/2/2012	12:07	6.89	17.88	3610	2.65	7
MO 11	7/25/2012	0:00	6.89	18.59	3805	2.64	195
MO 11	3/3/2013	13:07	6.83	18.56	3679	2.3	181
MO 11	9/3/2013	11:54	6.78	18.68	3957	3.8	154
MO 11	3/1/2014	--	6.95	18.34	3795	3	102
MO 11	9/3/2014	13:14	6.98	18.91	3345	1.17	132
MO 11	2/10/2015	13:26	6.95	18.83	3324	0.89	80.7
MO 11	7/21/2015	12:25	7.01	18.96	3443	1.51	66.5
MO 11	3/7/2016	10:25	7.02	18.54	3416	1.08	75.4
MO 11	11/30/2016	11:41	7.05	18.99	3635	1.06	123.9
MO 11	2/28/2017	8:33	7.16	18.2	3255	0.82	99
MO 11	8/16/2017	14:10	7.3	23.34	2710	82.7%	13.82*
MO 11	2/20/2018	10:45	7.09	19.23	16269*	17.2%	-1.6*
MO 11	7/23/2018	11:45	7.11	18.83	3323	1.02	304
MO 11	2/13/2019	12:30	7.53	17.1	3486	1.79	87
MO 11	7/18/2019	8:53	7.07	19.01	3297	0.87	133.9
MO 11	2/2/2020	12:52	7.65	18.6	2988	1.11	219.9
MO 11	8/20/2020	7:48	7.07	19.24	3100	1.63	104.4
MO 11	3/8/2021	14:20	7.10	18.80	3240	1.92	425
MO 11	7/21/2021	11:20	7.38	20.88	3674	2.41	39.5
MO 11	3/1/2022	11:45	6.96	19.65	3538	2.25	96.6
MO 11	7/5/2022	10:30	7.49	24.90	3409	1.67	95.2
MO 11	3/14/2023	12:35	7.57	18.56	3303	1.91	22.90

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 12 / CL 25	8/2/2011	12:49	6.96	17.23	3047	1.78	-21
MO 12 / CL 25	2/2/2012	11:40	6.9	16.65	3116	1.77	-7
MO 12 / CL 25	7/25/2012	0:00	6.88	17.38	3162	1.68	196
MO 12 / CL 25	3/3/2013	11:56	6.76	17.18	3185	1.34	178
MO 12 / CL 25	9/3/2013	14:39	6.83	17.44	3162	1.07	137
MO 12 / CL 25	3/1/2014	--	6.97	16.94	3099	0.71	84
MO 12 / CL 25	9/3/2014	9:57	6.84	17.42	3295	1.36	157
MO 12 / CL 25	2/10/2015	13:05	6.96	17.45	3311	0.77	78
MO 12 / CL 25	7/21/2015	10:32	6.96	17.4	3403	1.33	64.9
MO 12 / CL 25	3/6/2016	13:18	6.77	19.29	4360	4.34	90.4
MO 12 / CL 25	12/20/2016	9:43	7	16.59	2977	1.7	92.2
MO 12 / CL 25	2/22/2017	9:00	7.21	17.47	3847	5.76	113.1
MO 12 / CL 25	8/17/2017	8:28	11.35	19.43	3407	46.2%	11.5
MO 12 / CL 25	2/27/2018	9:30	7.31	15.39	15307*	26.2%	-29*
MO 12 / CL 25	7/23/2018	12:45	6.98	17.45	3737	1.85	249
MO 12 / CL 25	2/14/2019	10:00	7.48	17.21	3726	1.97	133
MO 12 / CL 25	7/18/2019	8:40	6.98	17.97	3822	2.02	115.5
MO 12 / CL 25	8/3/2020	10:00	7.04	18.84	3177	1.97	414.2
MO 12 / CL 25	3/8/2021	14:40	7.14	18.29	3084	1.88	425.7
MO 12 / CL 25	3/1/2022	12:15	6.82	18.61	3377	1.27	1079
MO 12 / CL 25	7/5/2022	11:53	7.69	20.82	3059	1.31	48.6
MO 12 / CL 25	3/14/2023	13:00	7.52	17.49	2774	1.04	12.19
MO 14	8/3/2011	14:48	7.1	20.66	4992	8.4	39
MO 14	2/20/2012	14:21	7.23	17.95	4864	8.28	44
MO 14	7/25/2012	0:00	6.98	19.25	5060	6.1	195
MO 14	3/3/2013	12:37	7.01	19.36	5395	8.56	187
MO 14	9/3/2013	11:21	6.87	19.15	5376	7.5	175
MO 14	3/1/2014	--	6.96	18.15	5512	5.54	114
MO 14	9/3/2014	12:35	6.94	19.94	5581	5.67	156
MO 14	2/10/2015	13:53	7.12	20.13	2551	6.83	85.1
MO 14	7/21/2015	13:05	7.03	20.23	5379	6.83	79.5
MO 14	3/7/2016	11:23	7.05	18.93	5254	6.9	88.4
MO 14	11/30/2016	14:15	7.01	18.22	6482	5.45	86.7
MO 14	2/21/2017	10:25	7.12	19.99	4872	1.42	91
MO 14	2018	Not sampled 2018					
MO 14	2019	Not sampled 2019					
MO 14	2/3/2020	12:00	7.9	19.64	34.1	7.46	124.9
MO 14	3/14/2023	12:15	7.64	18.26	4693	10.98	117.6
MO 17	8/4/2011	11:21	6.93	16.87	4513	5.29	-3
MO 17	2/2/2012	13:36	6.92	16.3	4426	5.57	35
MO 17	7/16/2012	0:00	6.81	16.95	4433	5.45	176
MO 17	3/3/2013	14:56	6.82	16.81	4444	5.38	187
MO 17	9/3/2013	10:09	6.64	16.88	4417	5.76	156
MO 17	3/1/2014	--	6.95	16.74	4354	8.96	129
MO 17	8/29/2014	8:59	6.88	17.21	4336	9.56	153
MO 17	1/28/2015	13:34	6.94	17.32	4268	9.04	104.5
MO 17	2/28/2016	12:01	7.05	16.99	3824	12.39	101.1
MO 17	12/12/2016	13:00	7.15	16.96	4600	4.5	90.5
MO 17	3/1/2017	10:15	7.26	16.6	3790	5.67	116.1
MO 17	3/8/2018	10:35	7.11	16.86	16161*	54.2%	-36.2*
MO 17	8/15/2018	9:40	7.27	20.35	3565	11.28	195
MO 17	3/6/2019	14:15	7.22	16.78	3390	11.84	102
MO 17	7/28/2019	11:30	7.5	23.26	2792	3.89	218.7
MO 17	2/26/2020	13:45	7.95	16.87	2990	4.22	212.4
MO 17	7/28/2020	7:30	7.21	19.49	3108	4.13	298.3
MO 17	3/15/2021	10:00	7.14	18.12	3029	4.13	538.2
MO 17	8/22/2021	8:00	7.86	18.71	3456	3.78	38.4
MO 17	3/15/2022	12:15	7.36	19.07	3215	5.00	79.8
MO 17	7/19/2022	7:00	7.51	18.88	2699	3.05	93.1
MO 17	3/26/2023	15:30	7.66	17.28	2623	3.66	43.37

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 18	8/4/2011	11:51	6.89	17.98	4478	3.25	-13
MO 18	2/2/2012	13:04	6.85	17.36	4404	3.21	19
MO 18	7/16/2012	0:00	6.81	18.11	4310	2.83	176
MO 18	3/3/2013	14:28	6.77	18.06	4511	2.41	185
MO 18	9/3/2013	10:34	6.6	18.1	4349	317	154
MO 18	3/1/2014	--	6.85	17.76	4409	2.81	112
MO 18	8/29/2014	9:18	6.8	18.23	4517	2.78	146
MO 18	1/28/2015	13:55	6.82	18.12	4683	2.74	93.5
MO 18	7/19/2015	12:34	6.85	18.47	4872	3.06	78.6
MO 18	2/28/2016	13:46	6.86	18.14	4866	2.69	84.1
MO 18	12/5/2016	--	6.81	17.85	5280	2.2	165.6
MO 18	3/1/2017	9:50	7.76	16.05	4665	8.92	124.4
MO 18	10/25/2017	10:00	7.74	15.93	7743	123.9%	78.7
MO 18	3/8/2018	11:15	7.12	18.12	16207*	70.2%	-14.3*
MO 18	8/8/2018	8:45	7.06	18.46	4505	2.03	249
MO 18	3/6/2019	14:49	7.58	18.03	4361	9.66	130.5
MO 18	7/28/2019	10:40	7.49	27.73	3490	5.75	91.9
MO 18	2/26/2020	13:30	8.16	17.71	3200	1.42	141.06
MO 18	7/28/2020	10:00	7.3	18.59	2842	1.65	401
MO 18	3/15/2021	12:15	7.49	17.75	2646	1.48	396.1
MO 18	8/22/2021	12:15	7.90	21.99	2392	6.97	19.4
MO 18	3/15/2022	13:50	7.41	18.63	2704	2.60	71.9
MO 18	7/19/2022	8:00	8.01	21.18	2364	2.28	70.6
MO 18	3/27/2023	11:00	7.64	18.08	2561	1.83	21.80
MO 19	7/27/2011	11:37	7.07	18.6	3195	0.16	-31
MO 19	1/26/2012	13:21	6.94	18.1	3214	0.24	-82
MO 19	7/12/2012	0:00	6.82	18.66	3338	0.8	160
MO 19	2/14/2013	13:03	6.88	18.3	3162	0.48	184
MO 19	8/22/2013	9:59	6.94	18.52	3048	1.09	142
MO 19	3/1/2014	--	7.14	18.5	2794	0.25	86
MO 19	9/2/2014	15:25	7.1	18.96	2602	0.29	118
MO 19	2/9/2015	10:40	7.2	18.56	2644	-2.5	143
MO 19	7/21/2015	10:03	7.15	18.72	2727	0.14	59.4
MO 19	3/6/2016	11:59	7.17	18.57	2685	0.12	67.8
MO 19	10/25/2016	10:00	7.01	18.5	4408	0.45	78.6
MO 19	3/14/2017	9:18	7.1	18.26	2793	0.34	77.5
MO 19	2/28/2017	10:46	7.27	18.35	2782	0.29	50.7
MO 19	9/13/2017	9:30	7.48	19.44	2173	39.2%	155
MO 19	3/7/2018	9:40	7.14	13.21	14987*	86.7%	-35.6*
MO 19	8/7/2018	11:15	7.39	19.21	2458	0.05	327
MO 19	2/25/2019	10:30	7.73	12.12	2503	12.89	51
MO 19	7/30/2019	12:30	7.36	20.83	0.5*	0.04	398
MO 19	2/19/2020	10:00	8.13	18.35	2232	0.11	87.8
MO 19	8/4/2020	11:30	7.25	20.26	2290	0.32	41.3
MO 19	3/21/2021	11:00	7.24	18.49	2221	0.09	355.8
MO 19	8/11/2021	7:30	7.69	18.75	2247	0.08	39.8
MO 19	3/8/2022	11:30	7.71	18.53	2272	0.03	70.2
MO 19	7/24/2022	10:45	6.89	19.68	2030	0.12	82.2
MO 19	3/20/2023	12:00	7.81	17.78	1944	0.27	3.64
MO 20	7/27/2011	12:02	6.91	17.69	4140	5.55	25
MO 20	1/26/2012	12:58	6.8	17.07	4212	6.08	40
MO 20	7/12/2012	0:00	6.76	17.67	2459	5.83	190
MO 20	2/18/2013	12:46	6.85	17.12	3912	5.51	191
MO 20	8/22/2013	10:24	6.84	17.51	3867	5.22	154
MO 20	3/1/2014	--	6.91	17.49	3686	4.46	108
MO 20	9/2/2014	15:51	6.87	17.85	3596	4.15	132
MO 20	2/9/2015	11:05	7.1	17.53	3606	-2.5	145
MO 20	7/21/2015	9:20	6.95	17.8	3675	4.93	82.5
MO 20	3/6/2016	11:37	6.98	17.47	3731	5.43	89.2
MO 20	10/25/2016	12:54	6.77	18.08	4364	5.91	97.6
MO 20	3/14/2017	9:46	6.97	17.46	3911	6	85
MO 20	3/7/2018	9:30	7.11	17.29	16478*	66.8%	-21*
MO 20	8/7/2018	10:30	7.15	18.14	3515	4.29	353
MO 20	2/25/2019	11:00	7.53	17.51	3513	4.28	90
MO 20	7/30/2019	14:40	7.52	22.15	50.4*	3.89	268.7
MO 20	2/23/2020	12:30	7.9	16.85	2890	3.75	103.3
MO 20	8/4/2020	8:00	7.18	17.99	3011	4.07	330.8
MO 20	3/21/2021	10:30	7.13	17.80	2951	2.42	806.7
MO 20	8/11/2021	10:00	7.44	18.14	3408	2.83	44.7
MO 20	3/8/2022	11:45	7.52	18.27	3162	3.63	3.00
MO 20	7/24/2022	10:00	6.86	20.50	2905	2.19	90.70
MO 20	3/20/2023	12:30	7.46	17.07	2852	2.38	28.19

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 21	7/27/2011	12:32	7.04	18.1	3348	3.63	0
MO 21	1/26/2012	12:29	6.92	17.59	3347	3.93	25
MO 21	7/23/2012	0:00	6.95	18.09	3283.0	3.57	201
MO 21	2/14/2013	14:04	6.87	17.71	3304.9	3.22	197
MO 21	8/22/2013	10:49	6.97	18.05	3250	3.35	142
MO 21	3/1/2014	--	7.02	17.93	3162	3.05	99
MO 21	9/2/2014	13:37	6.96	18.25	3199	3.43	125
MO 21	2/9/2015	11:31	7.22	18.07	3162	-2.5	132
MO 21	7/21/2015	8:53	6.99	18.3	2844	3.48	78.5
MO 21	2/22/2016	14:18	7.04	17.68	3320	2.76	80.2
MO 21	11/30/2016	14:45	7.13	17.88	4039	6.3	110.5
MO 21	3/20/2017	8:31	7	17.99	3218	3.22	116.4
MO 21	9/13/2017	11:30	7.66	19.73	2996	75.9%	149.9
MO 21	4/5/2018	12:00	7.09	17.97	16697*	50.2%	-4.1*
MO 21	8/6/2018	14:10	7.16	18.19	3188	2.57	299
MO 21	2/25/2019	11:30	7.63	17.92	3414	3.75	142.7
MO 21	7/30/2019	14:22	7.47	21.06	81	6.53	352.1
MO 21	2/23/2020	12:00	7.84	17.36	3050	3.72	84.5
MO 21	8/4/2020	10:30	7.11	19.06	3150	3.98	490.7
MO 21	3/21/2021	10:00	7.09	17.74	2874	2.75	304.1
MO 21	8/11/2021	10:40	7.41	18.27	3658	8.81	53.3
MO 21	3/8/2022	13:00	7.43	17.77	3342	3.88	78.4
MO 21	7/24/2022	9:00	6.78	19.42	2975	6.84	95.4
MO 21	3/20/2023	10:30	7.71	17.67	2948	39.8	47.16
MO 22	7/27/2011	13:06	7.11	18.87	3085	6.89	30
MO 22	1/26/2012	12:00	7	18.22	3158	6.71	53
MO 22	7/23/2012	0:00	7.02	18.85	3187	7.51	206
MO 22	2/18/2013	13:24	7.02	18.46	3283	6.7	179
MO 22	8/22/2013	11:22	7.11	18.82	3266	7.24	141
MO 22	3/1/2014	--	7.09	18.69	3264	6.93	110
MO 22	9/2/2014	13:09	7.04	19.09	3250	6.96	125
MO 22	2/10/2015	9:35	7.08	18.52	3296	6.61	85.9
MO 22	7/19/2015	15:36	7.08	19.32	3172	7.03	79.7
MO 22	3/6/2016	11:04	7.07	18.77	3234	7.33	98.8
MO 22	11/30/2016	15:30	7.1	18.63	3611	6.87	82.3
MO 22	3/14/2017	10:11	7.08	18.64	3095	6.7	86.7
MO 22	9/12/2017	11:02	7.38	19.02	2620	87.3%	152
MO 22	3/7/2018	8:30	7.74	14.31	14502*	85.8%	-15.5*
MO 22	8/15/2018	12:40	7.47	22.67	2268	4.77	301
MO 22	2/25/2019	12:30	7.64	18.7	3209	6.57	137
MO 22	7/30/2019	14:00	7.32	22.44	74.5*	5.77	282.4
MO 22	2/19/2020	11:30	7.81	18.59	2877	6.07	111.1
MO 22	8/4/2020	9:30	7.09	19.77	2891	6.63	435
MO 22	3/21/2021	8:30	7.09	18.07	2866	5.77	279.6
MO 22	8/11/2021	13:15	7.52	20.30	3219	5.57	29.1
MO 22	3/8/2022	13:00	7.45	18.61	3081	5.51	75.0
MO 22	7/24/2022	8:00	6.77	20.35	2660	5.65	92.8
MO 22	3/20/2023	10:00	7.58	16.62	2764	5.67	66.10
MO 23	7/20/2011	13:59	6.9	17.9	3906	0.15	-105
MO 23	1/26/2012	13:46	6.75	17.31	3928	0	-134
MO 23	7/23/2012	0:00	6.85	17.84	3789	0.73	199
MO 23	2/14/2013	13:26	6.77	17.53	3900	0.92	182
MO 23	8/22/2013	9:35	6.77	17.65	3854	0.25	160
MO 23	3/1/2014	--	7	18.09	3115	5.87	111
MO 23	9/2/2014	14:57	6.86	18.12	3972	0.7	126
MO 23	2/9/2015	10:15	6.98	17.57	3708	-2.5	160
MO 23	7/21/2015	9:42	6.94	17.9	3786	0.25	68.8
MO 23	3/6/2016	12:19	6.95	17.59	3848	0.02	69.9
MO 23	10/25/2016	10:23	6.95	18.6	4410	0.53	79.2
MO 23	3/14/2017	10:37	6.95	17.64	3609	0.14	75
MO 23	9/14/2017	9:40	7.6	19.32	2884	4.7	56.7
MO 23	3/7/2018	10:00	7.78	13.21	14987*	84.3%	-14.4*
MO 23	8/7/2018	12:07	7.07	17.94	3550	0.43	295
MO 23	2/25/2019	14:00	7.51	17.85	3978	1.07	105.4
MO 23	7/30/2019	12:45	7.35	23.47	33.2*	2.51	491
MO 23	2/19/2020	9:30	7.88	17.21	3315	1.95	95.6
MO 23	8/4/2020	11:15	7.07	17.78	2985	1.38	539
MO 23	3/21/2021	11:48	7.06	17.48	2947	1.16	338.5
MO 23	8/11/2021	8:30	7.49	17.73	3435	0.48	331
MO 23	3/8/2022	11:00	7.36	17.45	4096	2.63	78.4
MO 23	7/24/2022	7:00	7.00	20.08	3263	0.63	50.1
MO 23	3/20/2023	11:30	7.80	16.87	2765	0.23	2.51

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 25	7/21/2011	10:28	7.05	18.21	2835	5.36	19
MO 25	1/24/2012	14:11	6.91	17.49	2679	5.02	44
MO 25	7/16/2012	0:00	6.98	18.07	2857	5.47	184
MO 25	2/24/2013	15:22	7.01	17.9	2705	4.99	178
MO 25	9/10/2013	13:59	6.88	18.29	2653	4.97	97
MO 25	3/1/2014	--	7.07	17.86	2519	4.84	118
MO 25	8/25/2014	10:07	6.87	18.38	2497	5.17	163
MO 25	1/28/2015	13:04	7.08	18.26	2421	4.86	96.7
MO 25	7/19/2015	12:08	7.1	18.61	2489	5.66	76.1
MO 25	2/28/2016	11:31	7.1	18.369	2559	5.76	90.6
MO 25	12/7/2016	11:20	7.22	17.52	2928	5.72	100
MO 25	3/21/2017	11:10	7.2	19.59	2579	6.45	93.5
MO 25	3/2/2017	8:59	7.14	16.6	2701	5.85	78.3
MO 25	10/25/2017	12:10	7.68	19.16	2264	72.4%	112
MO 25	3/8/2018	11:41	7.12	18.12	16207*	70.2%	-14.3*
MO 25	8/14/2018	9:15	7.24	18.68	2792	5.16	212
MO 25	3/14/2019	9:30	7.71	14.22	2518	5.5	9
MO 25	7/29/2019	10:30	7.28	20.04	2688	5.45	267.4
MO 25	2/2/2020	12:10	7.52	17.39	3277	1.78	308
MO 25	7/29/2020	9:00	7.25	19.27	1869	6.16	497
MO 25	3/14/2021	10:15	7.16	17.27	2281	5.64	316
MO 25	8/16/2021	11:20	7.71	18.99	2606	4.79	50.1
MO 25	3/15/2022	11:30	7.26	18.15	2538	3.75	71.8
MO 25	7/18/2022	13:30	7.42	21.33	2277	2.85	85.9
MO 25	3/26/2023	15:00	7.50	18.35	2270	2.82	34.02
MO 26	7/18/2011	13:07	7.15	18.95	2086	5.85	55
MO 26	1/19/2012	13:27	7	18.64	2249	6.81	57
MO 26	7/10/2012	0:00	7.09	19.07	2183	6.51	111
MO 26	2/24/2013	11:01	6.96	18.68	2485	6.89	181
MO 26	8/12/2013	10:02	6.94	18.92	2555	7.04	91
MO 26	3/1/2014	--	7.11	18.79	2635	7.03	126
MO 26	8/29/2014	10:04	7.05	19.11	2747	7.32	145
MO 26	1/29/2015	10:43	7.14	18.7	3044	7.4	95.4
MO 26	7/20/2015	12:10	7.17	19.33	2905	8.14	81.3
MO 26	3/1/2016	13:16	7.18	18.97	3078	7.95	84.6
MO 26	10/26/2016	10:03	7.04	18.92	3336	7.79	94
MO 26	3/9/2017	10:10	7.22	19.01	2756	7.58	81.7
MO 26	10/24/2017	9:00	7.55	18.3	2588	91.1%	85.9
MO 26	3/12/2018	10:29	7.17	18.32	1649	90.6%	-29.1*
MO 26	8/13/2018	10:10	7.34	19.1	3213	7.57	299
MO 26	3/7/2019	11:30	7.8	18.85	3281	7.24	134
MO 26	7/25/2019	8:20	7.3	19.43	3201	6.96	150.3
MO 26	2/24/2020	14:40	7.94	18.8	2908	7.34	175
MO 26	7/27/2020	7:30	7.19	19.11	2917	6.91	452.1
MO 26	3/9/2021	9:30	7.17	17.54	2811	6.73	290.2
MO 26	8/4/2021	8:00	7.71	18.75	2804	11.58	45.5
MO 26	2/21/2022	10:30	7.81	18.76	3358	6.29	71.6
MO 26	6/15/2022	9:00	7.72	19.88	2825	6.92	80.0
MO 26	2/28/2023	9:00	7.57	18.73	2825	6.21	57.9
MO 27	7/18/2011	13:34	7.05	19.02	2645	7.22	59
MO 27	1/19/2012	13:51	6.95	18.81	2553	7.77	66
MO 27	7/11/2012	0:00	6.95	18.92	2474	7.76	162
MO 27	2/24/2013	11:23	6.96	18.77	2375	7.08	176
MO 27	8/12/2013	10:25	6.96	19.06	2339	6.91	91
MO 27	3/1/2014	--	7.71	23.64	1.31	6.76	108
MO 27	8/29/2014	10:25	7.07	19.11	2297	7.18	138
MO 27	1/29/2015	11:01	7.14	18.88	2515	6.97	95.6
MO 27	7/20/2015	12:29	7.17	19.41	2417	8.17	82
MO 27	3/1/2016	13:39	7.19	19.19	2524	8.1	86.6
MO 27	10/26/2016	10:37	7.03	19.77	2529	6.73	96.6
MO 27	3/8/2017	9:10	7.14	17.86	3304	6.45	105
MO 27	10/24/2017	9:30	7.59	18.78	2028	90.5%	86.6
MO 27	3/12/2018	10:47	7.23	18.56	1635	147%*	-13.1*
MO 27	8/13/2018	10:30	7.39	19.13	2564	7.27	384
MO 27	3/7/2019	11:50	7.9	18.9	1948	5.55	222
MO 27	7/25/2019	8:45	7.38	19.41	1881	8.8	172.1
MO 27	2/24/2020	13:00	7.73	18.51	2879	6.84	165
MO 27	7/27/2020	8:00	7.29	19.84	1745	10.43	451.2
MO 27	3/9/2021	10;00	7.12	18.52	3001	6.59	290.3
MO 27	8/4/2021	8:30	7.99	19.06	1507	5.03	33.3
MO 27	2/21/2022	11:00	8.01	18.88	2389	6.0	86.1
MO 27	6/15/2022	9:30	7.73	20.13	2339	7.56	77.9
MO 27	2/28/2023	9:30	7.79	18.88	1754	5.45	33.4

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 28	7/18/2011	14:07	7.07	19.28	3066	6.66	51
MO 28	1/19/2012	14:14	6.97	18.79	2932	6.85	56
MO 28	7/11/2012	0:00	6.95	19.01	2933	7.05	162
MO 28	2/24/2013	11:48	6.92	18.84	2952	6.67	179
MO 28	8/12/2013	10:49	6.48	19.09	2901	6.92	94
MO 28	3/1/2014	--	7.08	18.95	2818	6.44	126
MO 28	8/29/2014	10:44	7	19.25	2761	6.82	140
MO 28	1/29/2015	11:21	7.1	18.81	2897	7.02	95.5
MO 28	7/20/2015	12:52	7.14	19.5	2521	7.94	82.3
MO 28	3/1/2016	13:57	7.16	19.28	2507	8.1	91.3
MO 28	10/26/2016	11:05	7.02	19.91	2844	7.53	99
MO 28	3/8/2017	12:00	7.21	19.06	2351	7.7	66.2
MO 28	10/24/2017	10:00	7.45	18.97	2027	85.6%	85
MO 28	3/13/2018	8:30	7.26	18.23	1779	91.5%	-48*
MO 28	8/13/2018	10:45	7.40	19.46	2375	7.57	503
MO 28	3/7/2019	12:10	7.81	18.88	2587	7.66	116
MO 28	7/25/2019	9:00	7.44	19.64	2178	6.6	230.5
MO 28	2/24/2020	13:30	8.06	19.55	2269	7.46	277.5
MO 28	7/27/2020	9:55	7.18	19.11	2299	7.51	511.7
MO 28	3/9/2021	10:30	7.31	18.70	1592	5.5	286
MO 28	8/4/2021	9:00	7.86	19.11	1873	10.89	41.0
MO 28	2/21/2022	11:30	8.02	19.11	2306	8.37	88.4
MO 28	6/28/2022	6:45	7.59	19.20	1905	6.96	71.9
MO 28	2/28/2023	9:45	7.72	18.94	1741	6.72	29.9
MO 29	7/19/2011	11:06	7.15	19.06	2212	4.81	78
MO 29	1/19/2012	14:38	7.01	18.75	2186	5.27	39
MO 29	7/11/2012	0:00	6.99	18.97	2187	5.39	158
MO 29	2/24/2013	12:09	6.95	18.91	2261	4.94	176
MO 29	8/12/2013	11:12	6.92	19.13	2384	5.22	92
MO 29	3/1/2014	--	7.11	18.94	2382	5.34	121
MO 29	8/29/2014	11:04	6.96	19.24	2591	5.39	139
MO 29	1/29/2015	11:40	7.11	18.82	2597	5.78	92.8
MO 29	7/20/2015	13:20	7.09	19.55	2662	6.88	81.7
MO 29	3/1/2016	14:16	7.07	19.28	2882	6.01	86.5
MO 29	10/26/2016	11:27	7	19.77	2939	6.83	98.7
MO 29	3/8/2017	11:27	7.19	19.1	2478	7.09	64.6
MO 29	10/24/2017	10:15	7.17	19.03	2115	91.1%	109
MO 29	3/13/2018	8:41	7.25	18.33	1784	89.7%	-42.5*
MO 29	8/13/2018	11:10	7.32	18.99	27130*	7.56	346
MO 29	3/7/2019	12:30	7.79	18.91	2694	7.28	122
MO 29	7/25/2019	9:15	7.42	21.11	2158	8.42	117.4
MO 29	2/24/2020	14:05	7.89	18.96	2552	7.42	433.5
MO 29	7/27/2020	10:15	7.16	19.28	2572	7.46	564
MO 29	3/9/2021	11:30	7.36	18.14	2343	7.78	300
MO 29	8/4/2021	9:30	7.71	18.99	2452	7.36	43.9
MO 29	2/21/2022	12:00	7.93	18.89	2648	7.33	88.7
MO 29	6/28/2022	7:15	7.75	19.55	2446	7.05	77.7
MO 29	2/28/2023	10:00	7.84	18.91	2045	6.36	42.2
MO 30	7/19/2011	11:35	7.06	19	2844	6.36	47
MO 30	1/23/2012	12:10	7.01	18.57	2734	6.47	51
MO 30	7/11/2012	0:00	6.92	18.93	2697	5.89	164
MO 30	2/24/2013	12:36	6.9	18.87	2767	5.31	182
MO 30	8/12/2013	11:38	6.9	19.08	2726	5.22	96
MO 30	3/1/2014	--	7.01	18.89	2799	5.17	137
MO 30	8/29/2014	11:26	6.95	19.21	2815	5.49	137
MO 30	1/29/2015	12:03	7.02	18.79	3126	5.48	94.9
MO 30	7/20/2015	13:41	7.05	19.46	2834	5.97	81
MO 30	3/1/2016	14:39	7.07	19.28	2882	6.04	86.5
MO 30	10/26/2016	11:50	6.94	19.77	3356	6.24	98.1
MO 30	3/21/2017	9:31	7.07	18.03	3252	7.93	85.7
MO 30	3/8/2017	11:00	7.32	20.13	7.9	7.85	69.1
MO 30	10/24/2017	10:30	7.49	18.97	2294	79.5%	118
MO 30	3/13/2018	9:03	7.18	18.57	1765	79.5%	-35.1*
MO 30	8/13/2018	11:20	7.28	18.97	2793	6.81	328
MO 30	3/7/2019	12:48	7.75	19.01	2699	12.57	210
MO 30	7/25/2019	9:30	7.34	20.37	2705	12.2	412.7
MO 30	2/26/2020	9:30	7.97	17.81	2459	7.35	138.6
MO 30	7/27/2020	10:35	7.13	19.14	2461	6.95	597
MO 30	3/9/2021	12:00	7.20	19.35	2456	11.03	313
MO 30	8/4/2021	10:00	7.71	19.32	2445	6.90	42.1
MO 30	2/21/2022	12:30	7.91	18.94	2853	6.57	82.2
MO 30	6/28/2022	7:45	7.68	19.95	2392	9.37	83.7
MO 30	2/28/2023	10:15	7.71	18.84	1760	7.28	48.3

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 31	7/19/2011	11:58	7.09	19.08	2761	5.14	32
MO 31	1/23/2012	12:50	6.9	18.67	2713	5.26	40
MO 31	7/11/2012	0:00	6.95	18.96	2736	5.3	164
MO 31	2/24/2013	13:00	6.93	18.99	2706	4.93	184
MO 31	8/12/2013	13:27	6.89	19.23	2670	4.85	93
MO 31	3/1/2014	--	7.06	18.94	2622	4.61	122
MO 31	8/29/2014	11:48	6.99	19.29	2653	4.72	136
MO 31	1/29/2015	12:25	7.07	18.79	3008	4.72	91.7
MO 31	7/20/2015	14:00	7.09	19.64	2691	5.33	78.4
MO 31	3/6/2016	9:15	7.07	18.88	2731	5.47	83.1
MO 31	10/26/2016	12:15	6.96	19.64	3086	6.16	93.9
MO 31	3/8/2017	10:46	7.14	19.07	2656	5.35	63.4
MO 31	10/24/2017	10:45	7.5	18.97	2213	67%	119
MO 31	3/13/2018	9:20	7.18	18.61	1751	66.8%	-30.9*
MO 31	8/13/2018	11:42	7.29	19.15	2581	11.67	411
MO 31	3/7/2019	13:10	7.75	19.1	2675	5.63	167.8
MO 31	7/25/2019	10:00	7.28	19.41	2736	5.87	2740
MO 31	2/26/2020	10:00	7.99	18.58	2361	9.77	118.8
MO 31	7/27/2020	11:00	7.14	1995	2376	6.07	588
MO 31	3/9/2021	12:30	7.13	20.32	2507	6.96	391.7
MO 31	8/4/2021	10:15	7.70	19.55	2413	5.89	41.5
MO 31	2/21/2022	13:00	7.97	19.07	2424	5.33	75.5
MO 31	6/28/2022	8:15	7.56	19.29	1935	4.78	82.3
MO 31	2/28/2023	10:30	7.73	18.92	1773	5.01	39.6
MO 32	7/19/2011	12:16	7.04	19.08	2744	2.22	0
MO 32	1/23/2012	13:13	6.95	18.58	2745	6.34	-5
MO 32	7/11/2012	0:00	6.93	18.95	2693	2.63	159
MO 32	2/24/2013	13:24	6.94	19	2655	2.76	181
MO 32	8/12/2013	13:50	6.86	1910	2604	2.92	93
MO 32	3/1/2014	--	7.05	19.03	2637	3.06	113
MO 32	8/29/2014	12:08	6.96	19.27	2642	3.34	135
MO 32	1/29/2015	12:45	7.07	18.75	3005	3.56	88.3
MO 32	7/20/2015	14:19	7.09	19.74	2691	4.25	77.7
MO 32	3/6/2016	9:34	7.07	18.84	2693	4.07	80.5
MO 32	10/26/2016	12:33	6.95	19.64	3031	3.81	90.2
MO 32	3/8/2017	10:22	7.12	19.06	2580	3.76	60.7
MO 32	10/24/2017	11:10	7.05	18.93	2131	44.2%	103
MO 32	3/13/2018	9:45	7.17	18.66	1744	44.5%	-25.4*
MO 32	8/13/2018	12:00	7.25	19.10	2598	3.77	474
MO 32	3/12/2019	10:30	7.67	16.44	2720	4.65	110
MO 32	7/25/2019	10:15	7.34	20.83	2671	6.24	450.6
MO 32	2/26/2020	10:30	7.99	18.22	2225	4.66	104.4
MO 32	7/27/2020	11:30	7.15	19.79	2278	4.49	597.8
MO 32	3/9/2021	12:48	7.19	19.95	2272	4.61	476.2
MO 32	8/4/2021	10:30	7.68	19.43	2327	4.65	41.2
MO 32	2/21/2022	13:30	7.88	18.9	2558	4.31	84.3
MO 32	6/28/2022	9:00	7.66	21.17	2037	6.03	84.0
MO 32	2/28/2023	10:45	7.65	19.07	1915	4.55	42.4
MO 33	7/19/2011	12:47	7.06	18.67	2198	2.31	7
MO 33	1/23/2012	13:37	6.97	18.41	2426	2.74	-58
MO 33	7/11/2012	0:00	6.92	18.76	2570	0.22	159
MO 33	2/24/2013	13:44	7	18.75	2621	0.89	182
MO 33	8/12/2013	14:11	6.83	19.02	2611	1.13	86
MO 33	3/1/2014	--	6.99	18.71	2608	1.25	115
MO 33	8/29/2014	12:25	6.96	19.12	2619	1.28	138
MO 33	1/29/2015	13:03	7.08	18.45	2924	1.21	81.7
MO 33	7/20/2015	10:53	7.09	19.18	2584	0.96	65.4
MO 33	3/1/2016	11:35	7.1	18.75	2525	1.18	71
MO 33	11/7/2016	11:11	6.97	19.15	2758	0.79	83
MO 33	3/8/2017	10:10	7.09	18.88	2433	60%	71.4
MO 33	10/24/2017	11:20	7.41	18.83	1981	55%	84.4
MO 33	3/15/2018	8:15	7.4	17.77	1628	3.2	3.6
MO 33	8/13/2018	12:15	7.28	20.44	2616	9.46	455
MO 33	3/12/2019	10:50	7.65	18.43	2473	0.56	116
MO 33	7/25/2019	10:30	7.28	20.43	2431	6.91	250
MO 33	2/26/2020	11:00	7.95	17.59	2190	2.43	97.6
MO 33	7/27/2020	11:42	7.02	23.7	2118	4.88	576
MO 33	3/10/2021	9:00	7.24	19.23	2325	2.97	449.1
MO 33	8/4/2021	11:30	7.54	19.9	2400	3.75	48.9
MO 33	2/21/2022	14:20	7.89	18.86	2349	3.88	68.5
MO 33	6/28/2022	9:30	7.56	20.49	1602	7.59	89.8
MO 33	2/28/2023	11:30	7.57	18.71	2201	4.25	41.9

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 34	7/20/2011	11:21	6.86	18.78	2834	0.12	56
MO 34	1/24/2012	12:20	6.82	18.13	2707	0.18	87
MO 34	7/11/2012	0:00	6.71	18.62	2727	0.38	159
MO 34	2/24/2013	14:52	6.87	18.55	2631	0.53	176
MO 34	8/19/2013	10:40	6.24	18.73	2522	0.31	208
MO 34	3/1/2014	--	6.86	18.65	2515	0.11	110
MO 34	8/25/2014	9:37	6.75	18.9	2636	1.65	168
MO 34	1/28/2015	14:38	6.97	18.79	2507	0.47	83.9
MO 34	7/20/2015	10:35	6.99	19.41	2486	1.4	71.4
MO 34	3/1/2016	11:17	7.07	18.81	2534	2.33	741
MO 34	11/7/2016	10:52	6.96	19.19	3000	2.83	90.9
MO 34	10/24/2017	11:45	7.46	18.61	2176	47.5%	88.6
MO 34	3/15/2018	8:29	7.26	18.21	1610	54.3%	-69*
MO 34	8/13/2018	12:30	7.3	19.29	2625	4.85	418
MO 34	3/12/2019	11:20	7.71	18.26	2642	4.7	113
MO 34	7/25/2019	10:45	7.31	20.21	2072	7.06	224
MO 34	2/26/2020	11:30	7.96	18.21	2139	4.72	95.9
MO 34	7/27/2020	12:00	7.05	21.33	2081	8.21	583
MO 34	3/10/2021	9:30	7.15	18.86	2312	5.93	447.9
MO 34	8/4/2021	11:55	7.61	19.79	2033	6.45	40.5
MO 34	2/28/2022	10:40	6.96	18.62	2551	5.15	92.4
MO 34	6/28/2022	10:00	7.61	20.21	2254	7.57	84.9
MO 34	2/28/2023	12:30	7.59	18.82	2310	5.43	41.1
MO 35	7/20/2011	10:58	7.02	19.02	2089	1.87	133
MO 35	1/24/2012	11:54	6.86	18.28	2265	1.43	147
MO 35	7/11/2012	0:00	6.93	18.96	2164	1.71	154
MO 35	2/24/2013	14:31	7.06	18.86	1964	2.43	174
MO 35	8/19/2013	9:41	6.37	18.87	1854	2.75	208
MO 35	3/1/2014	--	6.99	18.8	1858	2.36	129
MO 35	8/25/2014	9:14	6.96	19.11	1903	2.55	162
MO 35	1/28/2015	14:23	7.07	18.99	2297	2	87.7
MO 35	7/20/2015	10:16	7.13	19.37	2259	3.3	71.4
MO 35	3/1/2016	10:49	7.15	19.04	2267	3.78	76.5
MO 35	11/7/2016	10:33	6.93	19.36	2998	3.66	91.6
MO 35	3/9/2017	10:00	7.16	18.79	2763	5.03	135.6
MO 35	3/8/2017	9:22	7.13	18.7	2728	4.26	68.6
MO 35	10/24/2017	11:52	7.48	18.71	2144	60.3%	96.7
MO 35	3/15/2018	8:46	7.19	18.32	1622	66.3%	-35.5*
MO 35	8/13/2018	12:45	7.28	19.56	3125	6.48	412
MO 35	3/12/2019	11:45	7.74	18.28	2683	4.86	118
MO 35	7/25/2019	11:00	7.38	19.64	2172	8.1	150.2
MO 35	2/26/2020	12:00	7.91	18.43	2803	5.87	108.7
MO 35	7/27/2020	12:30	7.05	19.18	2803	4.94	508
MO 35	2/23/2021	11:00	7.41	18.62	1649	2.53	148.6
MO 35	3/10/2021	10:00	7.06	18.85	2846	3.72	457
MO 35	8/4/2021	12:15	7.46	19.33	2903	1.99	45.4
MO 35	2/28/2022	11:15	6.86	18.74	3067	3.03	87.4
MO 35	6/28/2022	10:30	7.58	19.84	2840	5.01	89.1
MO 35	2/28/2023	13:30	7.51	20.48	2743	4.13	536
MO 36	7/19/2011	13:40	6.95	18.29	3273	0.07	-114
MO 36	1/23/2012	14:29	6.82	17.87	3278	1.11	-42
MO 36	7/11/2012	0:00	6.78	18.29	3283	0.64	160
MO 36	2/24/2013	14:08	6.85	18.11	3388	0.4	183
MO 36	8/13/2013	9:13	5.98	18.37	3029	0.11	141
MO 36	3/1/2014	--	6.74	18.02	3195	0.23	153
MO 36	8/29/2014	12:45	6.77	18.5	3443	0.29	143
MO 36	1/29/2015	9:43	6.95	17.8	3586	0.61	104
MO 36	7/20/2015	11:15	7	18.63	3176	1.19	70.5
MO 36	3/6/2016	10:21	7.03	18.01	3324	0.51	76.9
MO 36	11/7/2016	10:00	7.01	18.18	3765	0.6	85.1
MO 36	3/14/2017	11:08	7	17.99	3301	0.8	74.2
MO 36	3/6/2017	11:00	7.22	18.12	3332	5.21	115
MO 36	10/24/2017	12:00	7.42	18.81	2136	55.2%	101
MO 36	3/15/2018	9:07	7.13	17.9	16270*	20.2%	-61.9*
MO 36	8/13/2018	13:00	7.16	19.19	3457	3.32	397
MO 36	3/12/2019	12:00	7.62	17.9	3471	2.76	118
MO 36	7/25/2019	11:15	7.2	19.17	3376	3.06	399.4
MO 36	2/26/2020	12:30	7.95	17.94	2884	2.75	115
MO 36	7/27/2020	12:45	7.07	21.1	3052	7.12	631.7
MO 36	3/10/2021	10:30	7.09	18.87	2908	2.9	500
MO 36	8/4/2021	13:00	7.39	18.51	3038	6.37	47.9
MO 36	2/28/2022	11:42	6.79	18.26	3037	1.20	84.6
MO 36	6/28/2022	11:00	7.51	18.62	2645	0.92	82.9
MO 36	2/28/2023	13:40	7.48	15.48	2631	1.64	40.4

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 37	7/19/2011	14:00	7.09	18.75	2580	1.75	-19
MO 37	1/23/2012	14:06	6.99	18.25	2728	3.21	-8
MO 37	7/10/2012	0:00	6.98	18.76	2778	2.84	79
MO 37	2/24/2013	10:14	6.86	11.79	2818	5.95	220
MO 37	8/12/2013	14:31	6.82	18.87	2855	3.14	99
MO 37	3/1/2014	--	7.04	18.59	2923	3.34	128
MO 37	8/29/2014	13:08	6.93	19.06	2992	4.28	147
MO 37	1/29/2015	10:04	7.09	18.16	3485	5.59	93.6
MO 37	7/20/2015	11:31	7.09	19.19	3190	6.43	79.3
MO 37	3/6/2016	10:36	7.09	18.39	3353	6.93	83.6
MO 37	11/7/2016	9:40	7.05	18.27	3663	6.46	98
MO 37	3/8/2017	12:10	7.22	19.06	2365	7.32	72.5
MO 37	10/24/2017	12:10	7.49	18.54	2627	84.5%	88.1
MO 37	3/15/2018	9:24	7.17	17.73	1610	84%	-18.1*
MO 37	8/13/2018	13:20	7.32	19.15	3223	6.84	369
MO 37	3/12/2019	12:10	7.68	17.64	3402	6.82	103
MO 37	7/25/2019	11:30	7.15	18.56	3407	2.71	460.7
MO 37	2/25/2020	13:00	7.96	17.99	3017	6.31	138.5
MO 37	7/27/2020	13:00	7.01	21.13	3035	5.3	645.1
MO 37	3/10/2021	11:00	7.07	19.30	3015	6.11	513
MO 37	8/4/2021	13:10	7.27	18.63	2992	2.21	442
MO 37	2/28/2022	12:35	6.80	18.28	3243	6.36	103.0
MO 37	6/28/2022	12:00	7.77	25.22	2949	6.97	7.05
MO 37	2/28/2023	14:00	7.57	18.40	2633	1.83	37.7
MO 38	7/18/2011	12:43	6.98	20.49	2718	1.49	101
MO 38	1/19/2012	13:06	6.93	18.51	2762	2.3	52
MO 38	7/10/2012	0:00	6.95	18.86	2688	2.11	96
MO 38	2/24/2013	10:39	6.86	18.45	2630	1.92	177
MO 38	8/12/2013	9:41	6.9	18.83	2541	2.25	69
MO 38	3/1/2014	--	7.05	18.69	2493	2.73	135
MO 38	8/29/2014	9:42	6.99	18.95	2535	3.39	137
MO 38	1/29/2015	10:22	7.06	18.44	2991	4.017	97.1
MO 38	7/20/2015	11:50	7.1	19.28	2940	5.51	77.8
MO 38	3/1/2016	12:51	7.14	18.7	3138	7.24	83.3
MO 38	10/26/2016	9:40	6.81	18.84	3766	7.28	105
MO 38	3/9/2017	10:25	7.16	18.61	3259	7.66	86.5
MO 38	10/11/2017	9:00	7.42	17.92	2760	7.81	89.9
MO 38	3/15/2018	9:51	7.27	17.94	1630	86.6%	-17.4*
MO 38	8/13/2018	9:30	7.30	19.72	3372	7.21	260
MO 38	3/7/2019	11:00	7.76	18.48	3448	7.13	144
MO 38	7/25/2019	8:00	7.51	21.18	3258	8.16	143.9
MO 38	2/24/2020	12:20	7.89	18.6	3033	6.97	2562
MO 38	7/27/2020	7:00	7.38	19.97	3022	6.61	340.3
MO 38	3/9/2021	9:00	7.23	14.15	2768	3.65	396.6
MO 38	8/4/2021	7:30	7.73	18.31	3021	6.51	44.3
MO 38	2/21/2022	10:00	7.84	18.12	2947	6.47	80.6
MO 38	2/28/2022	12:52	6.77	18.21	3240	6.23	84.5
MO 38	6/15/2022	8:00	7.50	18.61	2832	6.40	80.9
MO 38	2/28/2023	8:45	7.58	18.28	2785	6.43	51.1
MO 39	7/27/2011	13:38	6.85	17.72	4405	5.13	24
MO 39	1/26/2012	11:23	6.71	17	4455	5.5	61
MO 39	7/24/2012	0:00	6.68	17.69	4129	4.4	196
MO 39	2/28/2013	10:37	6.66	17.3	4449	5.04	209
MO 39	8/26/2013	9:30	6.45	17.66	4462	4.98	170
MO 39	3/1/2014	--	6.81	17.44	4393	4.74	115
MO 39	9/2/2014	12:28	6.75	17.81	4422	4.8	133
MO 39	2/8/2015	15:24	6.64	18	4425	4.62	98.9
MO 39	7/19/2015	15:04	6.87	18.09	4166	5.03	82.9
MO 39	2/28/2016	14:10	6.9	17.81	4119	4.98	91.1
MO 39	12/5/2016	--	6.8	17.28	4571	5.65	109
MO 39	3/14/2017	11:39	6.91	17.58	3878	5.8	94.3
MO 39	9/14/2017	10:46	7.52	19.33	3387	157.4%	120
MO 39	4/5/2018	11:30	7.32	18.94	16394*	139%	24.6
MO 39	8/6/2018	10:55	7.01	17.72	4329	5.76	301
MO 39	2/26/2019	13:00	7.3	17.59	4131	5.7	165
MO 39	8/1/2019	11:40	7.76	23.22	3502	5.88	27
MO 39	2/19/2020	10:20	8.02	17.36	2153	8.37	123
MO 39	8/11/2020	9:30	7.1	19.19	3254	5.05	513
MO 39	3/16/2021	12:34	7.18	19.99	3168	9.04	449.1
MO 39	8/12/2021	10:15	7.44	19.56	3882	5.18	59.5
MO 39	3/15/2022	9:00	7.09	17.36	3770	9.83	89.6
MO 39	7/26/2022	13:00	6.58	19.41	3150	4.45	51.2
MO 39	3/21/2023	11:30	7.47	17.63	3108	5.59	68.11

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 43	7/27/2011	14:04	6.95	18.03	4158	7.09	33
MO 43	1/26/2012	10:17	6.69	17.28	3959	7.43	91
MO 43	7/18/2012	0:00	6.78	18.04	4169	7.04	189
MO 43	2/28/2013	11:11	6.73	17.76	4174	5.95	190
MO 43	8/26/2013	14:47	6.57	18.21	4178	5.79	145
MO 43	3/1/2014	--	6.82	17.61	4097	6.22	118
MO 43	9/2/2014	11:13	6.7	18.16	4302	6.38	129
MO 43	2/8/2015	14:33	6.71	18.08	3957	6.66	102
MO 43	7/19/2015	14:15	6.86	18.51	4343	6.6	85.6
MO 43	2/18/2016	12:57	6.91	18	4182	6.86	92.5
MO 43	12/5/2016	--	6.8	17.54	3979	10.16	100
MO 43	3/20/2017	10:00	6.94	17.9	3465	11.94	104
MO 43	9/19/2017	9:40	7.78	19.02	2760.1	95.4%	96.7
MO 43	4/5/2018	11:00	7.09	17.98	17049*	91.9%	-32.8*
MO 43	7/31/2018	9:15	7.00	18.03	3858	11.3	223
MO 43	2/26/2019	15:30	8.15	23.12	2552	6.7	167
MO 43	8/1/2019	11:10	7.63	26.6	2425	6.41	207.7
MO 43	2/26/2020	10:30	7.92	17.39	2493	6.89	90
MO 43	8/11/2020	9:45	7.14	20.57	2790	7.29	602
MO 43	3/16/2021	11:20	7.02	18.21	2712	3.43	329
MO 43	8/12/2021	11:35	7.68	19.11	3019	6.69	50.8
MO 43	3/9/2022	11:00	7.63	18.78	3168	10.08	84.1
MO 43	7/26/2022	11:30	6.63	19.17	2791	6.54	108.8
MO 43	3/21/2023	10:15	7.45	17.72	3128	6.36	76.21
MO 44	7/27/2011	14:27	6.97	18.23	3530	7.01	30
MO 44	1/26/2012	10:57	6.81	17.5	3458	7.92	72
MO 44	7/24/2012	0:00	6.82	18.13	3313	7.93	157
MO 44	2/28/2013	12:18	6.89	17.76	3282	7.53	180
MO 44	8/19/2013	14:18	6.73	18.28	2883	7.46	150
MO 44	3/1/2014	--	7.02	17.89	2933	7.19	115
MO 44	9/2/2014	11:42	6.96	18.3	2920	7.21	125
MO 44	2/8/2015	15:02	6.91	18.2	2937	7.07	95.2
MO 44	7/19/2015	14:40	7.06	18.52	2969	7.66	82.7
MO 44	2/22/2016	13:33	7.08	17.78	2924	7.59	90.4
MO 44	12/5/2016	--	6.9	17.9	3457	7.24	93.6
MO 44	3/20/2017	10:31	6.98	10.13	3091	7.4	101
MO 44	9/19/2017	9:15	7.77	18.71	1915	98.5%	77.5
MO 44	4/5/2018	10:30	7.56	16.83	1673	88.4%	1.2
MO 44	7/31/2018	9:45	7.1	17.94	3471	7.42	217
MO 44	2/26/2019	14:00	7.96	21.51	2037	6.76	51
MO 44	8/1/2019	10:45	7.74	22.29	2207	6.8	56.3
MO 44	2/23/2020	9:30	7.97	18.21	2100	7.12	85.4
MO 44	8/11/2020	8:00	7.45	19.04	3630	6.88	441
MO 44	3/16/2021	10:45	7.13	18.49	3592	7.35	331.7
MO 44	8/12/2021	11:00	7.53	18.52	4091	6.52	3.6
MO 44	3/9/2022	10:30	7.47	17.68	2742	10.14	84.5
MO 44	3/21/2023	12:30	DRY	DRY	DRY	DRY	DRY
MO 45	7/21/2011	9:49	7.11	18.97	2713	8.82	97
MO 45	1/24/2012	12:54	6.99	18.36	2274	8.19	74
MO 45	7/16/2012	13:31	7.08	19.22	2496	9.51	190
MO 45	2/28/2013	12:58	7.05	18.64	2412	8.6	176
MO 45	8/27/2013	10:23	7.06	19.01	2181	8.64	144
MO 45	3/1/2014	--	7.13	18.59	2193	7.98	133
MO 45	8/25/2014	12:36	6.94	19.36	2267	7.82	145
MO 45	1/28/2015	11:36	7.25	18.88	2090	7.17	97.7
MO 45	7/19/2015	10:52	7.12	19.29	2373	8.4	75.1
MO 45	2/28/2016	10:26	7.14	18.79	2343	8.36	110
MO 45	12/12/2016	12:00	7.43	18.83	1232	6.5	81.7
MO 45	3/21/2017	10:00	7.17	19.06	1853	7.17	76.2
MO 45	10/25/2017	12:45	8.4	24.06	2105	114.4%	87.3
MO 45	3/12/2018	9:25	7.38	18.61	1659	98.7%	26.1
MO 45	8/14/2018	11:15	7.45	19.25	2065	8.43	412
MO 45	3/14/2019	10:30	7.85	17.85	2059	8.55	88
MO 45	7/29/2019	8:40	7.47	21.91	2001	8.18	209.5
MO 45	2/24/2020	11:50	8.08	18.84	1801	8.27	260.7
MO 45	7/29/2020	7:00	7.49	19.26	1840	8.01	339.1
MO 45	3/14/2021	8:04	7.36	18.53	1806	8.13	331.4
MO 45	8/16/2021	10:00	7.90	19.99	2015	7.80	44.0
MO 45	3/14/2022	11:00	7.38	18.98	1832	7.82	98.3
MO 45	7/18/2022	10:30	7.22	23.27	1679	7.91	95.8
MO 45	3/26/2023	10:30	7.92	18.57	1412	7.94	95.92

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 46	7/21/2011	10:59	6.9	18.01	4246	7.18	32
MO 46	1/24/2012	13:45	6.77	17.35	4209	6.96	63
MO 46	7/16/2012	0:00	6.85	17.99	4112	7.44	193
MO 46	3/3/2013	15:26	6.84	17.85	4000	6.98	188
MO 46	8/27/2013	11:24	6.81	17.93	4031	6.89	151
MO 46	3/1/2014	--	6.96	17.6	3909	6.52	127
MO 46	8/25/2014	10:33	6.75	18.05	3983	6.59	155
MO 46	1/28/2015	12:41	6.95	18.03	3906	6.02	101
MO 46	7/19/2015	11:43	7	18.19	3943	7.23	82.8
MO 46	2/28/2016	10:59	7.02	17.77	4041	7.18	98.3
MO 46	12/12/2016	10:00	7.12	17.63	4457	6.74	99
MO 46	3/21/2017	10:30	6.91	18.12	3770	6.6	93
MO 46	3/12/2018	10:07	7.08	17.41	1661	77.6%	-38.4*
MO 46	8/14/2018	9:56	7.15	18.7	3704	6.84	255
MO 46	3/14/2019	10:15	7.69	17.01	3608	7.77	76
MO 46	7/29/2019	9:38	7.3	22.98	3541	8.35	217
MO 46	2/24/2020	11:30	7.91	17.8	3040	10.36	152.7
MO 46	7/29/2020	7:30	7.26	19.85	3339	8.51	377.9
MO 46	3/14/2021	11:00	7.07	17.71	3267	5.78	395
MO 46	3/14/2022	10:30	7.23	18.79	3831	7.20	104.1
MO 46	7/18/2022	11:45	7.19	19.62	2959	5.48	92.0
MO 46	3/26/2023	14:00	7.45	17.90	2868	5.75	68.97
MO 47	7/21/2011	10:21	7.16	19.05	1754	6.86	42
MO 47	1/24/2012	13:19	7.02	18.41	1633	6.74	60
MO 47	7/16/2012	0:00	7.13	19.13	1656	6.94	178
MO 47	2/28/2013	13:26	7.16	18.77	1626	6.48	168
MO 47	8/27/2013	10:54	7.1	19.02	1705	6.37	138
MO 47	3/1/2014	--	7.17	18.55	1708	5.92	123
MO 47	8/21/2014	13:40	7.22	19.22	1918	5.18	112
MO 47	1/28/2015	12:05	7.26	19.05	1698	5.29	95.8
MO 47	7/19/2015	11:16	7.2	19.5	1723	7.37	70.9
MO 47	2/28/2016	10:31	7.2	18.81	1779	6.06	90.6
MO 47	12/12/2016	10:59	7.31	18.74	2064	5.8	85.6
MO 47	3/21/2017	11:00	7.15	19.15	1715	5.88	79.8
MO 47	3/12/2018	9:50	7.31	18.52	1643	76.1%	-52.7*
MO 47	8/14/2018	10:30	7.45	19.41	1775	6.44	327
MO 47	3/14/2019	9:50	7.86	17.66	1840	6.08	46
MO 47	7/29/2019	9:17	7.46	20.54	1769	6.48	255
MO 47	2/24/2020	11:00	8.06	18.46	1617	5.95	132.8
MO 47	7/29/2020	8:00	7.21	19.19	1681	5.9	509
MO 47	3/14/2021	11:43	7.26	18.68	1692	5.71	392
MO 47	8/16/2021	10:40	7.86	20.14	1852	6.02	43.7
MO 47	3/14/2022	10:00	7.25	18.82	1855	5.70	85.1
MO 47	7/18/2022	12:45	7.31	21.55	1653	5.99	96.1
MO 47	3/26/2023	13:00	7.72	16.99	1629	5.90	71.94
MO 48	7/25/2011	10:56	7	18.2	981	7.06	34
MO 48	1/30/2012	10:52	6.93	17.76	927	7.22	62
MO 48	7/17/2012	0:00	7	18.29	885	7.17	190
MO 48	3/4/2013	12:02	6.98	18.24	832	6.9	187
MO 48	8/26/2013	11:50	6.93	18.3	854	6.94	144
MO 48	3/1/2014	--	7.16	18.13	845	6.6	121
MO 48	8/25/2014	13:17	6.96	18.59	902	6.81	137
MO 48	1/29/2015	13:37	7.24	18.03	1027	6.8	89.4
MO 48	7/22/2015	13:38	7.18	18.83	1058	7.61	76.8
MO 48	2/22/2016	10:07	7.2	17.94	8935	7.68	89.7
MO 48	3/12/2017	8:41	7.15	16.1	1014	8.28	96
MO 48	9/25/2017	9:31	7.53	18.17	940.1	91.4%	7.64*
MO 48	2/26/2018	10:00	7.52	17.47	15341*	86.6%	62.9
MO 48	7/30/2018	14:00	7.39	18.3	1171	7.5%	405
MO 48	3/14/2019	12:00	7.81	16.93	1236	7.73	88.5
MO 48	7/24/2019	9:00	7.59	21.19	1202	6.95	178.6
MO 48	2/18/2020	14:00	8.1	17.94	1056	7.1	102.4
MO 48	7/30/2020	7:00	7.6	18.52	1148	7.25	344
MO 48	3/22/2021	11:20	7.20	17.72	891	6.82	333.2
MO 48	8/5/2021	7:15	8.04	19.30	1127	7.01	38.7
MO 48	8/16/2021	11:00	7.56	21.34	4020	6.45	61.3
MO 48	3/9/2022	13:55	7.50	18.53	2481	6.24	81.7
MO 48	7/14/2022	11:00	6.74	23.99	1339	6.71	111.9
MO 48	2/21/2023	10:00	7.75	18.90	949.68	6.65	42.5

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 49	7/25/2011	11:27	6.69	17.19	3473	5.49	29
MO 49	1/30/2012	11:22	6.61	16.74	3409	5.68	53
MO 49	7/17/2012	0:00	6.62	17.24	3408	5.52	205
MO 49	3/4/2013	12:32	6.48	17.27	3805	5.13	204
MO 49	8/26/2013	12:20	6.41	17.4	3546	5.16	164
MO 49	3/1/2014	--	6.74	17.06	3011	5.04	142
MO 49	8/25/2014	13:51	6.65	17.6	2579	4.93	147
MO 49	1/29/2015	14:06	6.91	17.01	2409	4.89	96.2
MO 49	7/22/2015	14:07	6.9	17.93	2315	5.36	75.4
MO 49	2/22/2016	10:40	6.89	17.01	2592	5.69	94.9
MO 49	3/12/2017	9:19	6.81	17.19	2562	5.44	97.6
MO 49	9/25/2017	10:23	7.21	17.41	2032	66.9%	5.66*
MO 49	2/26/2018	10:23	7.19	18.28	15499*	71.2%	70
MO 49	7/30/2018	13:15	7.06	17.54	2738	5.7%	396
MO 49	3/14/2019	11:30	7.63	16.02	2865	6.12	85
MO 49	7/24/2019	10:00	7.14	21.46	2936	8.09	197.6
MO 49	2/18/2020	14:20	7.83	17.64	2310	5.38	1.4
MO 49	7/30/2020	7:30	7.14	18.64	2315	5.52	399
MO 49	3/22/2021	11:00	7.03	17.22	2138	5.12	399.1
MO 49	8/5/2021	7:45	7.52	18.04	2194	5.24	50.1
MO 49	3/9/2022	13:40	7.59	18.17	952	6.62	76.6
MO 49	7/14/2022	11:30	6.65	20.39	2118	4.75	120.9
MO 49	2/21/2023	10:30	7.47	17.54	1749	4.64	30.6
MO 50	7/25/2011	12:03	7.03	17.99	3445	8.83	28
MO 50	1/30/2012	11:57	6.97	17.48	3414	8.19	44
MO 50	7/18/2012	0:00	7	18	3401.6	8.72	180
MO 50	2013	No Data					
MO 50	8/26/2013	11:12	6.86	18.18	3198	6.94	148
MO 50	3/1/2014	--	7.13	17.65	3053	8.06	123
MO 50	8/25/2014	14:40	6.99	18.29	2780	10.56	144
MO 50	2/8/2015	11:03	7.07	18.24	2872	12.15	102
MO 50	7/23/2015	14:07	7.17	18.81	2927	12.56	89.1
MO 50	2/22/2016	11:50	7.17	17.67	3139	13.63	98.1
MO 50	12/20/2016	15:30	7.01	18.03	2776	7.86	135
MO 50	3/21/2017	9:31	7.07	18.03	3252	7.93	86.9
MO 50	2/26/2018	11:00	7.1	18.08	15913*	159.6%	31.1
MO 50	7/30/2018	12:15	7.27	18.10	3160	4.58*	236
MO 50	3/5/2019	14:00	7.78	17.8	3160	14.32	112
MO 50	7/24/2019	11:00	7.23	18.42	3163	7.83	2692
MO 50	2/18/2020	15:00	7.96	17.85	2403	12.65	143.9
MO 50	7/30/2020	8:00	7.07	19.05	2585	11.92	470.4
MO 50	3/22/2021	10:00	7.17	17.79	2517	11.70	445
MO 50	8/5/2021	8:10	7.61	18.86	2690	7.59	41.7
MO 50	3/9/2022	13:00	7.69	17.90	2755	12.65	73.5
MO 50	7/18/2022	7:30	7.27	21.09	2558	6.97	98.5
MO 50	2/21/2023	12:45	7.59	18.35	2581	7.39	55.1
MO 51	7/25/2011	13:13					
MO 51	1/30/2012	12:34	7.08	18.76	2444	8.7	43
MO 51	7/17/2012	0:00	7.08	19.27	2363	9.19	197
MO 51	3/4/2013	10:29	6.98	18.94	2359	9.1	201
MO 51	8/26/2013	10:08	6.91	19.07	2305	8.96	150
MO 51	3/1/2014	--	7.18	18.84	2423	8.19	123
MO 51	8/25/2014	16.:13	7.01	19.44	2349	8.48	138
MO 51	2/8/2015	10:11	7.19	18.88	2393	8.46	92.7
MO 51	7/22/2015	15:03	7.19	19.5	2478	9.06	75.2
MO 51	2/22/2016	13:05	7.2	1890	2471	8.55	89.4
MO 51	12/20/2016	15:00	7.09	19	2776	7.86	134.9
MO 51	3/20/2017	11:20	7.18	19.35	2373	7.95	95.6
MO 51	2018	Not sampled 2018 (Pump not wired)					

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 52	7/25/2011	12:38	7.03	18.17	3147	8.4	20
MO 52	1/30/2012	13:07	6.96	17.75	3210	7.82	44
MO 52	7/18/2012	0:00	6.95	18.13	3306	7.99	173
MO 52	2/28/2013	14:16	6.9	17.69	3422	7.5	176
MO 52	8/26/2013	10:40	6.72	18.16	3505	7.36	149
MO 52	3/1/2014	--	7.04	17.84	3295	7.53	120
MO 52	8/25/2014	15:27	6.86	18.16	3406	7.37	141
MO 52	2/8/2015	10:34	6.96	18.09	3635	6.62	96.6
MO 52	7/22/2015	14:34	6.99	18.52	3796	7.2	74.7
MO 52	2/22/2016	11:15	7.03	17.68	3655	7.59	93.5
MO 52	12/20/2016	14:00	6.88	18.04	2982	6.84	156.1
MO 52	3/20/2017	11:00	6.96	18.43	3617	6.63	108.3
MO 52	2018	Not sampled 2018 (Pump not wired)					
MO 53	7/28/2011	12:46	7.06	19.29	3314	8.14	34
MO 53	1/26/2012	9:51	6.8	18.6	3308	8.43	133
MO 53	7/18/2012	0:00	6.98	19.24	3132	8.05	180
MO 53	2/28/2013	11:48	6.96	18.96	3026	7.77	178
MO 53	8/27/2013	9:42	6.89	19.23	2910	7.62	160
MO 53	3/1/2014	--	7.14	19.08	2675	7.15	122
MO 53	9/2/2014	9:47	7.06	19.41	2781	7.33	107
MO 53	2/8/2015	14:07	7.01	19.41	2831	7.21	93.3
MO 53	7/19/2015	13:49	7.17	19.73	2757	7.89	79.9
MO 53	2/10/2016	13:37	7.2	19.36	2612	7.97	87.6
MO 53	12/20/2016	13:04	7.08	19.28	2135	7.67	87.9
MO 53	3/20/2017	9:29	7.18		2454	8.05	102.1
MO 53	9/19/2017	9:57	7.53	20.70	2152	97.5%	91.8
MO 53	4/5/2018	11:15	7.24	18.83	16613*	92%	-36.6*
MO 53	7/31/2018	8:53	7.34	19.14	2565	7.71	368
MO 53	3/5/2019	13:30	7.68	18.96	2557	7.6	110
MO 53	8/1/2019	10:40	7.68	18.97	2653	6.68	492
MO 53	2/23/2020	11:00	8.03	18.66	2183	7.99	86.4
MO 53	8/10/2020	11:00	7.67	20.35	2282	7.4	636
MO 53	3/16/2021	12:09	7.26	19.18	2162	7.95	443.5
MO 53	8/12/2021	11:15	7.90	21.06	2530	7.44	26.3
MO 53	3/9/2022	11:45	7.84	18.91	2349	7.59	65.8
MO 53	7/26/2022	10:45	6.84	20.18	2085	7.32	84.0
MO 53	3/21/2023	9:30	7.84	17.53	2074	7.71	91.78
MO 58	8/3/2011	14:04	7.32	18.54	1889	0.17	-167
MO 58	2/20/2012	13:37	7.37	18.1	1717	0.22	-38
MO 58	7/17/2012	0:00	7.25	18.64	1835	0.16	170
MO 58	3/4/2013	14:13	7.2	18.65	1870	0.18	163
MO 58	9/10/2013	14:37	7.23	18.69	1839	0.19	55
MO 58	3/1/2014	--	7.34	18.68	1842	0.57	44
MO 58	8/21/2014	13:09	7.4	19.01	1983	0.32	97
MO 58	1/28/2015	10:23	7.42	18.61	1818	0.31	51.7
MO 58	7/16/2015	14:40	7.34	19.09	1909	0.33	47.5
MO 58	3/14/2016	14:16	7.34	18.92	2235	0.33	59.1
MO 58	11/17/2016	12:15	7.31	18.61	1816	0.32	99.2
MO 58	2/20/2017	11:10	7.35	18.39	2222	0.35	44.6
MO 58	8/9/2017	10:25	7.56	18.75	1546	3.5	66.7
MO 58	3/26/2018	11:28	7.05	18.83	1786	1.81	66.7
MO 58	7/23/2018	7:30	7.41	18.84	1591	0.11	128.7
MO 58	2/11/2019	11:00	7.6	17.49	2153	4.6	65.9
MO 58	7/17/2019	8:30	7.38	21.27	1522	0.12	227.5
MO 58	3/2/2020	10:00	8.4	18.34	137	0.3	49.2
MO 58	7/23/2020	10:45	7.17	20.13	1997	1.86	579.5
MO 58	3/24/2021	12:50	7.35	19.37	1512	6.17	318.1
MO 58	7/14/2021	14:17	8.05	21.49	1342	0.13	-32.7
MO 58	2/16/2022	14:30	8.20	19.07	1508	1.56	-9.1
MO 58	6/22/2022	10:00	8.22	22.33	553	6.76	24.6
MO 58	2/26/2023	11:58	7.97	19.19	1137	7.48	41.7

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 59	8/3/2011	13:01	7.06	18.96	2417	4.44	-10
MO 59	2/20/2012	13:02	7.06	18.54	2232	4.27	45
MO 59	7/31/2012	0:00	6.89	19.01	2429	4.58	216
MO 59	3/5/2013	11:02	6.90	18.58	2364	4.49	195
MO 59	9/10/2013	11:50	6.97	18.84	2320	4.39	44
MO 59	3/1/2014	--	7.08	18.97	2292	4.26	88
MO 59	8/21/2014	11:56	7.06	15.18	2450	4.09	120
MO 59	1/28/2015	9:35	7.28	20.6	2292	5.04	114.8
MO 59	7/16/2015	13:41	7.11	19.3	2330	4.51	69.1
MO 59	3/13/2016	16:06	7.14	19.22	2237	4.34	77.6
MO 59	11/17/2016	11:47	7.13	18.99	1926	4.17	125.1
MO 59	2/16/2017	10:15	7.29	18.61	2254	4.27	59.8
MO 59	8/10/2017	9:15	7.29	19.68	1780	53.5%	153.4
MO 59	3/26/2018	10:30	7.60	20.17	1699	3.99	53.7
MO 59	7/23/2018	8:30	7.20	18.98	1889	4.25	260.5
MO 59	2/11/2019	12:15	7.8	17.76	1661	0.34	102
MO 59	7/16/2019	11:18	7.26	20.79	2042	4.53	204.6
MO 59	3/2/2020	11:00	8.2	18.61	1822	3.96	168.4
MO 59	7/23/2020	10:00	7.26	22.13	1523	6.21	521
MO 59	3/24/2021	10:30	7.22	18.35	1800	3.89	273.9
MO 59	7/14/2021	11:00	7.58	19.6	1814	5.75	46.7
MO 59	2/16/2022	9:00	7.75	18.73	2011	3.46	92.7
MO 59	6/22/2022	10:30	7.92	20.77	1705	3.85	40.8
MO 59	2/26/2023	11:30	7.61	18.92	1708	3.15	41.9
MO 60	8/3/2011	13:35	7.1	18.34	2286	0.06	-181
MO 60	2/20/2012	12:25	7.11	17.92	2074	0.08	-14
MO 60	7/31/2012	0:00	6.94	18.55	2244	0.05	211
MO 60	3/5/2013	11:32	7	17.96	2210	0.08	164
MO 60	9/9/2013	14:34	6.93	18.65	2198	0.05	100
MO 60	3/1/2014	--	7.14	18.55	2168	0.17	72
MO 60	8/21/2014	10:56	7.04	18.9	2301	0.17	116
MO 60	1/28/2015	9:13	7.2	18.49	2161	2.57	152.3
MO 60	7/16/2015	13:05	7.16	18.91	2215	0.05	56.7
MO 60	3/13/2016	15:44	7.23	18.77	2140	0.09	66.4
MO 60	11/15/2016	12:09	7.17	19.06	2358	0.09	71.2
MO 60	2/16/2017	11:11	7.36	18.52	2097	0.07	55.2
MO 60	3/26/2018	11:00	7.21	18.61	1614	0.13	39.5
MO 60	7/23/2018	9:00	7.35	19.19	1616	0.19	302
MO 60	2/11/2019	10:30	7.72	17.62	1762	0.11	1
MO 60	7/17/2019	10:30	7.47	22.4	1636	9.58	193.9
MO 60	3/2/2020	10:30	8.29	18.39	1475	0.09	85.9
MO 60	7/23/2020	9:30	7.46	22	1335	1.71	488
MO 60	3/24/2021	11:00	7.38	18.02	1463	1.00	262
MO 60	7/14/2021	9:30	7.81	18.79	1416	0.05	28.3
MO 60	2/15/2022	13:30	7.82	19.22	1564	1.74	73.3
MO 60	2/26/2023	11:00	7.86	19.71	1873	4.15	42.3
MO 61	8/3/2011	10:17	7.07	18.6	1488	7.14	29
MO 61	2/8/2012	13:12	6.99	18.15	1412	7.49	33
MO 61	7/31/2012	0:00	6.97	18.83	1403	7.43	206
MO 61	3/5/2013	12:44	6.99	18.35	1427	6.72	165
MO 61	9/12/2013	11:42	6.87	18.63	1442	6.93	129
MO 61	3/1/2014	--	7.08	18.59	1439	6.38	126
MO 61	8/21/2014	10:18	6.82	16.06	1891	6.24	130
MO 61	1/27/2015	14:21	7.19	18.54	1540	6.69	136
MO 61	7/16/2015	12:05	7.07	17.06	1687	7.2	74.5
MO 61	3/15/2016	13:27	7.08	18.8	1732	1.91	89.2
MO 61	11/17/2016	9:10	6.97	18.56	1629	6.47	190.3
MO 61	2/20/2017	10:11	7.13	18.52	2062	6.65	82.6
MO 61	8/8/2017	10:05	7.32	18.72	5420	90.6%	58.2
MO 61	3/26/2018	12:00	7.43	19.55	1646	10.37	46.2
MO 61	7/20/2018	7:30	7.14	19.84	1322	6.84	188
MO 61	2/12/2019	15:00	7.84	22.78	1642	7.41	119
MO 61	7/17/2019	9:00	7.4	21.83	1364	6.04	197.9
MO 61	3/2/2020	14:20	7.8	18.86	1540	10.93	268.3
MO 61	7/25/2020	8:30	7.31	19.38	1073	6.92	402.2
MO 61	3/24/2021	12:10	7.52	20.14	2057	9.84	313
MO 61	7/14/2021	11:50	7.63	19.79	1496	6.15	44.7
MO 61	2/16/2022	11:30	7.70	18.74	1310	6.43	88.6
MO 61	6/22/2022	9:00	7.78	18.93	1076	6.48	69.4
MO 61	2/26/2023	10:00	7.70	18.65	1081	6.27	31.5

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 62	7/31/2012	0:00	7	18.81	1772	6.06	197
MO 62	3/5/2013	12:19	7.05	18.31	1747	6.17	164
MO 62	9/12/2013	11:16	6.96	18.56	1742	6.39	122
MO 62	3/1/2014	--	7.16	18.52	1777	5.5	119
MO 62	8/21/2014	9:56	6.87	18.76	1849	5.78	138
MO 62	1/27/2015	13:59	7.26	18.71	1681	6.28	122.3
MO 62	7/16/2015	11:43	7.16	18.86	1597	6.45	68.7
MO 62	3/15/2016	13:02	7.22	18.81	1824	6.1	82.4
MO 62	11/15/2016	2:05	7.21	18.97	2020	5.92	78.1
MO 62	2/20/2017	9:47	7.23	18.57	1940	6.15	98.5
MO 62	8/8/2017	10:09	7.32	18.8	1450	97.9%	75.6
MO 62	3/26/2018	12:30	7.1	18.72	1671	6.46	83.5
MO 62	7/20/2018	8:15	7.2	19.1	1564.2	6.35	195.4
MO 62	2/12/2019	14:30	7.77	18.61	1780	5.94	110
MO 62	7/17/2019	10:00	7.17	19.24	1713	6	216.7
MO 62	3/2/2020	14:00	7.91	18.79	1251	6.52	163.7
MO 62	7/25/2020	8:00	7.59	20.06	1286	7.34	382.8
MO 62	3/24/2021	12:30	7.22	18.69	1520	6.23	319.1
MO 62	7/14/2021	12:02	7.67	19.56	1203	6.02	42.4
MO 62	2/16/2022	10:15	7.86	19.73	1730	6.27	106.8
MO 62	6/22/2022	8:30	8.27	21.08	1959	6.13	62.5
MO 62	2/26/2023	9:30	7.76	18.79	1465	6.22	61.4
MO 63	8/1/2011	13:29	--	--	--	--	--
MO 63	2/8/2012	11:23	7.18	17.87	1450	5.88	31
MO 63	7/31/2012	0:00	7.24	18.76	1475.1	5.44	225
MO 63	3/5/2013	14:01	7.3	18.15	1463.1	5.23	148
MO 63	9/9/2013	14:06	7.14	18.48	1467	5.69	105
MO 63	3/1/2014	--	7.36	18.31	1454	5.38	105
MO 63	8/21/2014	9:07	6.88	18.49	1606	4.32	130
MO 63	1/27/2015	13:02	7.49	18.63	1533	5.66	115
MO 63	7/14/2015	13:03	7.37	18.82	1546	5.54	50.7
MO 63	3/13/2016	14:26	7.39	18.77	1553	5.86	72.9
MO 63	11/15/2016	10:00	7.39	18.34	1732	5.93	79.1
MO 63	2/16/2017	9:23	7.5	18.08	1642	5.58	60.6
MO 63	3/27/2018	10:20	7.39	18.35	1658	6.02	43
MO 63	7/18/2018	10:00	7.38	18.93	1347.9	6.36	485.5
MO 63	2/6/2019	12:40	7.77	18.75	1531	6.07	127
MO 63	7/16/2019	10:30	7.25	21.51	1705	6.63	141
MO 63	3/2/2020	13:30	8.19	18.43	1344	6.24	305.8
MO 63	7/25/2020	7:00	7.71	21.2	1199	6.48	283.6
MO 63	3/23/2021	13:01	7.40	18.3	1381	5.93	360.8
MO 63	7/13/2021	14:40	7.79	18.61	1375	5.97	40.1
MO 63	2/15/2022	12:00	7.10	19.71	1475	5.94	72
MO 63	6/22/2022	8:00	8.40	22.41	1309	6.11	59.5
MO 63	2/14/2023	11:40	7.91	18.20	1271	6.11	24.7
MO 64	8/9/2011	10:47	7.22	17.66	2481	0.02	-99
MO 64	2/7/2012	10:42	7.32	18.13	2695	0.13	-100
MO 64	8/7/2012	0:00	7.27	17.92	2527	-0.01	-34
MO 64	3/7/2013	11:16	6.99	18.43	2576	0.1	-10
MO 64	9/12/2013	14:30	6.91	17.55	2652	-0.04	-80
MO 64	3/1/2014	--	7.16	18.03	2606	0.11	-78
MO 64	2014	Down for Repairs					
MO 64	2/19/2015	11:01	7.29	17.59	2986	5.35	-48.9
MO 64	7/16/2015	9:40	7.27	18.56	2524	5.55	-48.5
MO 64	3/15/2016	11:00	7.07	17.95	2537	0.02	-47
MO 64	3/21/2017	9:00	7.3	16.11	2325	5	-44.3
MO 64	8/7/2017	13:09	7.45	22.81	2011	86.2%	57.3
MO 64	1/18/2018	--	6.58	19.15	2009	0	-2.1
MO 64	7/18/2018	8:40	7.25	18.74	1351	0.07	77.3
MO 64	2/12/2019	11:30	7.6	17.05	2908	6.74	117

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 65	8/1/2011	11:37	7.06	19.27	2851	7.04	35
MO 65	2/6/2012	12:51	7.01	18.69	2696	7.46	47
MO 65	8/1/2012	0:00	7.03	19.32	2798	7.09	197
MO 65	2013	No Data					
MO 65	9/9/2013	12:12	6.91	19.3	2854	6.79	144
MO 65	3/1/2014	--	7.12	19.01	2785	6.14	124
MO 65	8/19/2014	14:37	7.42	20.02	2766	6.13	182
MO 65	1/27/2015	11:24	7.25	19.1	2771	6.05	161.8
MO 65	7/14/2015	11:12	7.16	19.55	2776	6.64	59.3
MO 65	3/13/2016	11;55	7.15	19.15	2916	6.98	86.9
MO 65	12/7/2016	11:20	7.22	17.52	2928	5.72	100.4
MO 65	2/15/2017	13:49	7.12	19.15	3140	6.61	57.9
MO 65	7/26/2017	10:53	7.28	19.64	2403	77.2	103.2
MO 65	8/7/2017	11:20	7.89	22.01	2600	103.1%	67.9
MO 65	3/27/2018	9:30	7.16	18.88	1663	6.30	39.4
MO 65	7/18/2018	6:45	7.09	19.28	2573	6.27	228.8
MO 65	2/6/2019	10:00	7.5	18.97	2961	6.32	126.9
MO 65	7/15/2019	9:30	7.07	19.71	2882	6.46	100.8
MO 65	3/3/2020	12:00	7.87	18.99	2689	6.27	147.7
MO 65	8/17/2020	10:25	7.12	19.62	3561	5.12	512.3
MO 65	8/20/2020	10:25	7.21	19.24	2687	6.27	284.4
MO 65	3/23/2021	11:51	7.22	19.21	2779	6.17	396.8
MO 65	7/13/2021	12:30	7.47	19.46	2823	6.13	32
MO 65	2/14/2022	11:00	7.69	19.15	3114	5.96	41.7
MO 65	6/13/2022	12:45	7.22	19.90	2581	5.81	98.6
MO 65	2/13/2023	11:20	7.57	19.11	2499	5.82	57.5
MO 65	2/26/2023	10:38	7.88	19.87	1945	6.33	49.7
MO 66	8/9/2011	11:55	7.11	17.66	3780	-0.01	-141
MO 66	2/7/2012	11:25	6.96	16.98	3915	-0.04	-158
MO 66	8/7/2012	0:00	6.99	17.61	3741	-0.02	67
MO 66	3/7/2013	12:24	6.91	17.6	3882	0.02	55
MO 66	9/10/2013	11:21	6.83	17.62	3774	-0.01	-54
MO 66	3/1/2014	--	7.03	17.7	3727	0.02	40
MO 66	10/27/2014	13:15	6.84	18.3	4391	0	48.1
MO 66	2/19/2015	11:41	7.04	17.74	4142	0.03	46.2
MO 66	7/16/2015	10:35	7.01	17.99	4428	0.02	50.1
MO 66	3/15/2016	11:25	7.04	17.54	4034	0.01	50.3
MO 66	12/28/2016	--	7.02	18.79	2963	7.02	78
MO 66	3/21/2017	9:15	7.15	15.8	3635	6.7	110
MO 66	8/7/2017	14:10	7.67	24.81	2014.6	78.3%	59.6
MO 66	3/27/2018	10:00	7.18	18.9	1659	6.35	23.7
MO 66	7/18/2018	8:10	7.41	18.75	1350.6	0.06	56.8
MO 66	2/12/2019	10:00	7.61	16.92	3074	6.06	126.8
MO 66	7/15/2019	9:55	7.08	19.32	2957	6.24	156
MO 66	3/3/2020	11:30	7.93	18.9	2569	6.47	122.6
MO 66	7/22/2020	12:15	7.08	19.62	2240	6.12	249.4
MO 66	8/20/2020	9:45	7.16	18.93	373	4.16	176.6
MO 66	3/25/2021	7:30	8.84	16.65	2476	0.07	170.9
MO 66	8/23/2021	9:30	7.37	18.92	4245	5.60	54.6
MO 66	2/14/2022	13:00	7.55	19.16	2922	5.91	82.1
MO 66	6/13/2022	14:15	7.18	19.55	2462	5.62	76.0
MO 66	2/13/2023	12:45	7.59	19.16	2347	5.46	44.1
MO 75	8/1/2011	9:44	7.13	17.42	3205	0.97	39
MO 75	2/6/2012	10:51	7.02	18.99	3042	1.24	-15
MO 75	8/2/2012	0:00	7.2	18.21	3026	0.9	206
MO 75	2/20/2013	11:55	7.13	17.97	3015	2.54	186
MO 75	9/9/2013	10:02	6.97	18.77	2802	0.55	154
MO 75	3/1/2014	--	7.26	18.75	2837	0.96	83
MO 75	8/19/2014	12:53	7.09	17.98	2792	3.27	224
MO 75	1/27/2015	9:35	7.13	18.7	2851	3.08	156.2
MO 75	7/14/2015	9:21	7.32	16.76	2766	0.81	25
MO 75	3/13/2016	10:16	7.27	17.9	29.75	0.59	62
MO 75	11/8/2016	9:15	7.24	19.11	3457	0.33	90.7
MO 75	2/8/2017	--	7.3	19.59	1496	4.86	82.9
MO 75	2/9/2017	9:30	7.46	19.46	1482	3.98	81.7
MO 75	7/25/2017	8:33	7.35	17.81	2414	0.34	110.9
MO 75	1/30/2018	10:00	7.04	18.72	2556	4.8	134.2
MO 75	7/17/2018	9:45	7.23	17.81	2751	0.75	403.1
MO 75	2/5/2019	10:00	7.29	18.79	2700	0.69	86.9
MO 75	7/9/2019	11:00	7.41	18.26	1678	0.001	101.3
MO 75	3/3/2020	8:30	8.13	19.18	2039	0.56	117
MO 75	7/22/2020	7:00	7.54	20.71	2268	0.17	344.1
MO 75	3/23/2021	10:15	7.25	16.43	2086	9.83	294
MO 75	7/12/2021	6:30	7.83	17.9	2107	0.42	29.4
MO 75	2/14/2022	9:00	7.99	18.83	1937	0.59	24.6
MO 75	6/13/2022	7:30	7.79	18.28	1852	0.41	65.0
MO 75	2/13/2023	8:30	7.89	16.89	1920	0.25	37.0

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 76	8/1/2011	10:16	7.09	18.84	3140	0.02	-128
MO 76	2/6/2012	11:21	7.01	18.5	3072	0.03	-148
MO 76	8/2/2012	0:00	7.08	19.09	3113	0.01	201
MO 76	2/20/2013	12:37	7.04	18.56	3177	0.08	154
MO 76	9/9/2013	10:31	6.91	19.08	3172	0.05	122
MO 76	3/1/2014	--	7.15	18.95	3078	0.08	62
MO 76	8/19/2014	13:23	7.23	19.81	3094	1.78	197
MO 76	1/27/2015	10:00	7.27	18.09	3108	2.59	130.5
MO 76	7/14/2015	9:49	7.17	19.27	3109	0.16	40
MO 76	3/13/2016	10:40	7.17	19.33	3091	0.11	60.4
MO 76	11/8/2016	10:28	7.2	18.88	3471	0.33	78.2
MO 76	2/8/2017	--	7.15	19.39	3214	0.09	94.7
MO 76	2/9/2017	9:45	7.02	19.29	3213	0.08	91.3
MO 76	7/25/2017	8:56	7.29	19.29	2485	0.15	1.9
MO 76	1/30/2018	10:30	7.15	18.97	2695	1.4	111.7
MO 76	7/17/2018	10:00	7.19	19.16	2840	0.09	464.3
MO 76	2/5/2019	11:00	7.46	18.97	2979	0.07	91.2
MO 76	7/11/2019	10:00	7.32	19.6	1705	4.17	232.5
MO 76	3/3/2020	10:00	8	18.57	2630	0.09	101.3
MO 76	7/22/2020	10:30	7.68	21.65	2269	0.57	333.1
MO 76	3/23/2021	10:50	7.37	18.73	2440	3.92	293
MO 76	7/12/2021	7:15	7.65	18.91	2555	0.12	32.1
MO 76	2/14/2022	9:30	7.91	18.88	2380	0.10	68.3
MO 76	6/13/2022	8:30	7.50	19.29	2350	0.02	73.0
MO 76	2/13/2023	9:30	7.75	18.93	2296	0.11	43.6
MO 77	8/1/2011	10:46	6.99	19.53	2991	-0.02	-164
MO 77	2/6/2012	11:51	6.94	18.94	2920	0.01	-152
MO 77	8/2/2012	0:00	6.9	19.52	2956	-0.02	190
MO 77	2/20/2013	13:07	6.96	18.85	2960	0.02	142
MO 77	9/9/2013	11:01	6.83	19.45	2988	-0.02	119
MO 77	3/1/2014	--	7.07	19.39	2957	0.02	55
MO 77	8/19/2014	13:51	7.32	20.56	2968	2.47	182
MO 77	1/27/2015	10:26	7.17	18.08	2995	2.47	131.9
MO 77	7/14/2015	10:14	7.08	19.81	2973	0.04	43.1
MO 77	3/13/2016	11:02	7.08	19.46	2914	0.01	59.5
MO 77	11/8/2016	10:59	7.11	19.19	3313	0.02	73.3
MO 77	2/8/2017	--	7.06	19.82	3051	0	76.8
MO 77	2/9/2017	10:00	7.05	19.87	3051	0.02	76.8
MO 77	7/25/2017	9:25	7.19	19.7	2393	0.3	83.8
MO 77	1/30/2018	11:00	7.06	19.28	2589	0.3	112.1
MO 77	7/17/2018	10:15	7.08	19.54	2769	0.01	419.2
MO 77	2/5/2019	11:30	7.42	19.28	2856	0.02	93.6
MO 77	7/11/2019	8:30	7.28	19.03	3035	0.17	109.1
MO 77	3/3/2020	10:30	7.91	19.08	2525	0.05	121.1
MO 77	7/22/2020	10:42	7.06	19.56	2136	0.12	416
MO 77	3/23/2021	11:09	7.21	19.28	2402	0.06	262
MO 77	7/12/2021	7:45	7.55	19.37	2352	0	29.8
MO 77	2/14/2022	10:00	7.88	19.11	2717	7.49	76.2
MO 77	6/13/2022	9:00	7.36	19.77	2177	0.03	69.3
MO 77	2/13/2023	10:15	7.64	19.25	2132	0.04	30.3
MO 78	8/1/2011	11:08	7.31	19.47	1520	7.82	36
MO 78	2/6/2012	12:19	7.24	19.08	1543	8.65	58
MO 78	8/1/2012	0:00	7.3	19.57	1514	9.85	210
MO 78	2/20/2013	13:39	7.26	18.87	1579	8.4	167
MO 78	9/9/2013	11:30	7.16	19.53	1565	9.47	133
MO 78	3/1/2014	--	7.38	19.26	1591	8.25	128
MO 78	8/19/2014	14:12	7.65	19.94	1588	7.25	177
MO 78	1/27/2015	10:05	7.5	18.92	1584	7.03	129.5
MO 78	7/14/2015	10:39	7.24	19.6	1721	2.97	46.2
MO 78	3/13/2016	11:27	7.25	19.32	1719	3.17	72.9
MO 78	11/8/2016	11;27	7.28	19.26	1914	4.11	83.6
MO 78	2/8/2017	--	7.08	19.47	3086	0.08	86.3
MO 78	2/9/2017	10:15	7.06	19.42	3072	0.06	86.1
MO 78	7/25/2017	9:53	7.35	20.13	1420	36.8%	90.2
MO 78	1/30/2018	11:44	7.23	19.3	1531	44.9%	112.7
MO 78	7/17/2018	10:30	7.37	19.55	1367	8.63	468.2
MO 78	2/5/2019	12:00	7.84	19.24	1610	9.48	89
MO 78	7/11/2019	9:30	7.19	19.96	2884	0.06	97.1
MO 78	3/3/2020	11:00	8.12	19.06	1460	9.38	129.9
MO 78	7/22/2020	11:00	7.16	21.77	2184	1.37	425
MO 78	3/23/2021	11:31	7.38	19.19	1480	8.88	360.8
MO 78	7/12/2021	12:48	7.51	19.64	1438	8.31	41.0
MO 78	2/14/2022	10:30	7.99	19.55	1632	8.6	74.3
MO 78	6/13/2022	11:53	7.06	27.04	1438	7.46	128.1
MO 78	2/13/2023	10:40	7.90	19.13	1409	8.51	42.8

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 79	8/8/2011	14:53	7.23	17.41	2478	5.64	-15
MO 79	2/7/2012	13:25	7.21	17.15	2472	5.82	-52
MO 79	8/7/2012	0:00	7.33	17.71	2440	0.38	-82
MO 79	2/20/2013	14:06	7.1	17.34	2582	4.9	-14
MO 79	9/12/2013	13:25	6.95	17.57	2613	5.86	-28
MO 79	3/1/2014	--	7.16	17.84	2397	6.25	-52
MO 79	2014	Down for Repairs					
MO 79	2/2/2015	12:38	7.13	17.85	2232	6.56	-30.1
MO 79	2/11/2016	13:20	7.2	18.22	1885	6.87	-41.9
MO 79	8/15/2016	14:50	7.21	18.26	1940	0.01	-82
MO 79	11/8/2016	12:21	7.3	17.54	2113	0.02	78.3
MO 79	2/15/2017	10:20	7.23	17.83	1958	-0.02	-147.1
MO 79	7/25/2017	10:18	7.39	18.55	3100	6.71	-9.1
MO 79	1/31/2018	10:10	7.29	18.12	1583	49.4	-59.2
MO 79	7/17/2018	11:15	7.37	18.26	1663	0.01	19.2
MO 79	2/5/2019	12:30	7.72	18.03	1715	0.05	-102.9
MO 79	7/9/2019	13:00	7.28	17.54	2335	0.56	30.4
MO 79	2/9/2020	8:00	7.96	18.11	1473	0.03	-162.3
MO 79	7/22/2020	11:32	7.34	18.08	1203	0.05	-125
MO 79	3/1/2021	--	7.34	17.99	1445	457	-45.3
MO 79	7/13/2021	11:50	7.88	18.39	1441	4.43	-76
MO 81	8/1/2011	12:05	7.41	18.84	1829	3.28	-5
MO 81	2/22/2012	9:45	7.17	18.65	1520	3.32	88
MO 81	8/7/2012	0:00	7.29	19.07	1509	3.3	82
MO 81	3/7/2013	13:12	7.24	18.73	1518	3.04	108
MO 81	9/16/2013	9:10	7.03	18.84	1509	2.93	145
MO 81	3/1/2014	--	7.26	18.78	1521	3.05	53
MO 81	8/19/2014	14:45	7.65	19.48	1609	5.81	190
MO 81	3/16/2015	10:22	7.32	18.7	1712	3.17	70.4
MO 81	3/15/2016	12:09	7.28	18.88	1657	4.11	62.7
MO 81	8/16/2016	--	7.12	19.2	1934	2.91	78
MO 81	3/22/2017	9:30	7.33	15.91	3245	6.3	41.3
MO 81	7/26/2017	11:30	7.25	19.92	2772	72.5	102.3
MO 82	8/1/2011	12:29	7.34	18.87	1580	-0.01	-214
MO 82	2/6/2012	13:21	7.26	18.24	1544	-0.05	-247
MO 82	7/31/2012	0:00	7.2	19.06	1555	-0.01	-27
MO 82	3/5/2013	14:55	7.34	18.43	1536	0.01	-52
MO 82	9/9/2013	12:45	7.22	18.85	1527	0.01	-56
MO 82	3/1/2014	--	7.42	18.6	1513	0.01	-95
MO 82	8/19/2014	15:12	7.68	19.63	1528	2.82	70
MO 82	1/27/2015	11:54	7.5	18.91	1512	2.74	13.9
MO 82	7/14/2015	11:40	7.43	19.19	15291*	-0.01	-38
MO 82	3/13/2016	12:20	7.44	19.08	1520	0.01	-48.1
MO 82	11/8/2016	13:10	7.46	18.82	1764	0.04	-47
MO 82	2/15/2017	14:10	7.37	19.91	1630	0.05	29.9
MO 82	8/7/2017	9:38	7.55	18.85	1272	0.5	-28.4
MO 82	2/1/2018	8:55	7.44	18.24	1375	0.4	-60
MO 82	7/18/2018	7:50	7.45	18.79	1361	0.09	76.0
MO 82	2/6/2019	11:00	7.8	18.7	1530	0.04	-1.7
MO 82	7/16/2019	9:00	7.45	19.77	1497	0.04	3.2
MO 82	3/3/2020	13:45	8.31	18.6	1294	0.05	23.9
MO 82	7/22/2020	1:25	7.29	19.86	1128	0.21	449.7
MO 82	3/23/2021	12:15	7.47	18.9	1286	0.20	368.7
MO 82	7/13/2021	13:30	7.69	19.02	1291	0.00	-16
MO 82	2/15/2022	10:00	8.07	18.71	1420	0.26	18.7
MO 82	6/21/2022	8:00	7.83	24.11	1224	0.03	-30.3
MO 82	2/14/2023	11:00	7.99	18.64	1189	0.02	-66.8

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 83	8/1/2011	12:50	7.15	18.33	1777	2.26	-30
MO 83	2/6/2012	13:47	7.05	17.76	1735	2.35	12
MO 83	7/31/2012	0:00	7	18.55	1751	2.29	241
MO 83	3/5/2013	14:30	7.12	17.9	1733	2.27	154
MO 83	9/9/2013	13:13	6.97	18.29	1728	2.24	76
MO 83	3/1/2014	--	7.16	18.08	1707	1.99	100
MO 83	8/19/2014	15:32	7.42	18.81	1715	3.91	165
MO 83	1/27/2015	12:18	7.23	18.75	1711	3.75	109.7
MO 83	7/14/2015	12:03	7.21	18.7	1743	2	54.4
MO 83	3/13/2016	12;43	7.21	18.57	1755	2.07	71.3
MO 83	2/15/2017	14:50	7.16	18.24	1835	1.97	51.4
MO 83	8/7/2017	10:07	7.45	18.45	1404	24.7%	62.7
MO 83	2/1/2018	9:31	7.26	17.68	1516	26.2%	33.0
MO 83	7/18/2018	8:50	7.17	18.39	1515	2.12	291.7
MO 83	2/6/2019	11:30	7.65	18.34	1759	2.14	160.7
MO 83	7/16/2019	10:00	7.21	18.37	1743	2.2	119
MO 83	3/3/2020	14:00	7.97	18.03	1511	2.3	131.6
MO 83	7/22/2020	1:45	7.35	19.87	1309	2.49	454.9
MO 83	3/23/2021	12:41	7.45	18.72	1512	7.31	358.3
MO 83	7/13/2021	13:48	7.78	20.67	1526	3.11	-21
MO 83	2/15/2022	10:30	7.82	18.18	1687	2.33	62.3
MO 83	6/21/2022	11:00	7.92	27.78	1465	4.48	1.3
MO 83	2/19/2023	14:48	7.75	13.64	1290	5.71	80.8
MO 84	8/1/2011	13:09	7.01	18.46	3892	1.99	-30
MO 84	2/8/2012	11:46	6.91	17.81	3844	2.07	5
MO 84	7/31/2012	0:00	6.85	18.68	3872	1.99	245
MO 84	3/5/2013	13:35	6.9	18.18	4011	2.02	168
MO 84	9/9/2013	13:39	6.73	18.5	4168	2.31	108
MO 84	3/1/2014	--	6.98	18.47	3894	2.26	105
MO 84	8/19/2014	15:52	7.28	19.05	3974	4.33	176
MO 84	1/27/2015	12:37	7.03	18.59	4004	4.17	118
MO 84	7/14/2015	13:28	7	18.79	4192	2.5	63.2
MO 84	3/13/2016	13:03	7.06	18.78	3870	2.46	78.4
MO 84	11/15/2016	9:40	7.02	18.62	4369	2.7	89.5
MO 84	2/16/2017	9:10	7.2	18.19	4090	2.31	42.4
MO 84	2/1/2018	9:55	7.09	18.32	3450	31.5%	62.5
MO 84	7/18/2018	9:15	7.04	18.65	3377	2.68	314.1
MO 84	2/6/2019	12:00	7.51	18.57	3808	2.7	116
MO 84	7/16/2019	10:45	7.05	18.56	4062	2.97	141
MO 84	3/2/2020	12:30	8.19	18.88	1972	10.62	196.9
MO 84	7/25/2020	7:30	7.42	19.16	1196	5.98	353
MO 84	3/23/2021	13:30	7.26	78.63	2431	6.25	283
MO 84	7/13/2021	14:10	7.53	21.04	3704	3.5	40.9
MO 84	2/15/2022	11:30	7.66	18.46	3956	2.91	74.2
MO 84	6/21/2022	11:30	7.51	19.82	3360	3.04	60.9
MO 84	2/14/2023	12:20	7.63	18.89	3254	2.41	32.7
MO 85	8/3/2011	9:20	7.35	18.57	2303	6.2	99
MO 85	2/20/2012	11:55	7.42	18.39	2140	6.26	48
MO 85	7/31/2012	0:00	7.25	19.02	2315	6.51	217
MO 85	3/5/2013	13:12	7.31	18.75	2306	6.2	160
MO 85	9/12/2013	10:50	7.18	19.94	1.58	6.36	113
MO 85	3/1/2014	--	7.41	19.07	2335	5.99	75
MO 85	8/21/2014	9:33	7.08	19.05	2523	5.7	135
MO 85	1/27/2015	13:22	7.5	19.55	2359	6.19	123.2
MO 85	7/16/2015	12:29	7.41	19.36	2431	6.33	66.8
MO 85	3/13/2016	15:16	7.43	19.26	2377	6.31	73.4
MO 85	11/15/2016	11:45	7.39	19.57	2674	6.15	77.6
MO 85	2/16/2017	9:45	7.57	18.74	2412	6.22	58.8
MO 85	8/7/2017	10:50	7.54	19.15	1902	6.42	67.1
MO 85	2/1/2018	10:39	7.41	18.76	1992	79.1%	60.8
MO 85	7/18/2018	11:25	7.4	19.59	2004	6.23	409.8
MO 85	2/6/2019	14:00	7.85	19.14	2249	6.11	156
MO 85	7/16/2019	10:59	7.38	20.97	2279	6.09	143
MO 85	3/2/2020	12:00	8.31	18.88	2009	6.06	194.3
MO 85	7/25/2020	8:43	7.1	19.46	1835	5.47	443.7
MO 85	3/24/2021	11:41	7.29	19.88	2099	6.67	315.4
MO 85	7/14/2021	7:00	7.85	19.02	2102	6.12	32.6
MO 85	2/15/2022	12:30	8.10	20.18	2245	6.1	71.5
MO 85	6/22/2022	7:30	8.28	20.80	1921	6.36	59.0
MO 85	2/26/2023	10:38	7.89	19.81	1601	0.86	25.9

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 86	8/3/2011	10:42	7.3	19.02	1684	0.01	-197
MO 86	2/8/2012	12:14	7.08	19.23	2357	0.03	-126
MO 86	7/31/2012	0:00	7.06	19.43	2395	0.07	180
MO 86	3/7/2013	13:46	7.18	19.28	2003	0.13	83
MO 86	9/12/2013	10:23	7.06	19.24	1865	0.03	43
MO 86	3/1/2014	--	7.39	18.74	1584	0.14	18
MO 86	10/27/2014	14:27	7.28	19.73	1885	0.11	33.9
MO 86	3/9/2015	15:04	7.46	18.43	1518	0.17	45
MO 86	7/16/2015	11:15	7.46	18.66	1440	0.22	36.9
MO 86	3/13/2016	14:54	7.44	18.88	1490	0.08	42.8
MO 86	11/15/2016	12:57	7.3	20.13	1912	0.08	51
MO 86	2/20/2017	10:45	7.44	19.09	1783	0.13	31.3
MO 86	8/9/2017	11:05	7.37	19.06	1622	2.1	92.5
MO 86	2/1/2018	11:40	7.4	19.06	1351	1.2	5
MO 86	7/18/2018	11:45	7.43	18.81	1258	0.08	321
MO 86	2/11/2019	10:00	7.81	16.62	1898	0.1	-47
MO 86	7/16/2019	11:05	7.29	18.79	697	0.1	152.6
MO 86	3/2/2020	11:30	8.35	18.66	1317	0.08	137.3
MO 86	7/25/2020	9:00	7.33	19.87	1044	7.01	308
MO 86	3/24/2021	11:30	7.50	18.08	1223	0.09	234
MO 86	7/14/2021	9:00	7.83	18.48	1378	0.02	12.7
MO 86	2/15/2022	12:50	7.75	18.71	1575	0.75	70.1
MO 86	6/22/2022	9:30	7.96	21.32	1609	5.59	2.0
MO 86	3/28/2023	12:15	8.05	18.72	1730	--	6.98
MO 87	7/28/2011	13:33	7.06	18.89	2209	4.55	9
MO 87	1/26/2012	14:30	6.89	18.35	2219	4.97	44
MO 87	7/24/2012	0:00	6.92	19.06	2228	4.85	154
MO 87	3/4/2013	13:38	6.85	18.67	2253	4.5	180
MO 87	9/12/2013	16:20	6.84	19	2263	4.06	101
MO 87	3/1/2014	--	6.99	18.8	2284	3.81	95
MO 87	10/15/2014	16:42	6.94	18.95	2536	3.72	79.7
MO 87	2/12/2015	11:25	7.06	18.3	2383	3.87	39.2
MO 87	7/19/2015	13:13	7.03	19.06	2369	4.31	74.6
MO 87	3/7/2016						
MO 87	10/25/2016	11:45	6.96	18.79	2715	4.6	88.1
MO 87	3/21/2017	8:57	6.97	18.57	2340	4.42	85
MO 87	3/21/2017	8:57	6.97	10.57	2340	4.46	85.8
MO 87	3/8/2018	8:46	7.08	18.61	16322*	48.1%	-41.1*
MO 87	8/15/2018	11:03	7.28	19.86	2348	5	370
MO 87	3/5/2019	13:00	7.61	18.48	2516	4.1	93
MO 87	2/19/2020	10:50	7.98	18.36	2214	5.22	117.1
MO 87	8/4/2020	12:00	7.07	19.83	2678	0.66	525.1
MO 87	3/3/2021	13:48	7.48	21.20	1717	5.40	503
MO 87	3/21/2021	12:20	7.25	18.70	2133	5.90	375
MO 87	8/23/2021	12:35	7.56	18.95	2511	5.03	42.0
MO 87	3/8/2022	13:30	7.60	18.57	2279	5.32	77.1
MO 87	7/26/2022	13:30	6.57	20.60	1978	5.96	93.9
MO 87	3/20/2023	13:00	7.51	16.52	2798	3.75	41.40
MO 88	8/8/2011	11:42	7.22	19.02	1631	7.91	73
MO 88	1/30/2012	14:27	7.16	18.41	1636	7.14	34
MO 88	8/9/2012	0:00	7.17	18.77	1635	8.24	188
MO 88	3/6/2013	11:17	7.16	18.31	1677	7.54	160
MO 88	9/6/2013	15:09	7.06	18.79	1723	7.67	142
MO 88	3/1/2014	--	7.22	18.89	1789	7.31	96
MO 88	10/15/2014	15:56	7.14	18.89	2001	7.14	80.6
MO 88	3/9/2015	14:05	7.27	18.3	1885	7.15	78.5
MO 88	7/23/2015	13:38	7.21	19.15	1957	7.69	80.4
MO 88	3/14/2016	13:38	7.22	19	2252	7.49	88.7
MO 88	3/16/2017	12:10	7.21	18.88	1964	7.19	84.5
MO 88	9/12/2017	10:45	7.7	20.8	2115.6	86%	171
MO 88	2/19/2018	10:30	7.21	18.82	15893*	85.9%	-23*
MO 88	7/30/2018	7:30	7.32	18.7	1956	6.66	166
MO 88	2/22/2019	8:30	7.7	15.05	2140	7.46	111
MO 88	7/23/2019	10:31	7.65	23.07	1348	9.89	199.6
MO 88	2/12/2020	9:00	7.75	18.55	2750	5.05	130.9
MO 88	8/13/2020	10:00	7.31	20.87	1914	6.62	682.1
MO 88	3/3/2021	15:10	7.21	18.90	1854	6.52	554
MO 88	7/25/2021	9:30	7.49	18.96	1818	6.60	47.4
MO 88	3/7/2022	10:30	7.62	18.57	1923	6.57	78.29
MO 88	7/14/2022	10:30	6.74	19.98	1782	6.28	102.9
MO 88	3/5/2023	11:30	7.80	22.33	1776	7.34	37.8

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 89	8/8/2011	11:03	7.19	18.97	1763	6.83	103
MO 89	1/30/2012	13:53	7.11	18.58	1855	6.05	28
MO 89	8/9/2012	0:00	7.17	18.89	1679	7.6	167
MO 89	3/6/2013	10:47	7.1	18.18	1844	6.4	168
MO 89	9/6/2013	14:37	7.09	19.12	1755	6.89	141
MO 89	3/1/2014	--	7.16	18.99	1901	5.75	96
MO 89	10/15/2014	15:27	7.14	19.15	2025	6.09	83.8
MO 89	3/9/2015	13:39	7.21	18.43	1976	5.81	78.7
MO 89	7/23/2015	13:12	7.15	19.28	2058	6.14	79.8
MO 89	3/14/2016	13:14	7.2	19.06	2204	6.56	87.6
MO 89	12/20/2016	13:07	7.11	18.79	1601	6.66	83.8
MO 89	3/16/2017	11:36	7.18	18.88	1979	6.14	82.2
MO 89	9/12/2017	10:15	7.43	20.13	2593	90.7%	183.3
MO 89	2/19/2018	10:00	7.22	18.88	15947*	78.5%	-24.1*
MO 89	7/30/2018	9:30	7.33	18.59	2001	7.26	204
MO 89	2/22/2019	8:00	7.74	13.9	1930	7.78	109
MO 89	7/23/2019	10:49	7.46	21.4	1940	5.93	236.5
MO 89	2/10/2020	12:20	7.92	17.78	1701	5.99	91.8
MO 89	8/13/2020	9:43	7.5	20.56	1577	6.67	568.7
MO 89	4/8/2021	11:00	7.02	17.59	1495	7.05	7.13*
MO 89	7/25/2021	7:45	7.51	18.97	1587	6.00	45.0
MO 89	3/7/2022	11:00	7.65	18.62	1800	6.02	80.4
MO 89	7/14/2022	10:00	6.92	19.72	1576	6.52	86.3
MO 89	3/5/2023	11:15	7.71	18.84	1597	5.85	39.8
MO 90	8/8/2011	13:30	7.31	18.85	1392	6.46	53
MO 90	1/31/2012	10:15	7.18	18.06	1514	6.71	64
MO 90	8/1/2012	0:00	7.24	18.97	1526	6.65	174
MO 90	3/6/2013	11:42	7.26	18.34	1542	6.43	152
MO 90	9/6/2013	12:37	7.15	18.95	1421	6.4	146
MO 90	3/1/2014	--	7.37	18.94	1419	6.54	92
MO 90	10/15/2014	12:08	7.28	19.13	1580	12.26	78.6
MO 90	2/19/2015	14:17	7.46	18.84	1456	11.77	6.78
MO 90	7/23/2015	12:04	7.39	19.37	1460	7.25	78
MO 90	3/14/2016	11;54	7.36	18.88	1462	12.27	84.2
MO 90	11/30/2016	10:15	7.33	18.43	1474	8.09	98.8
MO 90	3/16/2017	10:59	7.34	18.61	1471	12.07	82.1
MO 90	2/28/2017	8:45	7.08	17.7	3724	4.3	117.1
MO 90	9/12/2017	8:40	7.48	21.63	3164	87.6%	37.2
MO 90	2/15/2018	11:30	7.33	19.04	1518	82.1%	-23.7*
MO 90	7/25/2018	12:30	7.53	19.64	1454	6.69	362
MO 90	3/28/2019	9:48	8.43	18.61	1326	10.96	89
MO 90	7/23/2019	10:08	7.46	21.28	1965	6.78	196.8
MO 90	2/10/2020	11:41	7.89	15.93	1672	9.28	88.5
MO 90	8/13/2020	9:00	7.47	19.86	1286	6.01	478
MO 90	3/3/2021	11:40	7.37	18.91	1273	6.40	488
MO 90	8/3/2021	13:00	7.87	22.19	1316	6.69	41.7
MO 90	3/7/2022	12:00	6.02	18.30	771	11.93	71.6
MO 90	7/14/2022	9:00	7.02	21.00	1218	9.90	108.4
MO 90	3/5/2023	12:15	7.84	21.78	1210	8.75	39.5
MO 91	8/8/2011	12:23	7.33	18.88	1099	7.77	57
MO 91	1/31/2012	10:50	7.19	18.08	1159	7.64	57
MO 91	8/1/2012	0:00	7.22	18.9	1394	7.91	186
MO 91	3/6/2013	12:11	7.2	18.5	1582	7.63	154
MO 91	9/6/2013	13:54	7.1	19.07	1761	7.74	146
MO 91	3/1/2014	--	7.24	18.87	1921	7.26	98
MO 91	10/15/2014	12:48	7.18	18.93	2190	7.17	79.2
MO 91	2/19/2015	14:50	7.29	18.82	2134	7.02	69.1
MO 91	7/23/2015	12:37	7.23	19.1	2279	7.69	80.4
MO 91	3/14/2016	12:27	7.39	18.88	1267	7.47	81
MO 91	11/30/2016	10:00	7.23	18.37	1465	7.12	174.4
MO 91	3/16/2017	10:26	7.32	18.47	1475	7.17	80.4
MO 91	9/12/2017	9:30	7.47	18.79	1216	89.8%	168.1
MO 91	2/19/2018	9:00	7.39	18.7	14472*	96.8%	-21.1*
MO 91	7/25/2018	12:45	7.39	18.9	1771	7.2	415
MO 91	3/28/2019	9:15	8.4	18.45	1712	6.98	78
MO 91	7/23/2019	9:49	7.55	22.06	2808	5.46	197.6
MO 91	2/10/2020	11:30	7.99	17.9	1594	6.83	92.4
MO 91	8/13/2020	8:15	7.37	20	1745	7.04	331
MO 91	3/3/2021	11:07	7.30	18.53	1691	6.84	339
MO 91	8/3/2021	12:20	7.86	20.11	1494	6.63	45.0
MO 91	3/7/2022	12:30	7.96	17.63	622	10.71	74.0
MO 91	7/14/2022	7:00	7.18	22.49	1776	6.53	87.9
MO 91	3/5/2023	12:43	7.73	22.61	1410	7.88	38.1

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 92	8/8/2011	13:00	7.26	19.06	1940	8.42	67
MO 92	1/31/2012	12:29	7.18	18.57	1968	8.8	36
MO 92	8/1/2012	0:00	7.2	19.06	1996	8.51	157
MO 92	3/7/2013	14:34	7.17	18.91	2040	8.24	134
MO 92	9/6/2013	12:08	7.18	2795	1.18	7.77	145
MO 92	3/1/2014	--	7.29	18.99	2054	7.85	99
MO 92	10/15/2014	11:36	7.23	18.97	2276	7.8	78.1
MO 92	3/9/2015	13:00	7.321	18.55	2073	7.69	76.6
MO 92	7/23/2015	11:31	7.29	19.27	2130	8.43	79.4
MO 92	3/8/2016	13:56	7.3	18.97	2080	8.34	84
MO 92	11/27/2016	12:48	7.29	18.78	2153	7.94	79.3
MO 92	3/16/2017	9:45	7.3	18.61	2044	8.03	72.9
MO 92	9/11/2017	12:09	7.6	19.24	1646	101.3%	185.5
MO 92	2/15/2018	10:30	7.43	17.56	14891*	92%	-41*
MO 92	7/26/2018	7:30	7.44	19.1	1935	8.28	180
MO 92	2/21/2019	15:30	7.87	19.15	1983	8.53	142
MO 92	7/23/2019	8:57	7.46	20.95	1498	7.71	175.5
MO 92	2/10/2020	10:00	8.34	14.49	1277	8.53	100.7
MO 92	8/12/2020	12:35	7.57	22.66	1580	8.83	689.3
MO 92	3/3/2021	13:20	7.29	19.50	2550	5.03	494
MO 92	8/3/2021	12:00	7.73	20.65	2557	6.40	48.3
MO 92	3/7/2022	13:00	7.73	18.60	1602	7.87	73.5
MO 92	7/12/2022	13:48	6.92	24.96	1488	7.08	99.6
MO 92	3/13/2023	11:15	7.91	18.57	1612	7.81	93.30
MO 93	8/4/2011	13:39	7.28	19.15	2403	6.23	-14
MO 93	1/31/2012	11:51	7.06	18.68	2784	6.91	39
MO 93	8/1/2012	0:00	7.04	19.22	2523	6.28	142
MO 93	3/6/2013	12:44	7.01	18.7	3454	6.58	161
MO 93	9/6/2013	11:28	6.95	19.22	2966	6.33	155
MO 93	3/1/2014	--	7.14	18.85	3348	6.03	98
MO 93	10/15/2014	11:02	7.13	19.27	3594	5.51	83.2
MO 93	2/19/2015	13:51	7.2	19	3363	5.24	74.2
MO 93	7/23/2015	10:59	7.22	19.95	2649	8.11	78
MO 93	3/8/2016	13:25	7.18	19.09	3008	5.51	81.3
MO 93	11/27/2016	11:50	7.15	19.07	2912	5.09	88.5
MO 93	3/16/2017	9:13	7.21	18.79	2759	5.16	82.4
MO 93	9/11/2017	11:30	7.48	19.37	2436	69.8%	206.7
MO 93	2/15/2018	10:00	7.36	18.8	15818*	63.0%	-45.6*
MO 93	3/27/2018	11:00	7.32	18.52	1665	23.9%	7.86
MO 93	7/25/2018	13:45	7.29	20.33	2911	5.27	453
MO 93	2/21/2019	15:00	7.78	19.19	2702	5.2	144
MO 93	7/23/2019	9:21	7.5	20.57	1830	9.43	215.9
MO 93	2/10/2020	10:45	7.92	18.21	2482	5.01	82.7
MO 93	8/12/2020	12:05	7.37	20.03	2571	5.11	493.7
MO 93	3/3/2021	12:50	7.48	19.23	1263	7.86	562
MO 93	8/3/2021	11:20	8.02	20.32	1412	13.34	37.7
MO 93	3/7/2022	13:30	7.74	18.93	1502	9.79	77.0
MO 93	7/12/2022	13:10	6.94	19.32	2394	5.49	67.3
MO 93	3/13/2023	9:45	7.77	18.78	2429	5.41	64.99
MO 94	8/2/2011	11:41	7.27	22.15	1940	7.75	34
MO 94	2/1/2012	13:37	7.2	20.83	1939	8.19	34
MO 94	7/30/2012	0:00	7.31	20	1847	10.27	199
MO 94	2/19/2013	15:04	7.35	18.89	1851	11.28	161
MO 94	9/5/2013	9:58	7.13	21.45	1887	9.37	149
MO 94	3/1/2014	--	7.35	21.18	2037	7.2	122
MO 94	10/15/2014	9:19	7.44	18.12	1430	8.07	54.6
MO 94	2/18/2015	14:27	7.52	20.32	238	7.86	73.2
MO 94	7/23/2015	10:25	7.64	23.75	484	7.86	74.1
MO 94	3/8/2016	12:18	7.41	20.62	1706	8.22	90
MO 94	11/27/2016	--	7.35	19.28	1883.9	11.03	88.3
MO 94	3/16/2017	8:41	7.43	18.48	1595	9.32	93.7
MO 94	9/6/2017	9:55	7.63	19.03	1522.4	8.26	94.6
MO 94	2/14/2018	10:50	7.37	19.5	15824*	98.1%	14.2
MO 94	7/24/2018	8:30	7.43	19.34	1969	7.83	222
MO 94	2/21/2019	14:30	7.84	19.07	1969	8.04	152
MO 94	7/22/2019	13:14	7.4	21.57	2392	6.1	209.1
MO 94	2/9/2020	14:40	7.46	17.63	3262	2.67	67.3
MO 94	8/12/2020	10:30	7.34	21.57	1681	7.7	609
MO 94	2/24/2021	12:15	7.38	19.05	1550	8.00	335.6
MO 94	8/3/2021	9:15	7.75	19.85	1559	9.33	34.8
MO 94	3/6/2022	11:28	7.48	16.38	2358	5.98	80.7
MO 94	7/12/2022	9:30	7.00	21.23	1446	7.48	94.1
MO 94	3/7/2023	11:00	7.97	19.01	1401	8.12	39.5

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
MO 95	8/4/2011	13:06	6.67	3834	0.99	6.15	20
MO 95	1/31/2012	13:53	7.27	19.03	1498	8.64	25
MO 95	7/25/2012	0:00	7.31	19.43	1427	8.91	198
MO 95	3/3/2013	11:16	7.08	19.12	1522	8.16	181
MO 95	9/6/2013	10:48	7.03	19.38	1599	8.35	154
MO 95	3/1/2014	--	7.29	19.13	1473	7.64	100
MO 95	10/2/2014	11:23	7.26	19.46	1506	7.26	86.5
MO 95	2/12/2015	12:03	7.29	19.19	1844	7.94	41
MO 95	7/21/2015	14:20	7.34	19.75	1425	7.45	76.5
MO 95	3/7/2016	12:29	7.31	19.29	1564	8.05	86.3
MO 95	11/27/2016	14:28	7.31	19.06	1468	7.31	80.2
MO 95	2/28/2017	10:10	7.77	18.95	1619	7.77	70.3
MO 95	9/11/2017	10:58	7.62	21.15	1068	116.4%	216
MO 95	2/14/2018	11:15	7.29	19.34	15793*	94.1%	18.2
MO 95	7/25/2018	14:20	7.39	19.25	1600	7.66	377
MO 95	2/20/2019	13:00	7.86	18.81	1530	7.21	134
MO 95	7/23/2019	8:27	7.38	19.5	2680	7.38	150
MO 95	2/3/2020	13:35	7.97	18.88	1290	6.42	162.5
MO 95	8/13/2020	8:00	7.62	20.48	1387	6.56	401
MO 95	3/2/2021	14:53	7.29	19.06	2187	7.27	411.8
MO 95	7/22/2021	13:30	7.75	20.51	1527	3.78	421.7
MO 95	3/7/2022	14:00	7.66	18.82	1516	6.54	75.7
MO 95	7/12/2022	7:30	7.09	19.73	1262	5.45	62.2
MO 95	3/13/2023	12:15	7.95	18.92	1189	6.37	76.30
MO 96	8/4/2011	12:28	7.23	19.12	2869	9.03	22
MO 96	1/31/2012	13:11	7.2	18.9	2594	8.21	26
MO 96	7/25/2012	0:00	7.25	19.32	2260	8.52	193
MO 96	3/3/2013	10:40	7.08	18.8	2222	8.24	186
MO 96	9/6/2013	10:06	6.88	19.18	2190	8.23	170
MO 96	3/1/2014	--	7.25	18.87	2247	7.9	102
MO 96	9/4/2014	10:43	7.15	19.31	2203	7.7	143
MO 96	2/10/2015	14:23	7.14	19.32	2443	7.56	88.9
MO 96	7/21/2015	13:50	7.26	19.54	2683	8.21	77.6
MO 96	3/7/2016	12:00	7.25	19.1	2726	8.21	87.9
MO 96	11/28/2016	15:00	7.25	18.75	2274	7.43	79.2
MO 96	2/28/2017	10:00	7.37	18.79	2593	7.67	86.7
MO 96	9/11/2017	10:00	7.69	20.78	1074	96.1%	231
MO 96	2/14/2018	11:58	7.26	19.32	15907*	94.8%	17.4
MO 96	7/25/2018	14:50	7.33	19.32	2672	7.74	410
MO 96	2/20/2019	12:30	7.74	18.52	2604	10.66	125
MO 96	7/23/2019	8:14	7.53	20.32	2324	6.72	139.7
MO 96	2/3/2020	13:00	7.68	18.89	2352	7.17	134.8
MO 96	8/13/2020	7:00	7.39	19.06	2289	7.46	391.2
MO 96	3/2/2021	13:50	7.42	18.97	1382	6.90	347
MO 96	7/22/2021	13:15	7.54	19.32	2090	7.15	55.7
MO 96	3/7/2022	14:30	7.60	19.05	2271	6.27	75.3
MO 96	7/12/2022	7:00	7.13	19.37	2140	6.96	-19.0
MO 96	3/13/2023	11:45	7.81	18.11	2223	8.86	92.5
CL 1	7/7/2011	10:37	7.14	17.93	3413	1.62	95
CL 1	2/21/2012	10:26	7.06	17.67	3323	1.94	54
CL 1	7/19/2012	0:00	7.01	18	3246	2.14	190
CL 1	3/4/2013	14:41	7.01	17.95	3253	2.3	168
CL 1	8/19/2013	12:52	6.82	18.04	3332	2.43	177
CL 1	3/1/2014	--	6.49	17.99	3198	1.63	40
CL 1	9/4/2014	14:05	6.99	18.41	3223	2.65	152
CL 1	2/4/2015	10:08	7.26	18.12	3084	7.71	92.2
CL 1	6/22/2015	10:22	7.13	18.39	3009	7.52	82.3
CL 1	2/14/2016	13:20	7.29	18.01	2918	2.07	62.4
CL 1	8/16/2016	--	7.1	18.89	2542	1.91	83.1
CL 1	2/20/2017	11:36	7.38	19.26	3076	4.9	729
CL 1	8/9/2017	9:15	7.6	20.08	2142	6.7	151.5
CL 1	1/29/2018	10:10	7.19	19.06	2229	86.4%	65.7
CL 1	2/11/2019	13:00	7.88	17.63	2550	6.33	90.8
CL 1	7/17/2019	11:00	7.27	19.84	1650	5.23	168.4
CL 1	3/1/2020	10:30	8.33	18.24	1918	4.47	
CL 1	7/23/2020	10:30	7.18	20.97	2005	1.81	569
CL 1	2/16/2022	13:40	8.14	20.88	2395	2.68	62.7

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 2	7/25/2011	14:13	6.76	20.42	4722	0.13	-128
CL 2	2/2/2012	14:44	6.82	19.88	4660	0.26	-75
CL 2	7/17/2012	0:00					
CL 2	3/4/2013	14:28	6.79	20.65	4899	0.86	186
CL 2	9/12/2013	12:45	6.66	20.74	4632	1.34	124
CL 2	3/1/2014	--	6.85	20.57	4761	0.97	85
CL 2	10/20/2014	15:05	6.69	21.06	6592	0.54	70.7
CL 2	1/28/2015	11:06	6.79	20.62	6579	1.26	84.7
CL 2	7/16/2015	15:37	6.7	21.55	7125	0.14	62.9
CL 2	2/28/2016	13:12	6.74	21.26	6649	0.85	76
CL 2	12/28/2016	12:40	7.33	19.4	2944	8.01	72.3
CL 2	2/21/2017	8:58	7.1	20.73	4922	1.36	88.5
CL 2	8/9/2017	9:30	7.59	19.15	239*	96.7%	167.9
CL 2	2018	Not sampled 2018 (Pump not wired)					
CL3 / MO57	7/7/2011	10:32	7.11	19.54	2764	1.46	119
CL 3/MO 57	2/21/2012	10:18	7.1	20.94	2737	1.21	56
CL 3/MO 57	7/19/2012	0:00	7.08	19.43	2779	0.63	174
CL 3/MO 57	4/3/2013	14:25	7.19	18.52	2833	8.21	44
CL 3/MO 57	8/19/2013	12:40	6.84	18.86	2719	6.67	154
CL 3/MO 57	3/1/2014	--	7.12	18.81	2794	7.43	51
CL 3/MO 57	2/4/2015	9:50	7.24	18.66	2801	8.86	66.4
CL 3/MO 57	6/22/2015	10:28	7.21	18.77	2864	0.24	28.7
CL 3/MO 57	2/14/2016	13:30	7.22	18.21	3015	1.58	75.7
CL 3/MO 57	8/16/2016	--	7.05	19.16	2067	7.63	86.7
CL 3/MO 57	2/21/2017	8:41	7.06	11.83	3074	7.92	198.2
CL 3/MO 57	8/9/2017	9:45	7.54	19.15	2368	95.2%	134.2
CL 3/MO 57	1/29/2018	9:50	6.59	20.26	2763	18.3%	58.1
CL 3/MO 57	2/11/2019	13:30	7.69	16.95	3047	6.28	102
CL 3/MO 57	7/17/2019	11:10	7.23	20.76	1387	4.58	1836
CL 3/MO 57	3/1/2020	10:46	8.04	18.97	2117	4.35	
CL 3/MO 57	7/23/2020	11:00	7.05	20.53	2484	6.14	554
CL 3/MO 57	7/14/2021	14:05	7.42	23.91	2926	3.47	1639
CL 3/MO 57	2/16/2022	13:00	7.75	20.75	3625	6.28	11.1
CL 4	7/7/2011	11:45	7.07	17.91	2901	4.03	58
CL 4	2/21/2012	13:18	7.12	17.56	2783	10.9	34
CL 4	7/10/2012	0:00	7.32	18.26	2775	8.84	122
CL 4	2/13/2013	11:37	7.18	17.75	2543	8.36	151
CL 4	9/16/2013	11:15	7.11	17.9	2449	6.05	91
CL 4	3/1/2014	--	7.22	17.95	2411	9.8	77
CL 4	10/23/2014	14:14	7.18	18.4	2735	3.27	90.5
CL 4	2/4/2015	13:10	7.39	18.03	2363	12.65	69.3
CL 4	6/22/2015	12:42	7.31	18.31	2444	5.54	38.6
CL 4	2/24/2016	14:14	7.38	17.29	2564	5.73	77.5
CL 4	8/1/2016	12:35	7.11	18.39	2403	2.19	53.7
CL 4	3/2/2017	8:35	7.16	14.76	2401	6.36	207
CL 4	8/28/2017	9:58	7.69	19.77	2032	49.9%	13.7
CL 4	2018	Out of service at time of 2018 sampling event					

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 5/MO 24	7/7/2011	11:37	7.13	18.85	2837	4.67	66
CL 5/MO 24	2/21/2012	13:25	7.09	18.26	2855	1.56	45
CL 5/MO 24	7/10/2012	0:00	7.18	18.79	2901	1.79	130
CL 5/MO 24	4/3/2013	13:50	7.11	17.08	2889	1.1	15
CL 5/MO 24	8/13/2013	13:14	6.34	18.13	2702	0.87	25
CL 5/MO 24	3/1/2014	--	7.19	18.1	2716	2.77	27
CL 5/MO 24	9/4/2014	14:43	7.07	18.5	2741	4.33	123
CL 5/MO 24	2/4/2015	13:00	7.32	18.24	2867	11.83	46.5
CL 5/MO 24	6/22/2015	12:00	7.06	18.88	3018	2.46	86.2
CL 5/MO 24	2/24/2016	14:05	7.36	15.59	3363	8.06	55.7
CL 5/MO 24	8/1/2016	--	7	24.78	3131	4.81	53.5
CL 5/MO 24	3/21/2017	8:40	7.28	14.81	3060	7.17	33.3
CL 5/MO 24	8/28/2017	10:27	8.55	24.14	2818	95.9%	52.5
CL 5/MO 24	2018	Out of service at time of 2018 sampling event					
CL 6	7/12/2011	11:57	7.16	17.64	3402	1.51	98
CL 6	2/21/2012	12:18	7.03	17.33	3340	1.94	63
CL 6	7/17/2012	0:00	7.15	20.29	3260	3.71	36
CL 6	2/13/2013	11:26	7.02	17.34	3352	1.29	173
CL 6	9/16/2013	10:55	6.92	17.56	3335	1.27	92
CL 6	3/1/2014	--	7.15	18.13	3158	4.55	54
CL 6	10/23/2014	13:52	6.91	18.3	3575	0.41	94.5
CL 6	2/4/2015	11:16	7.18	18.04	3313	0.39	72.4
CL 6	6/22/2015	11:40	7.03	18.12	3350	0.24	82.9
CL 6	5/10/2016	14:05	7.07	18.79	3516	0.65	-10.8
CL 6	8/1/2016	12:20	7.04	18.78	2580	3.86	77.3
CL 6	3/2/2017	8:45	7.23	15.53	3108	7.11	45.6
CL 6	4/11/2018	10:30	7.17	17.59	4314.2*	7.12	489.3*
CL 6	8/15/2018	9:00	7.24	17.99	3078	0.32	202
CL 6	3/6/2019	13:20	7.8	18.34	3002	4.99	87.3
CL 6	7/28/2019	9:30	7.95	23.88	2790	3.38	89.6
CL 6	7/28/2020	8:00	7.15	18.7	2539	0.32	224
CL 6	3/15/2021	10:30	7.39	22.00	2533	1.11	528
CL 6	8/22/2021	8:40	7.87	23.14	2473	1.89	0.8
CL 7	8/9/2011	15:52	7.16	17.23	3298	2.44	-10
CL 7	3/8/2012	9:15	6.95	16.67	3432	2.63	196
CL 7	7/16/2012	0:00	7.06	17.46	2758	4.4	56
CL 7	2/13/2013	12:24	6.79	16.9	3310	2.72	109
CL 7	9/16/2013	11:35	6.87	17.03	3304	2.98	111
CL 7	3/1/2014	--	7.1	17.16	3292	2.66	94
CL 7	4/7/2014	14:28	7.1	17.16	3292	2.66	94
CL 7	2/5/2015	11:12	7.08	16.87	3840	2.68	101
CL 7	6/23/2015	11:52	7.05	18.34	3457	3.62	83.9
CL 7	3/15/2016	15:20	7.25	18.09	3228	4.55	81.1
CL 7	8/16/2016	--	6.96	17.99	3461	3.65	88
CL 7	3/2/2017	8:48	7.16	16.32	3353	5.15	74.3
CL 7	10/25/2017	10:55	7.55	17.49	2673	60.9%	87.5
CL 7	2/6/2018	12:45	7.5	16.11	2938	62.5%	28.1
CL 7	8/8/2018	10:30	7.19	17.75	3391	4.32	250
CL 7	3/6/2019	13:00	7.78	17.77	3371	4.27	108
CL 7	7/28/2020	8:30	7.07	19.67	2769	3.42	257

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 9	7/7/2011	11:50	7.21	17.72	3159	4.13	53
CL 9	2/21/2012	13:05	7.2	17.44	3114	3.42	65
CL 9	8/2/2012	0:00	7.16	17.62	3141.7	3.22	141
CL 9	2/13/2013	11:45	7.09	17.54	3132.7	3.06	164
CL 9	8/13/2013	13:25	6.37	17.76	3126	3.5	124
CL 9	3/1/2014	--	7.21	18.4	2952	1.63	36
CL 9	10/23/2014	14:23	7.19	17.99	3396	2.51	85.2
CL 9	2/4/2015	13:20	7.42	18.08	3016	1.11	70.7
CL 9	6/22/2015	12:52	7.22	18.22	3136	2.46	83.1
CL 9	2/24/2016	14:25	7.26	17.83	3063	1.09	86.7
CL 9	8/16/2016	10:25	7.19	18.28	3048	2.86	72.7
CL 9	3/1/2017	10:35	7.58	17.03	2810	5.12	88.12
CL 9	4/11/2018	10:45	7.76	19.35	2556.1*	6.77	655.1*
CL 9	8/15/2018	10:00	7.62	20.09	2548	5.23	238
CL 9	3/6/2019	14:15	7.9	18.33	2979	4.72	111
CL 9	7/28/2019	11:55	7.5	24.59	2810	3.7	142.8
CL 9	2/26/2020	10:00	8.71	18.33	1205	7.05	96.2
CL 9	7/28/2020	7:00	7.71	19.41	2543	3.44	315.9
CL 9	3/15/2021	9:03	7.29	17.72	2566	2.44	363.2
CL 9	8/22/2021	7:30	7.74	18.96	3470	3.96	33.2
CL 9	3/15/2022	12:30	7.52	19.24	2605	2.44	76.0
CL 9	7/19/2022	9:30	8.01	21.21	2280	2.28	84.0
CL 9	3/27/2023	12:40	7.80	17.99	2269	2.23	2650
CL 10	7/7/2011	12:00	7.18	17.49	3369	5.35	58
CL 10	2/22/2012	10:10	7.09	17.09	3680	4.16	52
CL 10	7/10/2012	0:00	7.25	17.68	3562	4.06	134
CL 10	2/13/2013	10:24	6.98	17.2	3405	3.82	206
CL 10	8/13/2013	13:34	6.6	17.41	2899	2.11	53
CL 10	3/1/2014	--	7.32	17.36	3226	3.56	51
CL 10	10/23/2014	14:31	7.14	17.51	3986	3.89	76.1
CL 10	2/4/2015	13:32	7.36	17.71	3649	3.76	74.8
CL 10	6/23/2015	10:52	7.17	18.13	3612	4.29	91.7
CL 10	5/10/2016	14:18	7.34	18.83	3129	4.26	61.1
CL 10	8/16/2016	--	7.47	18.08	2927	2.89	10.6
CL 10	3/1/2017	8:16	7.4	15.96	3423	7.15	178
CL 10	2018	Out of service at time of 2018 sampling event					
CL 10	8/22/2021	11:15	7.77	21.60	4576	8.68	42.0
CL 10	7/19/2022	9:00	8.04	27.57	2661	5.47	69.1
CL 11	7/12/2011	11:50	7.11	17.91	2957	1.44	115
CL 11	2/22/2012	10:54	6.95	17.27	2888	0.79	64
CL 11	9/18/2012	0:00	7.28	17.57	2806	5.4	198
CL 11	2/13/2013	12:31	6.89	17.28	2851	0.96	119
CL 11	9/16/2013	11:47	6.8	18.45	29.07*	0.22	100
CL 11	3/1/2014	--	6.76	17.95	2696	0.19	96
CL 11	10/23/2014	12:42	7	17.71	3029	0.64	90.2
CL 11	2/5/2015	11:20	7.25	15.98	3781	9.36	94.5
CL 11	6/23/2015	12:10	7.05	17.94	2783	0.71	85.2
CL 11	5/10/2016	14:30	7.13	18.44	2681	1.08	53.5
CL 11	8/16/2016	--	7	18.82	2718	1.77	76.4
CL 11	10/25/2017	10:46	7.3	17.11	2650	18.9%	118
CL 11	2/28/2018	12:00	7.88	16.38	15109*	73.6%	74.8
CL 11	8/8/2018	10:00	7.28	19.82	2749	4.38	439
CL 11	3/6/2019	12:40	7.7	18.17	3349	4.61	97
CL 11	7/28/2020	10:30	7.13	19.67	2538	1.86	318
CL 11	3/15/2021	11:00	7.27	18.97	2590	1.92	535
CL 11	8/22/2021	10:21	7.8	22.94	2681	4.03	21.7
CL 11	3/15/2022	13:00	7.48	19.17	2633	3.24	78.1
CL 11	7/19/2022	10:00	7.86	21.87	2592	3.31	68.24
CL 11	3/27/2023	11:30	7.56	17.33	2406	2.91	34.10

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 12	7/12/2011	11:36	7.12	17.11	3236	4.78	161
CL 12	2/22/2012	10:38	6.94	17.25	3640	3.35	54
CL 12	7/16/2012	0:00	6.98	30.22	3100	0.33	99
CL 12	2/13/2013	12:12	7.33	9.19	3101	0.07	-159
CL 12	8/12/2013	14:30	6.43	17.16	2759	2.03	64
CL 12	3/1/2014	--	7.06	16.9	3281	10.71	69
CL 12	10/23/2014	12:00	7.07	17.23	3760	3.58	89.8
CL 12	2/5/2015	10:45	7.02	16.62	4030	3.85	100
CL 12	6/23/2015	11:05	7.08	17.66	3599	6.04	92.5
CL 12	2/24/2016	13:45	7.26	17.01	2959	4.91	83.2
CL 12	8/16/2016	No Data					
CL 12	12/20/2016	12:19	7.36	17.32	1989	6.01	5.4
CL 12	3/1/2017	9:58	7.55	14.61	3392	7.72	132
CL 12	10/25/2017	9:00	7.75	17.74	2771	92.6%	104
CL 12	2/6/2018	12:30	7.78	15.35	2573	96.7%	11.2
CL 12	8/8/2018	9:00	7.18	26.70*	3245	5.31	264
CL 12	2019	Not sampled in 2019					
CL 13	7/7/2011	12:21	7	17.79	2920	0.72	47
CL 13	2/22/2012	10:29	6.85	17.65	2930	0.25	47
CL 13	7/16/2012	0:00	6.87	17.63	2925	5.51	162
CL 13	2/13/2013	12:00	7.01	17.58	2946	5.66	180
CL 13	8/13/2013	14:06	6	17.69	2939	5.51	147
CL 13	3/1/2014	--	7.11	17.8	2971	8.41	80
CL 13	4/7/2014	14:15	7.11	17.8	2971	8.41	80
CL 13	2/4/2015	13:50	7.23	18.25	3087	1.81	79.2
CL 13	6/23/2015	11:27	7.08	18.26	2995	12.8	100.3
CL 13	5/26/2016	11:52	7.11	18.82	2811	1.56	27.6
CL 13	8/16/2016	--	6.96	18.11	3131	13.74	88.8
CL 13	3/1/2017	9:20	7.97	19.19	3092	7.58	101.9
CL 13	10/25/2017	10:20	7.45	16.87	2645	95.8%	77.1
CL 13	4/11/2018	11:00	7.25	20.33	5485.1*	9.22	629.2*
CL 13	8/8/2018	9:52	7.13	19.59	3367	6.99	294
CL 13	8/15/2018	13:40	7.38	28.65	2370	5.56	301
CL 13	3/6/2019	12:15	7.79	17.63	3487	7.78	85.8
CL 13	7/28/2019	10:00	7.8	21.31	3022	5.19	77.3
CL 13	2/26/2020	12:30	8.14	17.09	2413	7.63	110.3
CL 13	7/28/2020	9:00	7.05	19.48	2420	8.01	811.6
CL 13	3/15/2021	11:30	7.02	18.08	2991	9.17	441.3
CL 13	8/22/2021	10:38	7.58	19.67	2800	8.57	47.4
CL 13	3/15/2022	13:15	6.98	18.37	3376	0.60	81.7
CL 14	7/12/2011	13:16	7.2	18.57	2760	0.68	34
CL 14	2/6/2012	14:36	7.03	19.23	2746	0.83	-7
CL 14	8/1/2012	0:00	7.3	19.02	2676	3.33	199
CL 14	2/12/2013	14:17	7.01	17.18	2523	9.99	162
CL 14	9/13/2013	9:06	6.97	18.8	2731	0.9	144
CL 14	3/1/2014	--	7.04	17.15	3319	6.79	98
CL 14	10/20/2014	9:55	7.13	17.85	3006	1.04	81.7
CL 14	3/11/2015	13:46	7.17	18.88	26.89*	1.3	90.2
CL 14	6/25/2015	14:40	7.16	18.72	2762	2.83	80.1
CL 14	2/23/2016	13:50	7.2	17.81	2753	1.33	76.9
CL 14	8/2/2016	12:24	7.36	19.7	2631	2.57	59.2
CL 14	2/27/2017	10:51	7.47	17.63	2380	5.02	75
CL 14	9/13/2017	9:15	7.52	19.46	2187	35.4%	115
CL 14	2/20/2018	11:28	7.26	19.17	16283*	51.6%	-5.3*
CL 14	8/7/2018	10:51	7.26	22.62	2506	1.55	334
CL 14	2/25/2019	10:00	7.94	16.82	2748	3.02	61
CL 14	7/30/2019	12:00	7.49	36.58	3716	3.54	193.5
CL 14	8/11/2021	9:30	8.03	21.37	3485	5.04	13.0

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 15	7/12/2011	13:09	7.03	17.83	3481	1.86	51
CL 15	2/22/2012	11:11	6.91	17.78	3738	3.5	28
CL 15	8/1/2012	0:00	6.94	18.04	3682	3.11	147
CL 15	2/12/2013	14:01	6.88	17.79	3622	3.65	112
CL 15	9/13/2013	8:58	6.83	17.82	3319	2.24	156
CL 15	3/1/2014	--	6.96	17.91	2977	2.71	77
CL 15	10/20/2014	10:35	7.11	18.88	3452	2.47	73.9
CL 15	3/11/2015	13:56	7.05	18.59	3277	1.76	95.7
CL 15	6/25/2015	15:15	7.56	21.55	1.9*	8.25	71.9
CL 15	2/10/2016	14:20	7.02	18.97	3296	1.69	77.4
CL 15	8/2/2016	12:42	7.1	19.36	3181	3.74	75.6
CL 15	2/27/2016	10:45	7.53	17.53	3235	6.6	72.8
CL 15	9/13/2017	10:20	7.63	20.48	2683	59.5%	145.3
CL 15	2018	Out of service at time of 2018 sampling event					
CL 16	7/12/2011	13:42	7.21	18.1	2382	6.91	59
CL 16	2/22/2012	11:22	7.07	17.65	2465	6.92	55
CL 16	8/1/2012	0:00	6.88	20.72	2504	7.8	139
CL 16	2/12/2013	13:54	7.19	18.05	2529	7.28	166
CL 16	9/13/2013	8:40	6.62	1840	2460	5.01	158
CL 16	3/1/2014	--	7.02	18.23	2678	4.25	39
CL 16	10/20/2014	10:28	6.97	18.5	3243	0.5	48
CL 16	3/11/2015	14:06	7.06	18.34	2464	11.25	84.6
CL 16	6/25/2015	15:05	7.05	18.97	2730	10.42	85.8
CL 16	2/10/2016	14:09	7.27	18.88	2592	4.3	45.2
CL 16	8/2/2016	12:33	7.15	19.41	2667	7.52	59.3
CL 16	2/27/2017	10:35	7.65	19.06	1934	7.44	18.8
CL 16	9/13/2017	10:00	7.5	20.3	2728	58.3%	2730*
CL 16	2018	Out of service at time of 2018 sampling event					
CL 18/MO 15	7/13/2011	10:52	7.06	18.46	4563	7.13	69
CL 18/MO 15	2/22/2012	11:38	7.03	18.03	4488	10.74	69
CL 18/MO 15	8/9/2012	0:00	7.07	18.18	4470	11.11	177
CL 18/MO 15	2/7/2013	15:05	6.99	17.96	4408	6.72	228
CL 18/MO 15	9/18/2013	14:58	6.97	18.19	4335	6.51	101
CL 18/MO 15	3/1/2014	--	7.01	17.41	4402	5.54	92
CL 18/MO 15	10/27/2014	16:11	6.94	18.37	5227	4.86	85.6
CL 18/MO 15	3/16/2015	9:05	7.02	17.8	5133	4.71	97.8
CL 18/MO 15	6/29/2015	12:36	7.06	19.52	4632	4.53	98.7
CL 18/MO 15	2/23/2016	10:05	7.13	17.61	4111	20.67	91.7
CL 18/MO 15	8/2/2016	11:34	7	18.7	4796	5.1	82.5
CL 18/MO 15	2/21/2017	10:00	7.43	20.48	4506	7.18	95.2
CL 18/MO 15	8/17/2017	9:09	7.24	20.7	4657	93%	114.2
CL 18/MO 15	2018	Out of service at time of 2018 sampling event					
CL 18/MO 15	2/14/2019	12:30	7.74	19.12	4475	6.94	97.5
CL 18/MO 15	7/18/2019	9:41	7.35	19.86	4947	7.5	109.8

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 20	7/13/2011	10:43	7	17.93	4511	4.69	60
CL 20	3/8/2012	8:55	7.29	7.93	3668	5.76	143
CL 20	7/25/2012	12:38	7	17.87	4416	5.95	202
CL 20	2/7/2013	2:49	7.07	10.86	3569	7.13	230
CL 20	9/18/2013	14:50	6.92	18	4626	0.69	54
CL 20	3/1/2014	--	7.06	17.99	4328	6.78	68
CL 20	2014	Down for Repairs					
CL 20	2015	Down for Repairs					
CL 20	6/29/2015	11:45	7.02	18.39	4554	5.97	97.8
CL 20	2/23/2016	9:35	7.07	17.77	4677	5.79	40.1
CL 20	8/2/2016	11:22	7.08	18.61	4362	6.97	59.8
CL 20	2/21/2017	10:15	7.57	19.19	4340	7.62	77.3
CL 20	8/17/2017	9:05	7.41	21.1	4646	92.5%	122
CL 20	2/27/2018	11:00	7.57	17.01	16110*	90.7%	-6.5*
CL 20	7/23/2018	12:25	7.54	27.66	4074	7.35	267.2
CL 20	2/14/2019	12:00	7.73	18.49	4148	7.35	90.9
CL 20	7/18/2019	9:32	7.34	19.88	4449	6.98	110
CL 20	2/2/2020	14:40	7.77	19.73	3624	4.74	388
CL 20	8/3/2020	11:30	7.01	18.88	3604	3	597.3
CL 20	3/8/2021	12:45	7.07	18.23	3450	6.09	364
CL 21/MO 13	7/13/2011	10:36	7.03	17.47	4068	3.9	73
CL 21/MO 13	2/22/2012	11:48	6.88	17.42	4226	4.46	65
CL 21/MO 13	8/9/2012	0:00	6.97	17.45	4271	4.06	200
CL 21/MO 13	2/7/2013	14:40	6.77	17.1	4351	4.21	216
CL 21/MO 13	9/18/2013	14:43	6.83	17.43	4112	7.92	109
CL 21/MO 13	3/1/2014	--	6.91	24.06	4147	2.77	59
CL 21/MO 13	10/27/2014	15:58	6.85	17.78	4535	8.68	94.7
CL 21/MO 13	3/16/2015	9:22	6.95	17.3	4702	3.89	89.1
CL 21/MO 13	6/29/2015	11:30	6.99	17.89	2808	12.32	103
CL 21/MO 13	2/23/2016	10:34	7.13	16.56	4293	13.95	86.2
CL 21/MO 13	8/2/2016	11:14	7	17.91	4160	4.2	79.6
CL 21/MO 13	2/22/2017	9:08	7.62	17.86	4391	7.65	78.2
CL 21/MO 13	8/17/2017	9:01	6.82	19.5	3810	78.4%	93.2
CL 21/MO 13	2/27/2018	10:45	7.51	16.83	15784*	72.8%	-9.7*
CL 21/MO 13	9/6/2018	10:00	7.81	17.69	3688	7.67	144
CL 21/MO 13	2/14/2019	11:30	7.59	17.18	3546	4.53	67
CL 21/MO 13	7/18/2019	9:26	7.29	19.46	3965	4.84	62.4
CL 21/MO 13	2/2/2020	14:15	7.77	19.73	3624	4.74	388
CL 21/MO 13	8/3/2020	11:15	7.1	19.52	3524	2.68	605.9
CL 21/MO 13	7/5/2022	11:30	7.81	20.27	3236	4.09	25.8
CL 22	7/13/2011	10:30	7.06	17.72	4472	10.72	87
CL 22	2/22/2012	11:57	6.88	17.35	4410	4.86	57
CL 22	8/9/2012	0:00	6.98	17.49	4440	8.43	198
CL 22	2/7/2013	14:34	6.84	17.18	4331	8.31	215
CL 22	9/18/2013	14:37	6.74	17.25	4310	1396	90
CL 22	3/1/2014	--	6.9	17.69	4470	7.42	100
CL 22	10/27/2014	15:48	6.89	18.45	4865	9.82	105
CL 22	3/16/2015	9:32	6.97	17.54	4855	10.18	102.7
CL 22	6/29/2015	11:05	7.05	18.43	4395	6.26	107.5
CL 22	2/23/2016	10:20	7.09	16.33	4605	11.27	94.7
CL 22	8/2/2016	11:08	6.98	18.59	4586	4.84	82
CL 22	2/21/2017	10:50	7.38	21.15	4188.6	6.68	63.3
CL 22	8/17/2017	8:52	7.08	20.79	4352	78.5%	122.3
CL 22	1/29/2018	10:57	7.77	14.68	3834	53.2%	24.8
CL 22	7/23/2018	12:15	7.13	25.19	3965	5.26	278
CL 22	2/14/2019	11:00	7.63	19.84	3537	6.5	7
CL 22	7/18/2019	9:22	7.42	20.23	4105	7.74	30.5
CL 22	2/2/2020	13:43	7.8	24.26	4001	4.77	203.6
CL 22	8/20/2020	8:15	7.02	18.67	3842	4.72	181.8
CL 22	7/22/2021	12:30	7.30	18.70	3688	4.58	32.3
CL 22	7/5/2022	11:20	7.95	21.70	3391	7.69	20.8

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 23	7/13/2011	10:25	6.96	20.71	5796	5.99	96
CL 23	2/20/2012	14:48	6.96	19.47	5104	6.66	66
CL 23	8/9/2012	0:00	6.92	20.52	5812	6.72	180
CL 23	2/7/2013	14:25	6.86	18.33	5725	8.47	207
CL 23	9/18/2013	14:30	6.71	18.43	5588	7.06	89
CL 23	3/1/2014	--	6.8	18.64	5691	10.87	114
CL 23	10/27/2014	15:41	6.92	19.81	6184	10.11	107.4
CL 23	2015	Down for Repairs					
CL 23	6/29/2015	10:55	7.13	18.87	5325	8.23	99.8
CL 23	12/20/2016	9:00	7.51	13.52	3949	8.76	36.1
CL 23	2/12/2017	10:35	7.25	21.41	4566	5.36	6.3
CL 23	8/17/2017	8:46	7.46	24.97	5336	94.6%	140.3
CL 23	2/27/2018	10:30	7.23	17.79	17369*	82.9%	5.4
CL 23	7/23/2018	12:00	7.37	30.88	5817	6.18	271.3
CL 23	3/28/2019	9:00	8.07	33.2	5331	5.86	60
CL 23	7/18/2019	9:15	7.42	20.96	5703	6.8	62.2
CL 23	8/3/2020	10:50	6.99	26.1	4421	5.23	508.9
CL 23	7/21/2021	13:30	7.43	21.62	3395	1.41	40.7
CL 24	7/13/2011	10:17	7.1	17.32	3328	8.08	87
CL 24	2/7/2012	14:45	7.02	16.97	3262	10.61	38
CL 24	8/9/2012	0:00	7.11	17.15	3178	10.79	181
CL 24	2/7/2013	14:15	6.91	17.09	3096	7.33	236
CL 24	9/18/2013	14:22	6.75	17.22	3148	11.99	192
CL 24	3/1/2014	--	7.02	18.4	3121	2.38	83
CL 24	10/23/2014	14:50	7.02	17.72	3398	8.54	104.2
CL 24	3/11/2015	14:52	7.06	17.5	3313	2.27	84.4
CL 24	6/29/2015	10:45	7.1	17.75	3337	7.55	104.5
CL 24	2/23/2016	11:10	7.19	16.92	3047	8.25	90.6
CL 24	8/2/2016	11:00	7.13	18.43	3516	3.54	72.2
CL 24	2/22/2017	10:00	7.67	18.26	3645	7.02	96.6
CL 24	8/17/2017	Down for Repairs					
CL 24	2/27/2018	9:00	7.56	14.2	14770*	93.2%	-14.4*
CL 24	2019	Not sampled in 2019					
CL 24	8/4/2020	11:40	7.23	20.39	2379	0.99	497.6
CL 24	7/21/2021	12:10	7.68	20.46	3723	3.01	16.6
CL 24	7/5/2022	11:10	7.78	19.15	3074	7.67	-7.1
CL 25 (See MO 12/CL 25)							
CL 26/MO 10	7/13/2011	9:47	7.13	18.49	3435	4.99	187
CL 26/MO 10	2/7/2012	14:23	7.01	18.14	3477	5.24	4
CL 26/MO 10	8/9/2012	0:00	7.2	18.72	3493	5.95	204
CL 26/MO 10	4/3/2013	13:33	6.96	18.27	3379	5.47	118
CL 26/MO 10	9/11/2013	15:20	6.78	24.24	3541	7.96	111
CL 26/MO 10	3/1/2014	--	6.75	18.56	3558	7.27	138
CL 26/MO 10	10/23/2014	14:38	6.94	18.66	3663	15.2	98.6
CL 26/MO 10	3/11/2015	14:17	7.11	10.22	3579	12.39	90.7
CL 26/MO 10	6/29/2015	8:55	6.86	22.23	3302	9.47	125.4
CL 26/MO 10	2/23/2016	12:10	7.04	18.17	2209	14.35	100.2
CL 26/MO 10	8/2/2016	9:00	6.68	19.79	3442	7.07	94
CL 26/MO 10	2018	Out of service at time of 2018 sampling event					
CL 26/MO 10	7/21/2021	13:00	8.63	20.17	3613	4.12	15.53

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 27	7/13/2011	10:11	7.05	17.54	3543	8.31	100
CL 27	2/1/2012	14:04	6.83	18.67	3520	2.35	-8
CL 27	8/9/2012	0:00	7	18	3534	2.23	183
CL 27	2/7/2013	14:07	6.83	17.15	3076	6.44	171
CL 27	9/18/2013	14:12	6.53	18.18	3647	3.4	219
CL 27	3/1/2014	--	6.92	17.52	3597	2.08	80
CL 27	9/10/2014	16:04	6.88	17.88	4031	2.7	89
CL 27	3/11/2015	14:45	6.99	17.45	3561	7.68	95.2
CL 27	6/29/2015	10:15	7.03	17.85	3664	2.14	103.2
CL 27	2/23/2016	11:28	7.11	16.83	3547	11.67	97.21
CL 27	8/2/2016	10:52	7.1	18.29	3630	5.96	33.4
CL 27	2/22/2017	10:07	7.68	22.96	3195	5.97	20
CL 27	8/16/2017	14:16	13.22	21.37	2619	66.2%	34.8
CL 27	1/29/2018	10:45	7.65	14.49	3084	47.2%	-27.5*
CL 27	7/23/2018	11:25	7.16	20.39	3058	5.34	265.4
CL 27	2/13/2019	12:00	7.89	15.62	3254	7.44	88.5
CL 27	7/18/2019	9:07	7.31	20.22	3490	3.99	1.7
CL 27	2/2/2020	12:18	7.67	19.99	3239	5.43	379
CL 27	8/3/2020	10:15	7.02	19.04	3317	2.42	489.3
CL 27	3/8/2021	13:59	7.09	18.12	3265	2.61	435
CL 27	7/21/2021	11:10	7.35	18.17	3668	2.26	27.0
CL 27	7/5/2022	11:00	7.55	22.25	3029	4.94	56.8
CL 28	7/12/2011	12:05	7.3	18.02	1916	6.57	76
CL 28	2/21/2012	11:20	7.13	17.61	2036	6.45	33
CL 28	7/17/2012	0:00	7.17	17.88	1973	7.01	158
CL 28	2/12/2013	14:28	7.04	17.72	1951	6.32	163
CL 28	8/13/2013	14:42	6.2	17.82	2010	6.34	145
CL 28	3/1/2014	--	7.1	17.9	2019	6.43	117
CL 28	10/23/2014	12:58	7.13	18.1	2274	6.36	94.6
CL 28	2/3/2015	14:35	7.25	18.01	2034	5.16	43.9
CL 28	6/23/2015	12:20	7.13	18.79	1944	7.32	70.5
CL 28	5/10/2016	13:28	6.83	19.73	1223	7.09	102
CL 28	8/7/2016	11:10	7.04	18.61	2086	6.75	83
CL 28	3/6/2017	11:15	7.25	18.52	2102	7.06	72.9
CL 28	4/11/2018	11:30	7.98	19.57	2470	7.01	620.1*
CL 28	9/6/2018	9:36	7.72	18.70	6	8.04	138
CL 28	3/14/2019	10:45	7.75	16.98	2037	6.88	68
CL 28	7/29/2019	8:10	7.64	21.07	2242	6.77	218
CL 28	7/28/2020	11:00	7.01	21.24	2165	5.87	363.2
CL 28	3/14/2021	9:30	7.22	17.45	2164	7.97	313
CL 28	8/16/2021	10:20	7.69	19.87	3368	9.16	51.2
CL 28	3/14/2022	11:30	7.28	18.92	2231	10.57	93.1
CL 28	7/18/2022	10:00	7.06	20.57	2103	10.20	106.4
CL 28	3/26/2023	10:00	7.72	17.27	2058	6.56	77.27
CL 29	7/7/2011	11:11	7.21	18.7	2940	7.36	65
CL 29	2/21/2012	10:50	7.12	18.02	2944	4.92	-4
CL 29	7/17/2012	0:00	7.22	19.8	2958	7.45	112
CL 29	4/3/2013	14:00	7.1	18.01	2726	6.26	-103
CL 29	9/16/2013	9:54	7.2	18.7	3103	0.63	-7
CL 29	3/1/2014	--	7.35	18.34	3098	0.15	-94
CL 29	2014	Down for Repairs					
CL 29	2/4/2015	10:35	7.41	18.31	2995	6.74	42
CL 29	6/22/2015	11:08	7.18	18.88	2987	7.2	59.7
CL 29	5/10/2016	13:42	7.03	22.63	1223	7.09	102
CL 29	8/7/2016	Dry??					
CL 29	2018	Out of service at time of 2018 sampling event					
CL 29	8/14/2018	8:30	1/7/1900	19.9	2613	6.22	212
CL 29	3/14/2019	9:00	7.79	15.05	3047	3.64	-126
CL 29	7/29/2019	7:45	7.89	26.22	3210	8.51	164.2
CL 29	2/26/2020	11:45	8.4	17.05	3026	9.54	127.9

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 30	7/7/2011	11:26	7.12	18.79	2719	4.51	62
CL 30	2/21/2012	13:35	7.08	17.96	2708	5.72	58
CL 30	7/17/2012	0:00	7.12	18.51	2644	5.29	141
CL 30	2/13/2013	10:48	6.99	18.17	2752	5.79	174
CL 30	9/16/2013	10:40	7.07	18.75	2651	6.13	46
CL 30	3/1/2014	--	7.09	18.66	2648	5.7	34
CL 30	2014	Down for Repairs					
CL 30	2015	Will not stay on long enough to get sample					
CL 30	2015	11:50	7.09	18.61	2466	6.59	52.5
CL 30	2016	12:10	7.18	18.99	2603	6.06	34.4
CL 30	8/16/2016	--	7.03	18.96	2680	5.81	77
CL 30	3/2/2017	9:10	7.25	17.9	2593	7.05	71.3
CL 30	10/25/2017	11:50	7.87	22.09	2246	89.2%	107
CL 30	2/28/2018	11:30	8.24	19.68	16123*	92%	-7.6*
CL 30	8/14/2018	8:45	7.31	19.79	2625	6.19	208
CL 30	3/14/2019	9:45	7.84	15.3	2375	7.13	-15
CL 30	7/29/2019	10:00	7.43	20.62	2508	6.72	205
CL 30	2/26/2020	10:30	8.21	18.21	2218	5.95	103.2
CL 31	7/7/2011	10:43	7.05	18.36	3063	3.04	87
CL 31	2/21/2012	10:00	7.05	17.94	3015	5.41	114
CL 31	7/19/2012	0:00	6.78	18.38	3100	1.93	194
CL 31	4/3/2013	14:15	6.97	18.02	3023	2.32	107
CL 31	8/19/2013	12:30	6.7	18.48	3053	2.81	240
CL 31	3/1/2014	--	7.11	18.28	3070	4.43	195
CL 31	10/14/2014	15:20	7.06	19.9	3010	3.99	114.5
CL 31	2/4/2015	10:20	7.14	17.99	3184	2.92	100.5
CL 31	6/22/2015	10:05	6.86	18.3	3035	3.83	103.8
CL 31	2/14/2016	13:45	7.07	18.17	3221	2.55	86.5
CL 31	8/16/2016	--	6.86	20.61	3016	2.17	85.9
CL 31	2/20/2017	11:04	7.38	21.55	3266	616*	69.8
CL 31	8/9/2017	9:56	7.48	18.79	1568	3.8	97.2
CL 31	2018	Out of service at time of 2018 sampling event					
CL 31	2/11/2019	11:30	7.73	18.23	1865	3.7	53.4
CL 31	7/17/2019	10:50	7.18	20.49	1425	6.93	196.2
CL 31	3/1/2020	11:45	7.99	18.96	2655	3.32	
CL 31	7/23/2020	10:15	7.08	21.36	838	6.83	563.1
CL 31	3/8/2021	10:00	7.46	17.36	3389	8.2	329.7
CL 31	7/14/2021	13:57	7.73	19.61	1632	6.31	4621
CL 32/MO 16	7/7/2011	12:10	6.98	18.69	4291	2.81	67
CL 32/MO 16	2/22/2012	10:20	6.89	18.18	4352	2.72	83
CL 32/MO 16	7/11/2012	0:00	6.85	19.36	4412	2.8	182
CL 32/MO 16	2013	No Data					
CL 32/MO 16	8/13/2013	13:58	6.08	17.47	4521	1.98	88
CL 32/MO 16	3/1/2014	--	7.28	17.92	4281	7.66	29
CL 32/MO 16	10/23/2014	11:28	7.25	18.31	4371	8.73	64
CL 32/MO 16	2/4/2015	13:42	7.26	18.56	4516	3.43	55.7
CL 32/MO 16	6/23/2015	11:38	7.04	18.17	5190	0.15	18.6
CL 32/MO 16	2/24/2016	13:05	7.16	17.71	4954	6.46	74
CL 32/MO 16	8/16/2016	--	7	18.17	5111	4.4	76.3
CL 32/MO 16	3/1/2017	9:00	7.78	16.38	4687	9	155
CL 32/MO 16	10/25/2017	9:30	7.79	15.71	3747	127.5%	87.6
CL 32/MO 16	4/11/2018	11:15	7.2	20.69	5502.1*	9.2	597.0*
CL 32/MO 16	8/8/2018	8:30	7.26	19.44	3237	12	193
CL 32/MO 16	3/6/2019	12:00	7.98	16.54	4893	10.46	84
CL 32/MO 16	7/28/2019	10:20	7.6	22.13	4753	6.92	92.5
CL 32/MO 16	2/26/2020	13:00	8.24	17.81	2547	7.92	124.5
CL 32/MO 16	7/28/2020	9:30	7.03	20	3835	12.14	378.6
CL 32/MO 16	3/15/2021	11:53	7.14	18.39	4068	12.30	397.1
CL 32/MO 16	8/22/2021	10:50	7.66	19.6	4075	8.66	48.9
CL 32/MO 16	3/15/2022	14:20	7.80	18.83	4303	7.26	53.7

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 33/MO 7	7/13/2011	9:56	7.17	17.96	2845	6.29	142
CL 33/MO 7	2/7/2012	14:35	6.98	17.65	3027	5.47	11
CL 33/MO 7	8/9/2012	0:00	7.07	17.88	3014	5.4	208
CL 33/MO 7	2/7/2013	13:45	6.64	17.76	2939	5.31	247
CL 33/MO 7	9/11/2013	15:35	6.89	18	2975	5.41	126
CL 33/MO 7	3/1/2014	--	6.94	18.05	2936	4.74	127
CL 33/MO 7	9/10/2014	15:42	6.93	18.46	3099	4.43	99
CL 33/MO 7	3/11/2015	14:23	7.02	17.97	2971	4.94	92.2
CL 33/MO 7	6/29/2015	9:17	7.04	18.27	2960	6.64	104
CL 33/MO 7	2/23/2016	11:54	7.17	17.62	2879	6.75	96.3
CL 33/MO 7	8/2/2016	--	7.42	19.05	2708	7.1	55.2
CL 33/MO 7	2/22/2017	10:18	7.6	24.75	2438	5.9	81.7
CL 33/MO 7	8/16/2017	13:46	2.73	21.33	2569	81.1%	251
CL 33/MO 7	2018	Out of service at time of 2018 sampling event					
CL 33/MO 7	8/15/2018	13:22	1/7/1900	24.64	2093	4.02	221
CL 33/MO 7	2/13/2019	10:00	7.73	17.74	1931	6.21	-57
CL 33/MO 7	7/18/2019	7:55	7.65	24.18	2145	3.6	30.2
CL 33/MO 7	2/2/2020	9:30	8.38	17.72	1908	4.74	28.4
CL 33/MO 7	8/3/2020	7:30	7.84	19.77	1852	0.73	147.1
CL 33/MO 7	3/8/2021	10:00	7.46	17.36	3389	8.20	329.7
CL 33/MO 7	7/21/2021	8:49	7.55	19.1	2547	3.11	17.6
CL 33/MO 7	6/30/2022	7:36	7.71	18.88	2873	4.69	13.7
CL 33/MO 7	3/14/2023	9:45	7.79	16.35	2352	9.09	88.29
CL 34	8/9/2011	14:25	7.31	18.81	3869	6.74	-20
CL 34	2/21/2012	13:16	7.04	18.38	3714	6.43	63
CL 34	8/8/2012	0:00	7.26	18.55	3749	6.63	167
CL 34	2/18/2013	14:20	7.07	18.52	3742	6.04	141
CL 34	9/3/2013	15:08	7.07	18.63	3775	5.88	100
CL 34	3/1/2014	--	7.06	18.46	3807	5.63	45
CL 34	9/9/2014	13:30	6.84	19.1	3874	5.31	137
CL 34	2/3/2015	12:30	7.03	18.51	4504	5.18	76.9
CL 34	6/30/2015	13:20	7.09	19.06	3692	6.31	56.4
CL 34	2/11/2016	14:40	7.55	18.18	3980	6.49	28.9
CL 34	8/15/2016	15:50	7.02	19.5	3941	5.88	60
CL 34	9/6/2017	10:00	7.33	19.7	3198	23.7%	102
CL 34	2/6/2018	10:10	7.07	20.13	3419	74.8%	75.2
CL 34	9/6/2018	10:20	7.87	19.46	4353	5.01	123
CL 34	2/21/2019	12:30	7.84	21.23	4146	5.99	134
CL 34	7/22/2019	13:46	7.37	24.56	2416	6.78	162.3
CL 34	8/3/2021	9:30	7.68	19.18	2153	7.99	48.48
CL 35	8/8/2011	16:15	7.43	18.3	2016	6.95	10
CL 35	2/7/2012	13:15	7.35	18.14	1940	6.48	-8
CL 35	8/8/2012	0:00	7.34	18.28	2108	7.25	135
CL 35	2/19/2013	12:12	7.29	18.23	2239	5.76	131
CL 35	9/11/2013	15:00	6.93	18.33	2472	6.23	90
CL 35	3/1/2014	--	7.3	18.41	2427	5.51	34
CL 35	9/9/2014	16:06	7.26	18.56	2748	6.4	76
CL 35	2/3/2015	11:55	7.23	18.61	2823	4.9	57.2
CL 35	6/30/2015	13:04	7.38	18.55	2454	5.68	36.5
CL 35	2/14/2016	12:20	7.27	18.57	2655	5.44	35
CL 35	8/15/2016	17:40	7.29	18.34	2914	6.23	37
CL 35	2/27/2017	9:45	7.62	17.32	2827	5.01	142.6
CL 35	9/6/2017	12:00	7.97	20.31	1426	69.1%	102.5
CL 35	2/5/2018	11:09	7.62	18.81	16027*	0.25	13.5
CL 35	7/24/2018	10:35	7.8	25.9	1984	5.53	277.4
CL 35	2/20/2019	13:30	8.12	19.95	1703	5.51	103
CL 35	7/22/2019	9:00	7.67	19.96	2138	2.06	42.4
CL 35	2/9/2020	12:30	8.18	18.83	1657	1.78	29.2
CL 35	8/12/2020	7:30	7.62	18.88	2059	4.65	388.6
CL 35	2/23/2021	11:00	7.41	18.62	1649	2.53	148.6
CL 35	8/3/2021	10:00	8.01	19.52	1798	1.85	29.1
CL 35	3/2/2022	12:30	6.80	18.75	3490	6.36	101.2
CL 35	7/12/2022	12:17	7.28	21.28	1908	1.81	-8.4

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 36	7/26/2011	14:14	7.2	18.3	2152	6.01	10
CL 36	2/21/2012	12:21	7.26	18.16	1933	5.71	39
CL 36	8/8/2012	0:00	7.45	18.46	2650	5.93	180
CL 36	2/19/2013	11:30	6.82	18.23	2715	5.6	176
CL 36	9/12/2013	15:05	6.84	18.47	2978	6.39	112
CL 36	3/1/2014	--	7.22	18.42	2672	5.38	8
CL 36	10/28/2014	14:39	7.18	18.48	3120	4.19	71.4
CL 36	2/3/2015	13:29	7.23	18.38	3228	4.6	34.7
CL 36	6/30/2015	13:01	7.11	20.51	2331	5.52	69.4
CL 36	2/14/2016	11:12	7.08	18.7	2690	5.55	44.5
CL 36	8/16/2016	9:15	7.17	18.43	3102	5.28	49.1
CL 36	2/27/2017	10:00	7.82	19.24	1698	7.08	14.6
CL 36	9/6/2017	11:15	7.93	20.49	1468	69.3%	77.3
CL 36	2/5/2018	10:45	7.83	16.44			-58.2*
CL 36	2/6/2018	10:10	7.07	20.13	3419	74.8%	75.2
CL 36	7/24/2018	12:00	7.48	19.85	2031	5.79	248.7
CL 36	2/20/2019	15:00	7.93	18.97	2466	7.19	-11.8
CL 36	7/22/2019	14:07	7.46	23.16	2391	7.21	160.2
CL 36	2/9/2020	15:30	7.93	18.43	1744	5.61	77.1
CL 36	8/12/2020	11:09	7.46	20.91	1863	4.67	584
CL 36	2/28/2021	14:30	7.27	18.61	1752	4.09	78.3
CL 36	8/3/2021	10:15	7.97	21.11	14	3.87	34.1
CL 36	3/2/2022	10:00	7.09	18.85	1305	4.98	87.1
CL 36	7/12/2022	11:20	7.27	25.29	1563	6.06	33.2
CL 37	7/12/2011	13:24	7.16	17.5	2999	1.36	41
CL 37	2/6/2012	14:28	7.03	17.4	2930	1.35	-11
CL 37	8/9/2012	0:00	7.25	17.55	2205	7.76	190
CL 37	2/12/2013	13:42	7.04	17.74	2981	1.23	164
CL 37	9/13/2013	9:12	6.92	17.55	2898	3.38	150
CL 37	3/1/2014	--	6.99	18.07	3029	0.82	62
CL 37	10/20/2014	12:47	6.99	17.99	3236	6.41	88.3
CL 37	2/3/2015	13:27	7.13	17.54	2904	8.25	59.3
CL 37	6/25/2015	14:26	7.15	18.56	3086	5.98	81.7
CL 37	2/23/2016	14:34	7.22	17.65	2480	11.9	79.1
CL 37	8/2/2016	12:10	7.15	18.43	2346	9.92	76.7
CL 37	3/9/2017	10:45	7.36	19.61	2757	7.83	102.5
CL 37	9/14/2017	10:20	7.45	19.53	2433	100.2%	147.9
CL 37	2/22/2018	10:00	8.05	14.56	11481*	96.4%	17.1
CL 37	8/7/2018	12:30	7.30	21.58	2605	5.07	193
CL 37	2/25/2019	14:15	8.08	14.5	1893	8.63	128
CL 37	7/30/2019	8:00	7.67	20.8	2750	7.07	180.5
CL 37	7/24/2022	6:30	7.03	20.17	2169	8.07	42.3
CL 38	7/7/2011	11:18	7.09	18.3	3159	2.5	60
CL 38	2/21/2012	10:58	7.04	17.71	3130	3.63	48
CL 38	7/11/2012	0:00	6.86	17.91	3166	2.71	166
CL 38	2/13/2013	11:16	7.13	17.64	3180	3.08	179
CL 38	8/13/2013	9:18	6.07	22.65	2999	4.57	156
CL 38	3/1/2014	--	7.04	17.92	3144	3.86	130
CL 38	9/4/2014	14:34	6.9	18.14	3148	3.16	133
CL 38	2/4/2015	10:48	7.19	17.95	3251	3.37	72.6
CL 38	6/22/2015	11:15	7.04	18.1	3277	3.45	89.6
CL 38	5/10/2016	13:53	7.07	18.79	3516	0.65	-10.8
CL 38	8/1/2016	11:46	6.86	19.27	3388	3.13	96.5
CL 38	3/6/2017	10:48	7.28	17.97	3343	5.4	110.4
CL 38	10/24/2017	12:30	7.41	18.93	2024	59.1%	100.2
CL 38	2018	Out of service at time of 2018 sampling event					
CL 38	8/4/2021	12:40	7.39	18.61	2883	2.23	44.5
CL 38	2/28/2022	12:52	6.83	18.61	3052	1.86	81.2

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 39	7/12/2011	12:35	7	18.41	4116	10.55	90
CL 39	1/26/2012	11:20	6.79	17.01	4072	8.07	77
CL 39	7/24/2012	0:00	6.85	20.95	2899	6.11	202
CL 39	2/12/2013	12:58	6.91	16.64	4025	9.44	187
CL 39	9/13/2013	9:42	6.7	17.16	4064	7.43	137
CL 39	3/1/2014	--	6.52	17.21	3755	8.28	128
CL 39	10/14/2014	16:20	6.9	17.27	3780	9.2	78
CL 39	3/11/2015	13:06	6.86	17.68	3886	13.14	121.3
CL 39	6/25/2015	13:15	6.8	17.77	4113	13.86	115.9
CL 39	2/28/2016	14:25	7.16	17.81	4012	12.77	97.2
CL 39	8/7/2016	10:15	6.82	18.3	3755	4.1	44
CL 39	3/6/2017	12:09	7	17.98	3291	4.78	25.8
CL 39	9/14/2017	10:52	7.48	19.24	3388	114.1%	146.4
CL 39	3/1/2018	12:00	8.61	15.83	14848*	84.4%	159
CL 39	8/6/2018	11:00	7.01	19.23	4428	5.89	180
CL 39	8/1/2019	11:21	7.87	22.42	2510	6.16	242
CL 39	2/19/2020	10:20	8.02	17.76	2174	5.89	123
CL 39	8/11/2020	9:38	7.07	18.11	3239	5.14	488
CL 39	7/26/2022	12:30	6.61	20.07	3162	4.42	51.3
CL 40	7/12/2011	12:27	7.11	18.49	2874	5.99	76
CL 40	1/31/2012	14:27	3.05	17.99	2885	6.44	25
CL 40	8/2/2012	0:00	7.19	18.53	2897	6.36	179
CL 40	2/12/2013	12:44	6.98	17.32	2857	6.17	177
CL 40	9/13/2013	10:13	6.83	18.26	2889	6.33	117
CL 40	3/1/2014	--	7	17.85	2891	6.03	100
CL 40	10/14/2014	16:12	7.02	18.48	2661	6.16	65.2
CL 40	2/3/2015	13:12	7.1	17.86	3295	6.18	96.5
CL 40	6/23/2015	12:49	7.03	18.75	2928	6.65	57.2
CL 40	2/22/2016	13:49	7.13	18.01	2967	6.65	48.8
CL 40	8/7/2016	11:00	7.01	19.53	2690	1	-17
CL 40	3/6/2017	11:36	7.14	18.94	2812	6.76	39.4
CL 40	9/19/2017	8:52	7.81	18.89	2440	96.6%	113.8
CL 40	2018	Out of service at time of 2018 sampling event					
CL 40	2/26/2019	13:30	7.85	19.5	2903	7.45	40.2
CL 40	8/1/2019	10:15	7.76	2397	2816	6.83	-3.4
CL 40	2/23/2020	8:30	7.89	17.72	2128	6.8	116.6
CL 40	8/11/2020	9:00	7.3	19.37	2632	6.55	460.5
CL 40	3/16/2021	10:00	7.12	18.29	2644	6.60	433.8
CL 40	8/12/2021	10:30	7.68	19.14	3032	6.45	44.5
CL 40	3/9/2022	10:00	7.51	17.89	2826	10.03	84.3
CL 40	7/26/2022	10:00	7.05	20.16	2412	6.18	50.3
CL 40	3/21/2023	12:00	7.57	18.57	2555	6.63	80.50
CL 41	7/12/2011	13:33	7.06	18.14	3576	1.56	43
CL 41	1/26/2012	13:44	6.83	17.51	3574	3.59	28
CL 41	7/19/2012	0:00	7.17	17.88	3482	5.59	217
CL 41	2/12/2013	13:28	6.94	17.15	3510	1.72	165
CL 41	9/12/2013	16:40	6.98	18.68	3075	6.31	111
CL 41	3/1/2014	--	7.12	19.84	2889	8.04	73
CL 41	10/20/2014	9:47	6.99	17.54	4023	1.61	81.9
CL 41	3/11/2015	13:39	7.06	18.38	3522	1.42	97.3
CL 41	6/25/2015	14:04	7.01	17.85	3596	1.59	92.8
CL 41	2/23/2016	14:08	7.12	17.14	3584	1.6	96.9
CL 41	8/2/2016	11:55	7.05	18.16	3488	1.43	76.6
CL 41	2/27/2017	10:59	7.63	17.5	3251	5.6	113.8
CL 41	9/14/2017	10:00	7.56	19.27	2683	4.6	55.7
CL 41	2/20/2018	11:45	7.12	19.17	16283*	51.6%	-5.3*
CL 41	8/7/2018	12:15	7.17	17.84	3751	0.44	391
CL 41	2/25/2019	13:30	7.69	17.13	3214	6.16	146
CL 41	7/30/2019	13:00	7.32	22.1	32.6*	2.4	470.2
CL 41	2/19/2020	9:45	7.98	17.1	3292	1.86	123.5
CL 41	8/4/2020	11:00	7.14	19.55	3021	1.59	521
CL 41	3/21/2021	11:30	7.17	18.35	2957	1.42	342
CL 41	8/11/2021	8:00	7.65	18.7	2907	1.59	17.3
CL 41	7/24/2022	7:30	6.86	18.08	3162	0.94	62.3

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 42	7/12/2011	12:57	7.11	18.44	3383	3.74	62
CL 42	1/26/2012	12:26	6.94	17.75	3326	4.41	28
CL 42	8/2/2012	0:00	6.99	18.37	3379	3.88	73
CL 42	2/12/2013	13:17	7.02	17.08	3311	3.83	107
CL 42	9/13/2013	9:22	6.85	17.56	3423	4.11	144
CL 42	3/1/2014	--	6.98	17.54	3387	4.1	97
CL 42	10/20/2014	9:35	7	17.54	3919	3.67	87.1
CL 42	2/5/2015	12:03	7.01	17.41	3941	3.6	93
CL 42	6/25/2015	13:55	7.03	17.99	3539	4.1	95.9
CL 42	5/26/2016	11:35	7.14	19.14	3336	3.63	71
CL 42	8/7/2016	9:40	6.8	17.81	2508	3.84	74.7
CL 42	3/9/2017	Does not run					
CL 42	9/13/2017	11:12	7.77	19.99	2907	77.9%	179.4
CL 42	2/22/2018	10:52	7.91	16.91	13449*	81.5%	87
CL 42	8/6/2018	13:45	7.15	18.19	3184	2.59	234
CL 42	2/25/2019	12:00	7.54	17.81	3404	3.76	109.8
CL 42	7/30/2019	14:15	7.56	21.37	81	6.8	360.1
CL 42	2/23/2020	11:30	8.14	16.83	1806	8.22	94.2
CL 42	8/4/2020	10:00	7.14	20.5	3275	4.42	492.9
CL 42	7/24/2022	8:30	6.74	22.96	2985	6.84	97.2
CL 42	3/27/2023	12:30	7.73	18.02	2489	3.62	36.10
CL 43	7/7/2011	11:01	7.13	17.59	3054	4.79	77
CL 43	2/21/2012	11:08	7.03	17.13	2977	5.04	59
CL 43	7/16/2012	0:00	7.06	17.22	3030	5.41	185
CL 43	2/13/2013	10:59	7.02	17.07	2800	5.51	183
CL 43	9/16/2013	10:06	6.95	17.43	2974	5.8	96
CL 43	3/1/2014	--	7.04	17.4	2879	5.02	114
CL 43	10/23/2014	13:09	7.06	17.65	3187	5.05	96.6
CL 43	2/4/2015	12:35	7.22	18.17	2576	5.17	92.4
CL 43	6/22/2015	10:55	7.09	17.72	2855	5.31	89.5
CL 43	5/26/2016	12:23	7.17	18.18	2780	5.16	74.1
CL 43	8/1/2016	11:27	7.02	18.57	2760	5.25	91.9
CL 43	3/2/2017	8:55	7.19	16.2	2725	6.18	80.2
CL 43	10/25/2017	11:40	7.8	19.32	2262	73.8%	115
CL 43	2/28/2018	11:45	7.72	17.92	155940*	73.2%	-3.8*
CL 43	8/14/2018	8:50	7.25	18.36	2779	5.14	218
CL 43	3/14/2019	9:15	7.68	13.88	2586	6.26	-13
CL 43	7/29/2019	10:15	7.3	20.1	2670	5.6	140
CL 43	2/26/2020	11:00	7.98	17.81	2245	4.52	123.3
CL 43	7/29/2020	9:30	7.25	19.26	2275	4.29	505
CL 44	7/12/2011	12:15	7.28	18.44	2376	7.36	75
CL 44	1/26/2012	10:55	7.05	17.54	2324	8.64	69
CL 44	7/24/2012	0:00	7.23	17.73	2313	8.28	96
CL 44	2/12/2013	12:33	7.03	17.59	2281	7.27	147
CL 44	9/13/2013	10:04	7	17.8	2353	7.96	94
CL 44	3/1/2014	--	7.13	17.91	2229	7.33	75
CL 44	10/14/2014	16:20	7.13	18.03	2263	7.47	87.2
CL 44	3/16/2015	10:00	7.2	17.81	2488	7.44	94.6
CL 44	6/23/2015	13:10	7.15	18.12	2330	8.1	86.9
CL 44	2/18/2016	13:40	7.21	18.1	2280	7.78	87.7
CL 44	8/7/2016	10:55	7.13	18.48	2266	7.38	85.5
CL 44	3/6/2017	11:46	7.37	1910	2190	7.66	54.1
CL 44	9/19/2017	9:00	7.8	18.73	1914	98.5%	79.4
CL 44	3/1/2018	12:30	7.92	16.78	15397*	97.2%	18.2
CL 44	7/31/2018	9:50	7.29	18.34	2196	7.72	223
CL 44	2/26/2019	14:30	7.94	21.37	2047	6.84	85
CL 44	8/1/2019	10:30	7.79	22.84	2267	6.72	4.53
CL 44	2/23/2020	9:00	7.95	17.54	2109	7.31	85.8
CL 44	8/11/2020	8:30	7.41	18.78	3546	6.99	476.7
CL 44	3/16/2021	10:30	7.16	17.77	3197	7.37	358
CL 44	8/12/2021	10:47	7.56	20.93	4001	21.6	74.5
CL 44	3/21/2023	13:00	DRY	DRY	DRY	DRY	DRY

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 45	7/13/2011	10:04	6.98	19.46	3780	3.43	118
CL 45	2/1/2012	14:30	6.73	18.5	3782	4.76	26
CL 45	8/9/2012	0:00	6.97	19.48	3721	3.92	181
CL 45	2/7/2013	13:57	6.71	18.4	3704	3.32	168
CL 45	9/11/2013	15:45	6.66	18.91	3777	3.75	136
CL 45	3/1/2014	--	6.85	19.15	3814	3.54	80
CL 45	9/10/2014	15:54	6.86	18.61	3752	7.02	106
CL 45	3/11/2015	14:32	6.92	17.76	3904	4.7	96.7
CL 45	6/29/2015	9:38	6.95	18.02	3807	4.16	83.5
CL 45	2/23/2016	11:40	7.01	17.32	4010	5.16	92.1
CL 45	8/2/2016	10:45	7.03	18.39	3851	8.18	87.4
CL 45	2/28/2017	9:00	7.08	17.71	3725	4.28	115.3
CL 45	8/16/2017	13:56	8.75	21.1	2986	69.8%	71.2
CL 45	1/29/2018	10:36	7.85	15.66	3229	64.3%	-87.5*
CL 45	7/23/2018	11:00	6.89	19.85	38817*	4.36	302.3
CL 45	2/13/2019	11:30	7.51	17.77	3860	6.65	79.5
CL 45	7/18/2019	8:18	7.13	20.95	4264	5.2	121.5
CL 45	2/2/2020	11:45	7.43	18.03	3973	4.15	481
CL 45	8/3/2020	9:15	6.87	19.86	3895	5.47	399
CL 45	3/8/2021	11:00	7.01	18.58	3209	0.37	467.4
CL 45	7/21/2021	10:15	7.39	19.38	3154	7.31	51.9
CL 45	3/1/2022	11:00	6.76	18.03	3964	3.65	86.3
CL 46	7/12/2011	12:46	7.18	18.64	2429	4.15	59
CL 46	1/26/2012	11:58	7.02	18.43	2469	5.17	48
CL 46	8/2/2012	0:00	7.06	20.2	2747	4.74	56
CL 46	2013	Out of service at time of 2013 sampling event					
CL 46	9/13/2013	9:32	7	18.28	2458	4.64	127
CL 46	3/1/2014	--	7.1	18.33	2466	4.27	68
CL 46	10/20/2014	9:20	7.04	18.3	3317	5.46	77.7
CL 46	2/5/2015	11:40	7.16	18.17	2869	4.18	83.3
CL 46	6/25/2015	13:45	7.16	18.79	2545	4.7	83.6
CL 46	3/6/2016	11:15	18.43	18.43	2499	4.68	75
CL 46	8/7/2016	Down for repairs					
CL 46	9/12/2017	11:30	7.62	21.73	2177.9	86.8%	145.8
CL 46	2/22/2018	11:30	7.81	16.36	12552*	90.2%	35.7
CL 46	8/15/2018	12:48	7.43	21.77	2290	4.32	436
CL 46	2/25/2019	13:00	7.74	19.21	2377	6.6	129.5
CL 46	7/30/2019	13:15	7.29	22.6	70.0*	5.7	286.3
CL 46	2/19/2020	12:00	7.87	18.6	2879	6.06	157.8
CL 46	8/4/2020	9:00	7.07	20.48	3329	4.5	438
CL 46	3/21/2021	8:00	7.03	17.13	3542	3.72	264
CL 46	8/11/2021	12:45	7.58	22.68	2955	4.73	26.9
CL 47	8/9/2011	15:35	7.04	17.62	3347	7.42	29
CL 47	1/26/2012	10:15	6.91	17.01	3340	8.33	90
CL 47	8/2/2012	0:00	6.99	17.62	3305	7.33	196
CL 47	2/12/2013	12:23	6.76	17.14	3253	6.52	198
CL 47	9/13/2013	9:55	6.88	17.64	3133	6.7	63
CL 47	3/1/2014	--	6.94	17.49	3205	6.99	94
CL 47	10/14/2014	15:54	7.01	18.08	3010	7.54	91
CL 47	2015	Down for repairs					
CL 47	6/23/2015	13:47	6.98	18.03	3290	7.78	94.6
CL 47	2/18/2016	13:12	7	17.66	3373	7.53	89.14
CL 47	8/7/2016	10:17	6.73	18.08	3352	7.08	94.8
CL 47	3/6/2017	11:56	7.2	18.54	3196	7.58	71.8
CL 47	9/19/2017	9:25	7.79	19.15	2760	94.6%	98.9
CL 47	3/1/2018	12:15	7.86	15.3	15387*	92.0%	33.3
CL 47	7/31/2018	9:30	7.17	18.03	3243	9.72	223
CL 47	2/26/2019	15:00	8.2	23.63	2496	6.53	133.7
CL 47	8/1/2019	10:53	7.71	30.16	3382	4.87	195.1
CL 47	2/23/2020	10:00	7.99	14.22	2177	9.03	86.8
CL 47	7/26/2022	12:00	6.38	18.42	2765	6.63	108.5

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
CL 48	7/7/2011	10:51	7.18	18.73	1898	6.32	83
CL 48	2/21/2012	10:40	7.13	18.53	1880	6.58	55
CL 48	7/16/2012	0:00	7.07	18.96	1934	7.38	131
CL 48	2/12/2013	14:37	7.15	18.24	1905	7.06	157
CL 48	8/13/2013	12:55	6.4	18.76	1831	6.68	160
CL 48	3/1/2014	--	7.18	18.56	1750	6.13	72
CL 48	9/4/2014	14:25	7.01	18.67	1733	6.13	122
CL 48	2/2/2015	14:35	7.16	18.6	1738	5.88	76.3
CL 48	6/22/2015	10:45	7.18	18.78	1490	6.11	24.3
CL 48	2/24/2016	14:38	7.23	18.35	1779	6.61	84.7
CL 48	8/1/2016	No Data					
CL 48	3/9/2017	10:55	7.57	20.16	2893	7.45	71
CL 48	10/25/2017	12:26	8.39	23.67	2106	119.2%	90.3
CL 48	2018	Out of service at time of 2018 sampling event					
CL 48	8/14/2018	11:00	7.45	19.77	2048	8.31	335
CL 48	2019	Out of service at time of 2019 sampling event					
CL 48	8/16/2021	10:10	7.96	20.32	960	7.01	51
NE of Plot 6	7/21/2011	14:00	7.16	18.99	2724	8.36	9
NE of Plot 6	1/25/2012	11:40	7.25	18.05	2674	7.91	95
NE of Plot 6	7/19/2012	0:00	7.06	18.92	2832	8.2	84
NE of Plot 6	2/28/2013	13:43	7.37	18.83	2781	7.79	172
NE of Plot 6	8/19/2013	13:43	6.84	19.12	2792	7.2	92
NE of Plot 6	3/1/2014	--	7.12	18.69	2802	6.57	48
NE of Plot 6	10/20/2014	10:45	7.17	19.06	3227	6.91	58.1
NE of Plot 6	2/8/2015	13:18	6.99	18.88	2872	6.65	48.4
NE of Plot 6	7/14/2015	15:20	7.16	19.2	2685	7.65	57
NE of Plot 6	2/10/2016	13:00	7.25	18.66	2472	7.39	58.2
NE of Plot 6	2018	Not sampled 2018 (Pump not wired)					
Plot 7 - 9	8/9/2011	15:15	7.1	18.59	3061	6.44	5
Plot 7 - 9	2/21/2012	11:22	6.94	18.02	3164	6.16	67
Plot 7 - 9	8/2/2012	0:00	7.37	18.47	3081	6.97	162
Plot 7 - 9	2/14/2013	15:06	7.26	18.32	3105	6.52	192
Plot 7 - 9	9/13/2013	10:20	6.8	18.52	3354	6.25	124
Plot 7 - 9	3/1/2014	--	6.9	18.46	3340	6.3	131
Plot 7 - 9	10/28/2014	13:28	6.86	18.78	3375	5.61	117
Plot 7 - 9	2/4/2015	11:30	7.03	18.42	3358	5.49	92.5
Plot 7 - 9	4/2/2018	11:30	6.99	18.17	1676*	8.92	45.3
Plot 7 - 9	8/6/2018	10:30	6.99	18.7	3804	4.7	182
Plot 7 - 9	2/24/2019	13:30	7.56	17.81	2844	7.46	92
Plot 7 - 9	7/21/2019	7:00	6.89	18.67	4059	4.83	125
Plot 7 - 9	2/16/2020	12:00	7.77	17.9	2625	7.12	103.1
Plot 7 - 9	8/17/2020	10:00	6.89	18.61	3565	5.28	515.6
Plot 7 - 9	2/28/2021	12:30	6.85	18.44	3510	5.11	243.9
Plot 7 - 9	7/11/2021	11:00	7.21	18.7	3555	5.12	54.7
Plot 7 - 9	2/20/2022	15:30	7.54	18.72	3443	5.26	86.4
Plot 7 - 9	6/12/2022	14:40	6.98	19.04	3294	5.31	74.9
Plot 7 - 9	2/26/2023	9:20	7.31	18.43	3213	5.27	36.6

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
N of Plot 15	7/20/2011	13:34	6.95	18.78	2493	3.83	18
N of Plot 15	1/19/2012	12:23	6.88	18.86	2453	4.24	152
N of Plot 15	7/23/2012	0:00	6.92	18.77	2406	4.29	193
N of Plot 15	2/19/2013	15:28	7.29	18.7	2426	4.56	163
N of Plot 15	8/22/2013	13:24	7.21	21.36	2188	3.81	110
N of Plot 15	3/1/2014	--	6.96	18.51	2432	3.51	91
N of Plot 15	10/20/2014	12:33	6.97	18.89	2708	3.91	76.2
N of Plot 15	2/10/2015	10:38	7.01	18.57	2501	3.96	83.6
N of Plot 15	7/15/2015	15:16	7	22.18	2463	7.42	79.8
N of Plot 15	2/18/2016	10:21	7.03	18.6	2563	4.09	75.9
N of Plot 15	12/20/2016	10:45	6.94	18.64	2120	4.32	85.1
N of Plot 15	4/11/2018	9:30	7.07	18.84	4425.2*	6.81	527.9*
N of Plot 15	8/15/2018	10:30	7.23	19.40	2614	4.62	357
N of Plot 15	3/5/2019	12:00	7.65	18.45	2511	11.18	87
N of Plot 15	7/21/2019	11:20	7.29	23.05	2772	6.16	355
N of Plot 15	2/16/2020	14:45	7.79	18.9	2208	5.07	246.3
N of Plot 15	8/18/2020	8:45	7.13	18.61	2234	4.95	487.6
N of Plot 15	3/7/2021	13:15	7.16	18.45	2245	5.40	370
N of Plot 15	8/15/2021	12:00	7.59	18.80	2535	4.98	368
N of Plot 15	2/13/2022	2:25	7.56	18.66	2197	4.63	73.5
N of Plot 15	6/26/2022	12:25	7.51	18.84	2077	4.90	57.4
N of Plot 15	2/12/2023	9:40	7.30	18.5	1979	5.37	38.7
N of Schoppa	8/4/2011	10:39	6.97	18.71	2781	5.46	6
N of Schoppa	1/25/2012	14:24	6.81	18.19	2932	5.03	35
N of Schoppa	7/24/2012	0:00	6.86	18.96	2957	4.77	100
N of Schoppa	3/4/2013	12:51	6.84	19.16	2935	4.42	137
N of Schoppa	9/10/2013	13:20	6.8	18.89	3013	4.69	83
N of Schoppa	3/1/2014	--	7.02	18.73	3104	4.4	81
N of Schoppa	10/20/2014	13:39	6.91	19.13	3224	3.44	68.4
N of Schoppa	2/12/2015	10:50	7	18.3	3164	4.83	25
N of Schoppa	7/24/2015	9:46	6.97	19.02	2972	4.45	61.8
N of Schoppa	3/7/2016	9:45	6.94	18.74	3056	3.86	62.5
N of Schoppa	12/28/2016	10:00	6.94	18.76	2381	2.18	63.6
N of Schoppa	4/2/2018	9:45	7.13	17.9	16.45*	8.68	45.8
N of Schoppa	8/6/2018	13:00	7.12	18.93	2923	3.52	264
N of Schoppa	3/5/2019	14:30	7.57	18.52	3077	3.13	31
N of Schoppa	7/21/2019	12:20	7.11	18.9	2772	4.68	304
N of Schoppa	2/18/2020	12:55	7.99	18.3	2812	9.26	80.4
N of Schoppa	8/18/2020	9:15	7.07	18.82	2805	1.75	404
N of Schoppa	3/7/2021	14:20	7.09	18.63	2520	1.06	357.3
N of Schoppa	8/23/2021	11:30	7.48	19.01	4181	6.98	50.1
N of Schoppa	3/15/2022	9:30	7.35	18.61	4133	6.01	54.3
N of Schoppa	7/31/2022	6:30	8.09	18.99	3756	5.44	33.9
N of Schoppa	3/28/2023	11:40	7.34	17.32	3514	--	29.1
Plot 7	7/28/2011	12:09	6.97	17.72	3196	7.75	34
Plot 7	1/25/2012	13:33	6.85	17.04	2823	8.41	60
Plot 7	7/18/2012	11:45	6.92	17.92	2914	8.26	137
Plot 7	3/4/2013	11:22	6.98	17.97	2563	8	186
Plot 7	8/26/2013	14:03	6.83	18.13	2539	8.27	120
Plot 7	3/1/2014	--	7.07	17.72	2516	7.95	85
Plot 7	10/16/2014	12:46	7.02	18.26	2765	7.85	80
Plot 7	2/18/2015	11:13	7.08	17.79	2585	7.8	79.2
Plot 7	7/20/2015	9:35	7.1	18.31	2624	8.32	78.2
Plot 7	2/18/2016	11:44	7.11	18.26	2658	8.29	79.5
Plot 7	4/2/2018	10:30	7.43	18.1	1585*	7.93	38.9
Plot 7	8/15/2018	12:00	7.26	18.18	2942	7.47	303
Plot 7	2/24/2019	11:30	7.31	18.4	4006	4.93	110
Plot 7	7/21/2019	9:30	7.12	18.11	2795	7.96	138
Plot 7	2/16/2020	13:45	7.78	17.9	2575	7.27	188.5
Plot 7	8/17/2020	3:00	7.04	18.68	3610	6.64	488
Plot 7	2/28/2021	13:30	7.03	17.86	2683	7.22	268.7
Plot 7	8/8/2021	12:00	7.51	20.89	2865	8.61	37
Plot 7	2/27/2022	14:30	6.79	18.01	3163	6.88	74.9
Plot 7	7/10/2022	12:50	6.94	18.99	2905	6.84	70.3
Plot 7	3/28/2023	10:45	7.64	15.70	2884	--	34.1

Well	Date	Time	pH	Temp	Conductivity	DO	ORP
			Std Units	°C	uS/cm	mg/L or (%Sat)	Millivolts
G-1	3/15/2016	14:46	7.01	19.1	3061	5.99	59.6
G-1	12/28/2016	11:40	7.02	19.04	2980	5.82	65.4
G-1	2/19/2018	11:00	7.08	19.17	16261*	66.7%	-24.6*
G-1	7/30/2018	11:51	7.2	19.07	2905	6.17	226
G-1	2/24/2019	9:00	7.59	18.71	2988	5.68	72
G-1	7/21/2019	14:05	7.23	19.92	2814	6.15	345.8
G-1	2/12/2020	9:55	7.76	18.61	2742	5.31	85.2
G-1	8/18/2020	10:01	7.11	19.01	2843	5.6	490
G-1	3/7/2021	11:20	7.06	18.83	2785	5.89	313
G-1	7/25/2021	11:45	7.58	19.61	2877	4.87	49.9
G-1	3/14/2022	14:00	7.23	19.02	2922	5.16	94.5
G-1	7/16/2022	11:00	7.71	19.39	2431	6.97	16.0
G-1	3/5/2023	9:00	7.64	18.79	2516	5.26	63.1

* Denotes potentially suspect value.

Note that a new software interface between the field meter and the two different data logging computers was used in

As such, the measurement units for conductivity and dissolved oxygen were not consistent with previous units/values

Table 2. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	Mar-88	Apr-88	Aug-88	Mar-91	Jun-91	Sep-91	Dec-91	Mar-92	Jun-92	Sep-92	Dec-92	Mar-93	Jun-93	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94
MO 1	--	--	--	--	18.7	18.0	9.2	9.7	9.1	8.3	7.4	6.2	11.3	12.5	9.3	11.0	16.7	13.5
MO 2	--	--	--	--	11.2	14.3	11.8	8.3	7.7	13.2	12.6	12.0	11.3	11.3	10.1	15.3	15.6	9.8
MO 3	--	--	--	--	32.9	19.2	16.2	10.0	20.7	24.2	12.8	24.0	20.6	22.3	20.8	28.1	27.0	21.1
MO 4	--	--	--	--	12.5	14.1	13.3	10.8	10.3	12.8	22.0	11.9	11.4	13.6	10.3	11.8	12.0	11.1
MO 5	--	--	--	--	21.8	26.5	29.4	49.3	24.6	29.9	31.3	28.6	20.1	23.7	19.7	26.0	20.0	18.9
MO 6	--	--	18.200	--	15.9	16.2	15.4	43.6	15.2	14.5	16.3	19.5	14.8	24.2	23.6	38.5	31.3	31.1
MO 7/ CL 33	--	--	--	13.670	14.1	14.4	14.0	11.8	10.4	11.7	13.1	11.8	11.1	12.0	9.9	13.3	11.0	13.7
MO 8	--	--	--	--	10.7	13.1	10.8	8.2	10.3	9.5	11.1	10.6	11.0	12.0	10.4	14.8	15.0	14.2
MO 9	--	--	--	--	--	21.2	30.4	17.5	13.6	13.4	13.6	14.7	14.1	14.8	5.9	19.2	15.4	19.8
MO 10/ CL 26	13.500	13.540	--	10.400	13.0	7.3	14.9	15.4	13.0	16.6	16.5	16.1	--	13.0	5.4	13.6	15.0	16.6
MO 11	--	--	--	--	2.6	16.1	16.9	24.2	15.3	11.2	16.1	17.9	16.4	14.3	25.8	17.3	23.6	25.6
MO 12/ CL 25	9.000	--	--	3.270	6.0	9.7	8.5	8.7	7.4	8.7	34.7	--	--	--	--	9.4	9.1	7.5
MO 13/ CL 21	10.200	--	--	39.240	36.4	47.3	37.8	34.6	37.2	40.7	34.0	39.5	32.3	28.8	32.9	30.5	30.5	34.7
MO 14	--	--	--	--	27.9	28.2	30.4	28.2	32.0	31.6	32.6	33.1	32.0	29.9	5.5	30.4	29.8	34.2
MO 15/ CL 18	18.800	--	--	24.450	5.9	29.8	28.1	27.9	23.6	27.1	27.0	18.2	22.8	23.5	26.9	26.8	26.8	27.2
MO 16/ CL 32	--	--	--	7.380	7.4	11.0	6.8	10.2	10.4	6.4	11.4	12.1	10.9	7.1	6.0	5.6	5.0	4.7
MO 17	--	--	--	--	21.4	13.6	15.4	37.8	15.9	16.3	17.3	17.5	10.7	7.9	20.1	23.2	26.1	25.1
MO 18	--	--	--	--	16.0	24.2	13.3	36.4	24.5	16.7	14.2	10.1	10.8	4.2	20.1	5.1	3.5	3.8
MO 19	--	--	--	--	1.0	3.7	--	34.1	1.3	5.3	5.0	4.3	4.5	3.7	8.9	3.5	1.3	2.9
MO 20	--	--	--	--	18.6	17.6	19.5	29.3	16.7	11.7	15.9	15.3	4.4	2.7	18.3	12.8	14.1	14.2
MO 21	--	--	--	--	23.0	19.1	30.2	28.8	18.1	20.7	24.6	23.2	--	30.2	31.8	23.2	32.3	27.1
MO 22	--	--	--	--	--	3.9	3.7	23.8	3.3	4.3	4.1	5.1	13.0	18.5	4.5	11.3	5.1	11.9
MO 23	--	--	--	--	2.6	15.2	24.2	26.5	20.4	11.0	20.2	27.0	27.5	24.7	6.0	28.2	30.3	30.0
MO 24/ CL 5	--	4.690	--	4.520	6.6	10.0	10.7	9.9	11.3	15.3	14.2	12.8	18.6	17.4	17.4	15.2	15.6	17.4
MO 25	--	--	--	--	70.5	19.8	19.7	27.0	23.7	24.9	29.2	30.7	30.1	15.2	29.8	30.7	31.1	26.6
MO 26	--	--	--	--	26.0	30.2	25.0	20.7	19.4	21.7	17.6	20.2	23.6	18.2	21.6	19.8	17.2	18.8
MO 27	--	--	--	--	12.1	12.6	14.3	5.8	6.3	14.4	12.7	14.7	10.7	16.8	11.6	21.2	16.1	19.7
MO 28	--	--	--	--	21.3	22.2	12.3	14.7	18.4	24.7	17.3	20.7	19.6	16.9	17.7	20.7	22.9	17.1
MO 29	--	--	--	--	24.8	22.2	12.5	18.1	17.8	21.1	17.3	19.9	20.5	7.7	18.7	20.2	23.2	16.3
MO 30	--	--	--	--	24.2	24.5	22.6	21.7	20.8	21.4	26.5	25.1	24.0	19.0	26.9	25.4	31.6	24.4
MO 31	--	--	--	--	21.0	21.0	19.7	22.6	15.5	21.5	19.5	18.8	15.9	17.2	19.5	21.1	25.4	18.7
MO 32	--	--	--	--	17.5	17.8	15.8	21.8	14.9	17.8	19.4	17.6	18.3	14.7	18.0	21.6	21.9	22.5
MO 33	--	--	--	--	14.4	7.6	9.8	46.0	15.4	16.1	9.8	18.7	8.5	9.2	8.0	8.3	7.8	7.2
MO 34	--	--	--	--	52.5	7.0	8.1	22.2	15.1	7.3	7.0	16.4	8.4	19.0	3.9	2.7	5.3	3.4
MO 35	--	--	--	--	--	18.9	21.0	22.3	19.8	21.9	20.1	22.7	18.3	19.1	22.9	26.3	26.7	29.2
MO 36	--	--	--	--	35.3	25.6	24.1	26.3	27.0	32.0	30.0	32.8	32.1	25.8	27.6	32.3	32.5	31.0
MO 37	--	--	--	--	16.9	28.7	18.5	20.2	17.8	24.9	20.2	21.0	19.8	20.6	23.9	23.4	24.1	28.2
MO 38	--	--	--	--	16.0	18.8	26.5	16.2	63.5	17.4	18.3	14.7	12.2	17.8	17.6	17.8	21.2	20.9
MO 39	--	--	--	--	--	18.3	17.9	27.4	22.1	22.1	23.7	21.1	12.4	14.9	23.3	19.4	28.0	15.1
MO 43	--	--	--	--	27.8	14.7	4.5	20.8	12.1	11.8	11.9	15.7	11.9	7.8	9.0	10.4	9.7	9.9
MO 44	--	--	--	--	36.0	25.2	26.1	20.8	20.8	16.7	29.6	27.8	23.9	26.1	27.2	21.9	26.8	24.5
MO 45	--	--	--	--	29.8	14.7	19.4	13.3	13.9	14.0	12.0	15.9	15.3	9.7	15.4	15.7	15.5	14.3
MO 46	--	--	--	--	26.6	24.5	26.0	13.1	28.8	32.1	33.0	32.9	36.8	33.8	35.7	32.5	25.4	34.9
MO 47	--	--	--	--	10.7	16.7	12.3	19.8	16.0	17.9	17.3	19.7	18.9	15.8	17.0	15.7	21.1	19.7
MO 48	--	--	--	--	5.0	2.1	2.0	3.4	2.0	1.7	2.1	2.2	2.0	1.8	2.1	2.0	1.7	1.8
MO 49	--	--	--	--	84.1	22.0	36.1	3.2	18.4	21.0	27.2	0.0	1.8	1.8	43.5	47.0	46.4	46.4
MO 50	--	--	--	--	5.4	8.4	3.9	12.5	5.9	9.9	10.9	9.5	6.0	4.6	10.7	12.3	13.1	11.4
MO 51	--	8.170	--	--	5.6	2.5	1.3	5.2	4.9	4.9	5.2	4.7	5.9	4.4	4.7	4.8	4.7	4.5
MO 52	--	--	--	--	18.1	7.9	8.3	3.3	3.8	4.4	5.4	7.0	9.2	4.2	10.6	11.8	25.7	10.9
MO 53	--	--	--	--	17.4	14.8	15.1	12.1	15.8	13.3	14.7	16.2	4.8	16.9	16.5	17.3	15.6	4.6

MO 54	--	--	--	--	26.0	25.7	3.7	20.8	19.5	17.3	21.1	17.4	17.7	16.1	19.8	17.3	14.4	22.2
MO 55	--	--	--	--	23.8	27.9	21.5	24.5	21.3	18.2	19.4	22.6	21.4	20.8	23.4	20.1	20.8	18.5
MO 56	--	--	--	--	33.0	29.8	24.7	25.6	24.3	23.3	25.6	25.0	21.7	20.6	25.8	22.3	23.1	20.6
MO 57/ CL 3	--	16.800	--	12.320	19.8	17.3	16.9	16.3	12.4	15.1	13.6	8.6	12.3	7.8	15.2	14.0	19.3	27.2
MO 58	--	--	--	--	32.8	25.7	29.9	24.7	22.0	23.4	26.3	24.4	25.9	27.4	26.8	23.9	25.7	23.3
MO 59	--	--	--	--	7.4	25.3	30.4	22.2	23.1	20.4	22.1	26.3	28.5	29.0	31.7	26.3	33.7	41.7
MO 60	--	--	--	--	1.3	18.8	12.6	13.8	10.2	14.2	20.9	17.9	20.7	17.1	17.0	15.4	17.7	19.2
MO 61	--	--	--	--	--	6.4	--	2.0	5.5	4.5	6.5	5.0	4.1	20.0	4.3	3.6	3.4	3.6
MO 62	--	--	--	--	--	3.7	3.2	2.1	4.9	4.2	16.8	6.2	7.3	28.2	9.3	7.8	5.8	8.0
MO 63	--	--	--	--	11.3	6.9	7.2	7.7	7.7	6.6	14.1	15.7	8.2	8.4	9.0	7.8	9.4	7.7
MO 64	--	--	--	--	--	16.9	6.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.1
MO 65	--	--	--	--	0.9	17.3	1.3	8.4	7.4	8.5	8.7	8.0	8.0	7.0	8.2	7.5	9.1	10.4
MO 66	--	--	7.630	--	2.1	2.2	2.2	14.9	0.9	7.3	1.7	1.3	0.1	27.1	1.5	1.9	2.7	2.3
MO 75	--	--	--	--	--	2.9	1.1	1.6	1.6	2.8	2.1	5.5	10.2	9.9	5.9	7.7	12.2	9.2
MO 76	--	--	--	--	--	3.8	1.5	2.9	2.2	2.4	2.6	2.8	2.1	1.9	1.7	1.4	1.7	1.6
MO 77	--	--	--	--	--	2.7	4.3	3.2	3.0	4.8	3.6	4.6	3.3	2.6	3.0	2.8	2.9	2.6
MO 78	--	--	--	--	--	1.7	1.7	2.0	1.7	1.9	2.4	3.3	2.5	1.8	2.6	2.2	2.5	2.8
MO 79	--	--	--	--	--	--	--	0.0	0.6	0.0	0.0	0.9	0.0	0.0	0.0	1.1	0.1	0.2
MO 80	--	--	--	--	--	1.0	0.9	12.5	0.6	0.8	0.7	1.7	7.6	0.6	1.0	0.9	0.8	0.6
MO 81	--	--	--	--	--	7.2	1.5	6.0	5.7	6.4	7.4	7.6	2.3	7.1	4.5	4.6	7.1	7.4
MO 82	--	--	--	--	0.0	2.5	1.4	0.0	0.0	0.0	0.0	0.9	0.0	0.0	0.0	0.0	0.0	0.1
MO 83	--	--	--	--	13.4	10.2	9.0	8.4	9.5	8.2	9.7	11.9	3.9	9.0	10.4	8.2	10.5	10.9
MO 84	--	--	--	--	82.2	64.4	56.6	74.2	48.5	45.9	54.4	46.6	53.9	54.4	44.4	39.7	40.9	36.7
MO 85	--	--	--	--	22.5	16.9	3.3	19.2	9.6	6.1	7.8	11.2	6.3	8.0	9.6	11.9	18.7	36.6
MO 86	--	--	--	--	14.2	21.8	3.4	11.8	7.3	8.8	8.2	5.2	1.4	1.2	1.1	0.6	0.6	0.7
MO 87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B141A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fowler	--	--	--	20.490	29.1	26.6	23.5	20.6	25.7	19.6	21.2	18.7	21.2	23.9	15.8	16.6	19.3	26.6
Plot G-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Average	--	--	--	15.1	20.4	16.6	15.1	17.8	14.6	14.6	15.8	15.4	14.1	14.7	15.0	15.8	16.8	16.6
Plotting Date	--	--	--	3/1/1991	6/1/1991	9/1/1991	12/1/1991	3/1/1992	6/1/1992	9/1/1992	12/1/1992	3/1/1993	6/1/1993	9/1/1993	12/1/1993	3/1/1994	6/1/1994	9/1/1994

Table 2. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99
MO 1	8.8	8.4	11.1	11.9	8.8	--	13.7	12.0	5.3	5.0	12.3	5.1	9.1	6.6	5.9	11.9	14.1	14.4
MO 2	15.9	11.7	11.0	14.3	17.7	--	13.6	12.0	11.9	14.2	13.8	18.6	19.8	13.7	16.6	16.0	18.6	19.9
MO 3	23.2	22.1	20.3	17.5	25.7	--	21.4	20.3	19.4	18.4	18.8	17.5	18.8	15.7	15.5	15.9	14.1	15.5
MO 4	13.1	18.9	9.7	20.1	10.1	13.8	12.4	10.5	13.5	15.6	16.8	14.6	14.9	13.9	10.9	11.6	12.8	15.0
MO 5	14.9	18.4	17.5	11.3	14.4	12.2	12.0	12.6	12.3	14.2	13.8	13.6	14.3	--	--	--	14.2	16.3
MO 6	30.5	19.1	28.0	30.1	33.1	26.6	23.8	17.1	9.5	9.8	14.1	6.6	8.3	8.7	8.9	12.0	15.7	18.0
MO 7/ CL 33	14.8	11.0	10.3	18.0	20.1	--	--	--	--	--	--	15.1	15.4	25.7	18.4	20.5	21.0	20.3
MO 8	12.7	12.9	12.6	10.1	13.9	10.5	10.2	10.7	10.1	11.4	8.6	9.1	11.0	11.9	11.3	13.3	16.2	19.3
MO 9	18.2	15.8	16.0	14.6	21.3	22.2	19.1	20.5	18.7	20.3	--	16.3	17.8	22.5	22.4	21.7	21.6	22.6
MO 10/ CL 26	16.7	17.3	18.5	16.7	15.0	19.5	--	14.4	12.4	26.9	--	--	--	21.3	22.6	25.5	25.6	22.3
MO 11	24.4	22.9	18.0	22.7	18.0	25.6	19.3	16.5	20.2	16.2	14.3	18.7	19.8	17.4	18.0	16.5	16.7	18.0
MO 12/ CL 25	9.2	8.0	8.2	6.0	9.5	10.0	9.7	10.0	8.8	11.9	11.9	10.1	--	11.6	11.3	11.0	14.5	11.2
MO 13/ CL 21	32.8	27.8	31.3	30.6	33.6	--	--	--	--	30.5	--	17.1	--	34.6	--	29.7	28.7	25.0
MO 14	29.8	29.4	30.0	28.0	35.3	28.8	28.3	27.7	17.9	31.0	29.0	30.8	30.0	31.8	32.1	32.1	31.6	27.6
MO 15/ CL 18	28.8	33.0	30.6	28.1	44.7	30.6	34.6	31.4	19.0	19.1	31.9	35.3	35.0	63.1	32.6	36.7	--	22.7
MO 16/ CL 32	4.1	4.6	5.0	4.7	--	--	--	17.8	--	17.8	14.3	13.2	11.8	14.4	13.6	13.2	12.6	15.8
MO 17	16.9	17.1	14.3	15.6	24.8	18.5	18.1	19.1	16.8	16.6	18.6	15.3	16.6	29.6	20.1	18.8	17.5	20.0
MO 18	3.3	4.4	4.4	3.0	5.5	4.6	4.6	3.4	5.5	6.2	6.7	5.6	5.4	6.3	5.7	6.5	6.1	7.4
MO 19	0.7	0.3	0.2	0.1	0.6	0.0	0.0	0.0	0.0	0.9	0.0	2.4	0.0	2.9	4.0	7.4	8.4	11.5
MO 20	13.0	10.5	15.4	12.3	19.6	20.2	15.9	5.5	9.5	12.0	9.0	7.4	17.6	17.5	15.6	17.3	18.2	17.9
MO 21	35.3	34.8	32.6	22.2	39.2	39.5	28.0	23.4	30.0	20.7	23.4	17.2	32.6	29.2	34.4	32.8	29.4	27.6
MO 22	4.9	11.3	14.6	10.1	10.6	12.5	11.7	14.5	5.2	4.3	13.8	15.5	7.5	3.8	16.4	17.3	18.6	27.6
MO 23	25.3	25.5	25.7	27.4	--	33.2	21.4	28.9	31.2	16.5	29.3	--	--	--	--	--	24.2	24.2
MO 24/ CL 5	13.2	17.3	17.2	12.9	13.1	15.8	12.4	18.0	14.2	16.8	13.6	10.6	15.0	17.4	17.6	15.6	19.8	20.5
MO 25	24.8	24.3	23.5	19.7	--	--	--	--	24.2	26.0	26.5	25.3	--	42.2	--	33.1	35.3	29.5
MO 26	19.5	19.0	13.5	21.6	14.6	17.1	14.6	21.2	17.5	17.4	21.4	22.0	18.7	28.3	26.4	25.7	24.2	24.6
MO 27	24.6	18.3	20.7	25.1	21.7	14.5	18.5	19.5	18.8	15.3	18.4	17.8	19.8	18.4	15.7	16.8	15.8	18.3
MO 28	15.7	14.6	17.7	18.4	14.8	16.9	16.3	12.2	15.3	14.1	15.4	13.6	10.0	15.6	16.1	17.2	17.6	18.4
MO 29	18.0	16.0	14.8	17.5	14.1	16.2	14.6	11.6	14.6	13.0	13.0	12.1	9.7	12.2	12.4	11.9	15.0	18.2
MO 30	21.5	19.0	15.0	32.6	37.0	17.3	18.9	20.6	23.3	16.9	27.0	21.6	24.0	22.4	22.7	22.9	20.1	20.1
MO 31	19.0	18.2	14.0	19.3	21.2	19.5	18.2	13.4	14.1	14.0	15.9	16.3	14.5	15.4	17.7	19.5	18.8	20.8
MO 32	23.1	20.2	18.0	23.8	8.1	25.0	20.9	18.4	20.3	15.2	--	15.5	13.8	14.0	16.0	15.7	16.3	17.2
MO 33	6.2	5.6	6.0	6.6	8.1	6.4	4.4	4.9	5.0	5.1	--	3.9	13.9	12.2	14.7	3.5	2.2	2.5
MO 34	1.6	2.4	1.0	1.3	1.7	3.1	3.3	4.0	6.3	5.4	--	6.0	7.7	10.1	12.4	9.4	17.5	23.9
MO 35	27.1	25.0	17.6	13.3	5.5	6.4	11.9	9.5	17.9	4.3	--	16.9	17.2	20.0	23.5	23.8	22.4	21.7
MO 36	24.7	25.8	22.4	24.7	29.3	30.5	22.3	24.7	24.0	25.5	--	28.6	31.3	29.0	32.4	31.7	28.4	28.0
MO 37	27.0	25.8	24.7	24.7	39.0	37.0	29.1	29.6	26.8	31.2	20.8	31.1	31.0	19.3	32.3	36.6	29.4	28.8
MO 38	18.8	16.5	18.7	30.9	18.4	22.7	18.6	18.6	17.9	19.0	--	19.9	20.4	22.6	23.6	24.5	23.4	23.7
MO 39	21.8	28.9	31.1	24.7	56.5	45.9	35.9	23.8	27.0	14.4	--	32.8	33.7	40.5	35.1	33.1	33.4	27.5
MO 43	12.7	10.4	11.8	11.0	14.7	14.8	13.5	14.8	13.5	23.7	12.3	13.1	--	17.5	15.6	15.0	18.3	19.1
MO 44	14.6	23.3	27.0	20.8	30.1	31.9	30.0	23.4	23.4	23.7	29.3	29.6	38.0	39.2	35.8	34.7	35.7	29.0
MO 45	12.9	14.7	18.1	8.3	22.2	19.8	15.4	15.2	15.2	17.8	15.9	15.5	17.5	23.6	18.4	18.5	18.0	18.3
MO 46	29.6	38.7	44.0	33.7	17.6	15.7	47.2	36.5	25.1	14.5	--	32.3	32.3	31.6	26.4	25.3	23.5	22.4
MO 47	13.8	14.9	13.9	20.1	17.3	17.0	21.3	13.4	13.8	14.8	13.4	19.1	15.2	15.9	25.4	23.8	16.5	18.3
MO 48	1.9	1.6	1.7	1.8	2.1	1.5	1.7	1.8	2.1	3.3	3.2	3.5	3.3	5.8	3.0	2.7	3.0	3.6
MO 49	42.9	48.8	47.9	29.4	70.5	69.2	52.8	53.1	43.3	19.1	--	30.0	--	28.3	48.2	38.0	32.9	27.5
MO 50	13.0	15.8	16.1	10.6	25.6	28.3	24.4	21.6	24.4	22.7	--	25.2	27.8	38.1	26.6	26.7	26.7	27.0
MO 51	4.8	4.2	5.0	3.9	5.4	5.5	3.9	4.4	4.4	5.5	5.1	4.7	4.2	4.5	4.9	4.4	5.2	8.3
MO 52	14.9	16.6	23.8	17.5	17.8	15.9	18.4	19.9	24.7	23.1	19.7	19.1	20.7	18.2	21.6	18.6	20.3	19.0
MO 53	15.5	14.5	8.7	10.7	17.2	16.8	15.4	11.3	14.3	16.1	14.3	15.0	15.2	16.2	12.0	11.6	10.9	14.9

MO 54	18.2	--	--	--	16.6	21.9	23.5	--	--	--	--	--	--	--	--	--	--	--
MO 55	17.3	15.4	17.4	15.6	21.8	17.1	--	--	--	--	--	--	--	--	--	--	--	--
MO 56	18.7	21.9	21.5	17.7	24.9	27.2	21.5	--	--	--	--	--	--	--	--	--	--	--
MO 57/ CL 3	11.0	14.8	14.1	15.1	21.0	16.1	14.8	15.4	15.1	13.6	15.8	13.3	14.2	11.3	15.0	14.2	15.6	16.3
MO 58	22.1	21.9	17.7	4.5	25.5	33.8	20.1	20.3	19.8	22.1	22.3	20.5	18.5	23.6	21.4	22.1	23.6	23.0
MO 59	20.2	25.1	26.0	24.4	29.5	22.4	24.6	24.5	21.1	21.5	19.4	21.0	22.9	24.1	23.2	23.3	24.6	23.4
MO 60	11.4	13.0	11.9	7.9	25.5	19.7	11.3	11.6	11.8	14.2	11.4	11.8	12.8	12.9	12.8	13.6	13.7	15.2
MO 61	2.9	2.7	8.9	5.1	5.7	3.4	4.5	2.7	2.5	0.3	2.7	2.3	2.5	2.1	2.2	2.3	2.6	2.8
MO 62	8.4	6.8	9.6	3.5	3.9	5.2	4.4	7.8	3.8	9.8	4.5	9.3	11.9	9.3	10.1	11.2	11.9	13.4
MO 63	6.9	6.2	7.1	5.9	8.3	7.9	7.4	6.6	6.5	6.9	7.0	6.9	7.5	7.2	6.7	6.7	7.2	8.4
MO 64	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.0	0.4	0.2	0.0	0.1
MO 65	6.3	4.5	7.7	8.5	5.4	7.3	9.6	3.6	11.0	11.7	6.5	12.2	14.5	13.2	15.5	14.9	12.0	16.5
MO 66	2.5	0.9	2.1	0.0	4.2	6.2	8.4	5.6	4.7	7.3	8.6	--	--	5.4	--	7.9	5.7	9.7
MO 75	4.4	9.2	2.5	10.1	6.9	10.0	11.7	10.5	7.9	7.4	10.1	8.4	6.5	4.8	11.5	10.6	11.6	17.9
MO 76	1.9	1.2	2.4	1.3	2.0	2.2	1.2	1.0	1.2	0.4	1.0	0.0	1.0	0.0	0.7	0.7	0.6	0.6
MO 77	2.5	2.5	5.0	2.1	3.2	4.9	4.2	2.0	1.8	0.4	1.9	1.3	1.4	0.0	1.5	1.5	1.0	1.1
MO 78	2.9	2.5	7.6	3.0	4.0	5.9	3.4	3.1	3.8	0.3	4.6	4.5	4.5	4.5	4.7	4.8	5.0	6.4
MO 79	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.0	0.0	0.4	--	0.0	0.1
MO 80	0.8	1.3	0.6	0.6	0.7	0.9	0.7	0.0	0.7	0.2	1.0	1.8	0.9	0.0	1.2	0.7	0.6	0.7
MO 81	5.9	4.5	0.0	5.6	5.7	6.6	7.8	4.4	4.2	0.3	4.4	--	--	--	--	--	3.8	5.3
MO 82	0.0	0.0	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.2	0.0	0.0	0.4	0.0	0.2	0.0	0.2
MO 83	10.6	9.2	12.9	10.3	12.4	11.5	12.2	9.6	10.1	11.5	11.5	11.3	12.3	20.3	11.5	11.8	11.7	14.2
MO 84	40.8	31.9	29.3	22.5	20.5	23.4	26.9	26.5	23.7	26.9	28.9	21.2	25.1	25.1	23.8	23.5	26.0	29.0
MO 85	15.1	21.5	20.6	22.5	10.6	18.1	16.4	22.8	19.5	23.2	24.5	19.0	22.4	39.7	23.3	23.9	25.4	24.7
MO 86	0.3	0.3	0.2	0.0	0.5	0.0	0.0	0.0	0.0	0.3	0.3	0.0	0.1	0.3	0.4	0.2	0.4	1.9
MO 87	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 89	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 90	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 91	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 92	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 93	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 94	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 95	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 96	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B141A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fowler	18.6	20.5	15.6	14.6	20.8	24.8	12.9	16.0	15.0	14.6	18.0	19.3	21.6	15.8	17.1	18.4	15.8	18.2
Plot G-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Average	14.9	15.0	14.9	14.1	17.0	16.7	15.3	14.1	13.6	13.5	13.4	14.3	15.0	17.2	16.4	16.8	16.2	17.0
Plotting Date	12/1/1994	3/1/1995	6/1/1995	9/1/1995	12/1/1995	3/1/1996	6/1/1996	9/1/1996	12/1/1996	3/1/1997	6/1/1997	9/1/1997	12/1/1997	3/1/1998	6/1/1998	9/1/1998	12/1/1998	3/1/1999

Table 2. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	May-01	Jul-01	Mar-02	Aug-02	Jan-03	Jul-03	Jan-04	Jul-04	Feb-05	Jul-05	Jan-06
MO 1	13.5	13.7	13.4	11.1	10.8	6.3	11.5	6.5	13.9	5.9	16.9	5.0	5.3	4.9	7.3	6.3	7.9	5.9
MO 2	21.4	17.0	19.5	14.1	12.2	18.6	20.4	24.2	24.8	19.6	13.2	12.6	13.5	13.0	15.0	14.6	15.2	15.3
MO 3	15.6	15.2	14.1	12.4	12.5	13.6	13.3	12.4	13.9	12.4	9.7	10.3	12.8	11.1	11.1	11.4	11.5	12.1
MO 4	15.0	13.4	14.6	12.1	12.1	13.7	13.0	12.4	13.4	13.1	10.4	11.2	11.2	10.3	9.4	8.2	10.1	9.5
MO 5	17.8	17.0	18.5	15.2	14.6	16.9	15.9	18.6	17.0	17.4	13.9	13.8	14.4	13.0	13.7	12.9	14.6	15.4
MO 6	19.5	19.2	16.1	15.4	15.8	15.7	14.6	14.3	16.8	15.7	12.7	12.5	12.8	12.0	11.9	11.8	11.4	11.4
MO 7/ CL 33	21.5	20.9	19.7	18.8	18.9	20.9	19.9	23.4	23.3	20.2	18.9	19.3	18.2	15.9	16.0	14.9	14.8	14.4
MO 8	21.0	19.6	18.5	17.2	17.0	18.1	18.8	22.5	23.9	22.7	18.1	20.0	19.5	17.9	18.6	18.3	18.2	18.7
MO 9	24.6	25.7	27.6	28.4	21.9	20.5	20.7	31.3	32.7	31.7	26.3	25.3	24.4	21.1	21.4	20.3	20.6	19.2
MO 10/ CL 26	23.0	22.1	21.1	20.4	20.2	21.8	21.5	24.3	25.1	25.0	23.4	19.9	25.0	20.5	19.8	19.2	20.8	21.4
MO 11	16.5	15.6	16.6	14.0	14.5	14.6	15.0	16.6	18.2	15.3	12.7	12.7	14.0	14.6	15.6	12.9	12.2	13.5
MO 12/ CL 25	11.2	12.2	9.0	10.5	8.4	7.3	8.5	8.8	8.9	9.6	8.3	9.3	9.7	9.2	9.9	8.3	7.0	8.2
MO 13/ CL 21	25.2	25.4	25.2	24.1	16.6	27.3	25.0	26.1	28.4	28.7	19.9	25.8	20.8	21.4	18.4	19.3	18.1	19.2
MO 14	27.8	27.2	31.1	29.0	31.1	30.9	31.1	35.9	39.0	35.9	32.1	32.0	34.9	32.4	32.5	31.3	27.6	27.8
MO 15/ CL 18	22.9	22.8	21.0	35.3	34.5	34.5	34.9	42.2	42.7	41.5	39.8	32.8	31.4	29.0	27.4	27.1	25.6	26.4
MO 16/ CL 32	20.0	14.6	16.6	14.8	13.7	17.1	18.5	20.4	21.3	18.1	13.6	16.2	11.6	14.0	12.2	12.1	11.4	10.9
MO 17	21.5	22.0	18.5	19.2	20.0	24.6	22.9	28.4	29.1	27.2	24.6	24.2	21.1	22.0	20.8	21.5	22.5	18.2
MO 18	7.8	8.0	5.9	6.5	6.7	7.2	6.8	6.8	7.0	8.0	6.8	7.6	6.3	6.8	7.1	7.8	8.7	8.5
MO 19	12.3	9.9	12.1	10.1	8.1	6.4	8.8	9.6	22.1	10.3	9.7	12.0	14.4	11.6	12.9	13.1	14.6	12.0
MO 20	19.0	21.6	17.4	14.2	15.3	16.4	15.1	16.7	22.2	25.9	20.0	21.1	17.9	13.6	14.7	13.1	12.4	11.2
MO 21	27.8	28.6	33.1	33.9	37.6	33.6	35.9	36.8	45.6	41.4	30.5	21.6	23.5	24.5	25.6	20.4	25.6	19.7
MO 22	23.1	25.6	26.0	22.9	23.8	21.3	22.8	25.5	29.8	26.6	18.8	20.6	19.3	22.1	28.1	25.6	26.7	24.3
MO 23	23.2	24.4	18.6	19.3	21.0	23.6	21.5	38.7	26.6	28.8	29.3	24.6	22.2	15.7	23.4	21.3	23.3	21.9
MO 24/ CL 5	21.2	22.9	19.0	25.8	26.7	23.3	23.2	24.8	25.7	34.4	25.9	25.5	16.7	19.9	18.6	17.6	15.6	16.2
MO 25	29.3	29.4	35.2	31.3	31.5	37.2	34.2	42.7	41.0	38.0	28.1	30.0	22.2	25.3	26.4	29.7	30.0	31.4
MO 26	25.6	24.0	27.0	23.4	24.2	27.9	28.9	28.8	28.2	29.4	31.1	31.8	21.0	18.1	23.2	18.0	20.3	21.4
MO 27	18.5	13.6	15.8	20.0	19.0	21.6	17.5	20.2	17.9	20.6	18.1	22.0	16.1	15.4	18.4	18.0	20.6	20.6
MO 28	17.9	18.7	17.0	17.8	16.9	17.8	18.2	17.9	19.5	16.4	16.3	18.6	14.3	15.4	16.7	14.4	18.4	20.5
MO 29	22.0	21.6	20.3	21.7	13.2	14.0	16.7	15.4	21.7	11.1	10.5	11.8	9.7	9.7	9.7	9.9	11.5	12.0
MO 30	21.5	23.2	20.0	22.0	21.8	21.3	17.7	17.8	21.7	17.3	18.3	19.7	16.0	18.6	22.1	19.7	22.6	20.1
MO 31	22.8	22.4	21.9	21.2	23.1	32.4	28.8	22.7	28.2	19.4	20.8	20.8	17.4	15.9	20.6	17.0	18.5	15.9
MO 32	17.8	18.1	17.8	19.2	21.0	29.4	27.2	20.6	21.9	29.1	27.2	25.7	18.2	16.9	17.2	15.7	15.7	14.5
MO 33	3.0	3.0	3.5	3.5	3.5	3.7	3.9	2.8	2.7	3.0	4.4	10.7	13.8	18.9	15.0	12.8	26.2	31.2
MO 34	27.4	28.2	24.2	18.3	19.2	27.8	26.3	42.2	63.0	47.7	22.2	37.8	7.5	45.4	5.5	20.9	2.4	15.5
MO 35	21.1	20.6	19.3	21.7	21.5	24.4	21.6	20.4	21.7	20.1	25.3	35.5	35.1	51.9	31.7	29.8	22.1	19.5
MO 36	27.6	27.1	25.3	27.9	29.4	36.1	31.7	40.4	47.6	46.5	48.8	31.4	31.0	17.8	29.6	17.0	35.7	17.8
MO 37	28.6	28.2	37.0	33.6	34.9	40.7	35.6	40.8	43.0	43.5	52.7	40.5	25.5	36.9	34.1	27.8	34.3	29.4
MO 38	23.4	22.6	22.7	24.5	22.1	28.7	26.1	37.2	32.9	36.6	23.5	20.9	16.1	40.4	32.8	27.4	30.7	23.2
MO 39	27.4	--	31.5	28.0	31.4	31.2	33.5	33.6	35.1	34.6	24.5	27.3	16.6	24.2	20.1	15.4	15.6	19.0
MO 43	20.2	23.2	20.8	19.8	23.5	23.2	25.0	30.3	34.2	38.5	31.1	39.6	31.9	27.1	31.9	26.8	25.1	24.3
MO 44	29.1	29.0	39.1	36.7	37.9	35.3	37.9	56.4	60.1	59.7	43.8	34.2	26.6	20.5	28.5	22.5	31.3	29.3
MO 45	19.4	20.8	16.8	17.9	17.9	21.1	19.8	25.3	26.9	10.9	22.5	26.1	20.9	25.1	31.5	31.8	41.6	40.2
MO 46	22.9	21.8	21.3	21.7	19.0	21.1	17.4	22.1	19.8	17.5	16.2	18.8	14.9	20.7	21.1	21.2	23.5	21.1
MO 47	26.5	26.5	22.5	23.5	22.4	28.1	25.6	23.6	28.4	25.0	28.7	25.3	16.1	17.7	21.2	17.1	21.1	15.6
MO 48	4.1	3.2	3.0	2.9	2.9	2.6	2.9	3.2	3.4	3.2	3.6	3.2	3.2	3.3	3.1	2.6	3.1	2.7
MO 49	24.9	18.7	17.5	17.3	19.2	18.3	19.1	18.3	18.7	18.2	16.5	20.3	18.1	16.3	12.7	12.5	16.0	13.9
MO 50	27.5	27.2	30.2	28.9	29.2	33.4	29.4	34.4	35.4	34.7	31.7	31.1	25.5	24.8	24.4	20.8	22.8	20.1
MO 51	9.6	9.1	4.6	6.8	10.9	12.8	9.2	15.3	16.3	14.0	9.0	14.2	14.6	15.7	16.0	14.5	20.0	15.8
MO 52	20.8	19.4	14.8	16.3	16.1	16.7	14.5	16.0	17.6	17.0	12.8	14.5	12.2	12.8	11.3	11.5	12.9	11.8
MO 53	14.4	17.3	13.7	14.1	14.8	16.2	15.4	16.1	17.2	20.2	11.4	17.6	12.6	17.6	12.5	19.2	12.6	17.7

MO 54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 57/ CL 3	16.5	6.1	16.8	15.6	17.1	14.7	13.9	15.4	16.1	15.5	15.1	16.3	12.4	11.7	11.0	10.9	8.9	6.9
MO 58	23.1	25.0	23.3	21.6	23.1	24.2	23.2	26.8	23.4	25.0	18.2	18.1	12.5	13.7	12.9	17.5	14.4	10.7
MO 59	23.7	24.2	23.6	21.2	21.8	24.0	24.2	25.1	27.2	23.6	21.4	22.1	18.2	18.7	18.7	21.6	21.0	19.1
MO 60	16.1	15.2	13.8	13.6	12.8	11.7	13.6	14.0	14.9	13.2	11.2	12.2	9.8	11.9	11.1	13.5	13.4	11.7
MO 61	3.3	2.8	2.1	2.5	2.6	2.4	2.7	2.5	2.5	1.9	2.0	2.0	1.8	2.3	2.1	2.6	2.9	2.9
MO 62	12.5	11.9	10.6	11.6	8.4	6.5	6.7	10.4	12.1	11.2	9.8	9.9	8.2	12.2	9.0	5.2	10.2	11.2
MO 63	8.9	7.3	6.5	8.6	7.3	6.8	7.4	7.6	8.0	7.2	6.5	7.0	6.1	7.0	5.7	8.1	8.2	6.5
MO 64	0.1	0.0	0.2	0.0	0.0	0.0	--	0.4	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0
MO 65	15.7	17.3	14.8	15.5	11.8	15.8	15.6	16.9	18.1	16.2	16.1	15.7	12.7	12.1	14.5	11.7	9.4	7.0
MO 66	6.6	6.4	--	8.3	9.6	8.3	9.3	10.5	9.0	8.7	6.6	9.3	5.8	8.7	4.5	8.1	5.9	5.5
MO 75	18.8	13.4	5.4	12.8	18.1	16.7	11.9	19.6	19.2	14.9	10.4	15.7	14.4	13.9	11.9	11.1	13.8	12.0
MO 76	0.7	0.5	0.4	0.5	0.5	0.4	0.4	0.6	0.6	0.3	0.4	0.5	0.5	0.3	0.2	0.4	0.4	0.5
MO 77	1.1	0.7	0.5	0.5	0.5	0.4	0.4	0.5	0.5	0.2	0.3	0.2	0.0	0.2	0.0	0.2	0.1	0.1
MO 78	7.2	6.8	5.6	5.9	6.1	6.1	6.7	6.8	7.6	7.1	6.2	6.7	4.9	5.5	4.8	7.0	5.9	5.7
MO 79	0.1	0.0	0.0	0.1	0.1	0.0	0.0	0.3	0.1	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.1	0.0
MO 80	0.7	0.7	0.7	1.0	0.7	0.5	0.8	0.9	0.9	0.6	0.5	0.6	0.7	1.0	0.7	1.2	1.3	1.5
MO 81	5.5	--	--	--	--	4.3	4.6	4.3	5.0	5.1	4.1	4.3	3.9	4.2	3.8	4.5	4.1	3.9
MO 82	0.0	0.0	0.1	0.1	0.1	0.0	0.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
MO 83	14.2	13.1	11.6	12.7	12.6	13.1	12.8	14.1	15.1	13.6	12.7	14.8	12.3	14.9	12.6	14.0	13.7	12.7
MO 84	25.5	25.4	30.8	27.1	26.8	29.6	28.6	34.8	36.0	38.3	30.6	35.2	28.7	31.0	28.3	31.1	31.3	25.9
MO 85	25.1	27.8	26.6	28.2	24.8	26.6	26.0	30.3	29.8	29.8	25.1	26.4	22.1	24.9	23.5	24.9	23.8	22.3
MO 86	0.2	0.0	0.0	0.7	0.0	0.0	0.8	0.3	0.1	0.0	1.2	0.2	0.0	0.1	0.0	0.1	0.1	0.0
MO 87	--	--	--	--	--	--	--	--	--	24.2	25.5	27.8	22.5	22.2	23.7	22.5	23.8	23.5
MO 88	--	--	--	--	--	--	--	--	--	11.3	11.0	11.8	12.4	11.2	12.4	12.1	12.8	11.4
MO 89	--	--	--	--	--	--	--	--	--	20.5	15.5	19.6	17.7	16.7	19.9	17.1	19.6	19.1
MO 90	--	--	--	--	--	--	--	--	--	9.8	8.4	8.8	8.6	10.3	9.8	11.1	9.7	9.9
MO 91	--	--	--	--	--	--	--	--	--	20.6	21.4	22.9	23.1	20.8	24.0	27.3	28.2	28.8
MO 92	--	--	--	--	--	--	--	--	--	11.4	13.3	14.6	13.7	13.0	15.0	15.8	15.4	15.6
MO 93	--	--	--	--	--	--	--	--	--	11.3	8.8	9.3	9.7	9.2	9.3	10.5	11.9	9.9
MO 94	--	--	--	--	--	--	--	--	--	18.7	18.2	19.4	19.4	18.0	19.9	18.3	18.9	18.1
MO 95	--	--	--	--	--	--	--	--	--	15.4	14.9	14.7	14.6	13.0	13.9	11.6	13.8	13.0
MO 96	--	--	--	--	--	--	--	--	--	36.0	31.1	36.9	34.2	29.9	35.5	33.5	36.0	36.6
B25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B141A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fowler	19.8	18.8	16.6	16.3	17.1	15.6	17.5	17.0	19.8	18.6	14.2	16.5	12.1	15.6	12.0	13.9	13.8	12.9
Plot G-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Average	17.4	17.0	17.0	16.8	16.7	17.9	17.7	19.9	21.4	19.7	17.3	17.9	15.2	16.2	15.9	15.3	16.2	15.3
Plotting Date	6/1/1999	9/1/1999	12/1/1999	3/1/2000	6/1/2000	9/1/2000	12/1/2000	5/1/2001	7/1/2001	3/2/2002	8/2/2002	1/3/2003	7/3/2003	1/1/2004	7/1/2004	2/1/2005	7/1/2005	1/1/2006

Table 2. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	Jul-06	Jan-07	Jul-07	Oct-07	Jan-08	Jul-08	Sep-08	Feb-09	Sep-09	Jan-10	Jul-10	Mar-11	Jul-11	Jan-12	Jul-12	Jan-13	Sep-13	Mar-14
MO 1	16.9	7.5	7.5	--	7.7	18.6	7.4	7.5	14.6	8.0	7.4	8.0	20.0	9.1	19.3	9.8	19.8	10.6
MO 2	17.1	17.0	15.5	--	15.6	15.5	--	15.0	15.5	15.0	15.1	15.1	15.8	14.2	15.7	14.4	14.3	14.5
MO 3	12.4	11.0	11.2	--	10.7	9.1	--	9.6	10.0	12.2	11.7	13.9	11.7	11.2	11.7	10.9	10.2	11.6
MO 4	9.7	10.2	9.2	--	9.5	10.4	--	11.1	10.5	12.7	11.0	9.2	9.4	11.0	11.9	12.5	11.5	11.1
MO 5	16.6	15.7	15.1	--	14.2	15.7	--	16.3	15.9	16.2	15.9	15.0	15.0	15.2	16.6	16.2	16.2	16.4
MO 6	12.8	11.8	11.6	--	12.6	10.6	--	11.7	12.1	13.0	11.6	10.8	11.5	11.3	12.4	11.6	12.5	12.7
MO 7/ CL 33	15.1	12.7	14.1	--	12.4	13.2	--	14.3	15.2	--	16.5	16.7	17.1	17.9	18.9	18.7	13.8	18.6
MO 8	20.2	17.1	18.9	--	16.5	17.5	--	20.6	19.3	19.5	19.7	18.3	19.4	20.0	20.5	19.4	22.0	21.7
MO 9	19.7	19.1	19.6	--	16.6	18.8	--	18.6	17.7	18.4	18.8	17.1	17.6	17.8	18.7	17.4	20.3	19.3
MO 10/ CL 26	23.4	25.1	21.7	--	23.6	21.3	--	23.2	19.9	23.5	20.6	13.8	20.1	20.6	20.6	19.8	18.5	16.9
MO 11	14.3	13.4	13.9	--	12.2	14.9	--	13.0	11.6	12.2	12.8	11.8	11.8	10.5	12.0	10.8	12.8	12.6
MO 12/ CL 25	8.0	7.3	7.6	--	7.8	7.6	--	8.3	6.4	8.2	6.9	6.9	6.9	6.8	7.7	6.9	7.6	6.4
MO 13/ CL 21	19.8	19.6	18.6	--	19.8	17.8	--	20.4	16.5	19.8	17.6	18.0	17.9	17.8	17.5	17.2	18.5	16.0
MO 14	36.6	27.1	26.3	--	20.9	24.2	--	13.2	12.6	9.5	27.9	16.8	27.1	21.8	17.5	14.1	18.4	29.3
MO 15/ CL 18	26.7	26.6	23.6	--	24.4	22.9	--	23.5	21.7	--	20.9	20.8	20.4	20.0	21.2	20.0	22.2	16.2
MO 16/ CL 32	9.6	9.9	10.8	--	14.9	12.3	--	15.0	16.4	--	13.5	13.2	12.6	12.8	14.6	--	12.5	18.7
MO 17	18.1	17.4	20.0	--	18.4	18.6	--	21.4	20.4	22.5	21.5	21.6	22.0	22.7	22.4	21.1	26.3	23.8
MO 18	8.1	7.7	7.4	--	6.5	6.9	--	8.0	7.4	6.5	4.9	4.9	5.8	6.2	6.7	6.2	8.2	5.8
MO 19	11.9	11.6	12.6	--	11.5	10.7	--	12.0	11.0	13.0	16.5	12.0	11.5	12.9	18.5	14.1	13.5	8.5
MO 20	11.7	10.3	9.4	--	9.7	10.0	--	11.2	10.8	13.0	13.0	14.4	12.0	10.6	10.8	10.1	10.3	11.2
MO 21	23.2	24.2	24.5	--	23.6	24.0	--	24.1	24.0	25.8	23.4	24.3	24.2	26.0	26.6	26.4	26.1	28.1
MO 22	24.9	23.4	21.0	--	20.3	20.2	--	24.3	21.6	27.0	29.1	28.9	30.9	32.4	33.3	33.7	33.2	32.4
MO 23	24.9	18.9	21.2	--	25.9	24.2	--	25.8	19.8	23.1	23.8	23.3	23.9	25.8	22.3	22.0	25.2	19.7
MO 24/ CL 5	16.1	17.5	15.9	--	19.9	14.2	15.4	18.8	17.8	21.3	25.0	22.4	18.8	18.3	18.7	20.7	19.4	19.7
MO 25	31.3	31.7	29.6	--	27.6	25.7	--	25.4	24.7	25.1	22.6	22.4	20.4	21.1	21.2	20.7	21.9	20.7
MO 26	21.1	15.0	14.6	--	19.7	15.4	--	16.0	14.4	14.0	14.2	17.2	14.5	16.7	16.8	17.2	17.6	21.0
MO 27	24.1	25.3	27.3	--	25.8	21.6	--	24.3	22.5	20.9	19.3	19.8	19.1	18.5	18.9	16.6	16.2	17.1
MO 28	24.1	21.4	22.0	--	23.5	22.7	--	27.1	27.6	25.8	25.5	25.3	22.5	18.9	20.2	17.7	17.2	19.1
MO 29	13.4	13.7	19.8	18.0	18.6	17.7	--	20.4	17.9	16.5	14.3	16.5	16.5	16.2	16.9	16.2	16.7	17.6
MO 30	21.0	25.1	24.2	--	24.4	24.4	--	30.6	32.1	30.5	28.1	28.9	30.0	27.6	26.8	26.0	24.7	25.5
MO 31	21.4	20.0	21.3	--	22.5	23.6	--	25.8	25.4	24.6	24.8	25.0	25.7	25.7	26.5	25.2	25.2	26.2
MO 32	15.3	14.5	15.2	--	16.6	16.5	--	21.3	21.1	22.6	22.5	22.7	22.2	23.4	24.2	22.9	23.7	25.0
MO 33	30.4	34.0	28.7	--	17.7	21.6	--	22.5	22.3	20.7	19.0	16.2	13.8	16.1	19.7	20.8	22.3	22.5
MO 34	4.2	13.9	17.9	18.7	15.6	25.3	25.7	19.7	27.7	20.8	25.0	19.6	26.8	21.4	24.9	22.7	22.0	20.5
MO 35	16.5	12.9	13.6	12.6	14.5	13.5	--	15.9	15.5	16.4	15.5	15.8	14.9	17.0	16.9	15.8	16.3	16.3
MO 36	38.2	36.3	55.7	54.7	39.5	49.8	42.9	47.4	40.3	46.1	51.8	38.3	51.9	36.1	36.4	40.6	31.2	45.1
MO 37	33.0	27.4	25.1	22.7	28.3	23.5	--	25.8	28.5	30.2	29.5	30.5	30.8	30.5	28.6	29.5	27.6	25.4
MO 38	30.6	28.5	25.6	--	23.8	19.6	--	20.0	22.0	24.2	22.9	24.9	22.7	25.0	23.8	23.6	24.4	22.1
MO 39	14.1	20.5	15.9	--	20.5	13.2	21.8	14.8	15.3	16.7	22.5	20.8	18.2	18.9	21.7	18.0	19.0	21.0
MO 43	21.7	20.4	25.2	22.4	18.7	16.4	--	13.3	12.7	13.1	13.4	11.9	11.0	12.8	12.2	9.8	10.0	11.4
MO 44	34.0	24.8	32.8	--	29.3	30.5	--	28.6	25.1	28.2	22.4	14.6	23.9	24.7	25.0	24.7	27.0	27.4
MO 45	45.1	29.7	22.5	--	5.7	11.3	18.2	11.7	12.0	13.3	11.1	12.3	10.9	9.6	12.2	11.6	11.9	12.4
MO 46	22.0	21.5	19.6	--	18.3	17.3	--	17.6	16.9	17.7	16.7	18.2	15.4	15.1	16.4	16.3	16.7	18.2
MO 47	19.7	18.8	16.8	--	13.3	12.3	--	13.7	12.8	12.3	10.2	10.6	10.0	9.9	10.6	9.3	10.9	10.3
MO 48	2.7	2.8	3.1	--	3.3	3.6	--	3.4	5.4	6.8	12.6	12.4	12.4	11.1	9.8	6.2	6.1	6.5
MO 49	13.4	13.2	8.3	13.9	12.4	12.2	--	13.4	11.4	13.5	12.9	12.4	12.2	9.8	10.1	9.8	8.7	7.5
MO 50	19.9	19.2	20.1	--	21.0	22.6	--	23.3	21.0	20.9	18.8	17.6	16.5	16.9	17.7	18.6	17.9	17.4
MO 51	16.2	15.9	13.8	--	15.1	14.3	--	15.7	17.3	15.9	15.4	15.8	15.4	15.6	16.8	16.4	16.3	16.0
MO 52	11.5	13.4	12.3	--	12.3	12.0	--	13.8	14.6	17.7	16.3	14.3	12.5	13.1	12.1	11.3	12.2	15.2
MO 53	--	11.3	12.5	--	17.4	13.8	--	16.4	15.1	17.0	16.2	20.5	20.2	20.7	22.4	21.9	23.2	20.5

MO 54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 57/ CL 3	8.4	4.3	7.5	--	3.3	4.7	--	6.5	7.9	5.5	9.0	11.8	16.9	19.0	20.7	17.5	20.4	21.0
MO 58	7.5	6.6	4.2	--	3.3	2.7	--	2.3	2.2	2.6	1.7	2.2	2.5	1.7	3.4	1.5	1.3	1.2
MO 59	20.7	20.8	18.3	--	18.2	18.0	--	16.2	17.4	18.0	17.4	16.3	16.0	16.9	17.2	16.1	16.2	16.6
MO 60	13.2	12.5	9.9	--	9.3	7.3	--	5.5	5.0	6.6	5.3	3.2	2.9	3.0	2.6	1.5	1.4	1.3
MO 61	3.8	3.6	4.2	--	4.1	3.6	--	3.8	3.7	4.5	0.8	3.4	3.2	3.0	3.2	2.8	2.5	2.6
MO 62	12.0	6.6	9.1	--	13.6	6.9	9.3	11.7	11.6	8.2	5.5	16.1	13.9	16.4	16.0	14.6	14.2	17.4
MO 63	6.9	7.4	9.8	--	6.8	6.5	--	6.9	7.0	7.7	7.9	6.9	6.9	7.2	7.9	7.3	8.4	8.0
MO 64	0.0	0.1	0.0	--	0.1	0.1	--	0.2	<0.013	7.4	0.2	0.1	<0.013	<0.020	<0.02	<0.010	<0.010	<0.017
MO 65	6.9	9.9	12.2	--	17.0	18.2	--	18.5	17.9	12.4	11.8	16.8	17.0	13.9	15.7	13.1	15.1	13.7
MO 66	3.7	4.9	4.6	--	5.0	4.0	--	4.8	4.3	0.7	5.1	6.0	4.4	5.6	4.7	5.8	5.4	5.3
MO 75	15.6	12.9	14.2	--	12.1	14.6	--	13.7	12.3	12.7	11.0	11.3	14.4	14.1	14.8	13.0	9.8	10.7
MO 76	0.6	0.7	0.7	--	0.8	0.8	--	1.0	0.9	1.7	1.1	1.0	1.0	1.0	1.1	0.9	1.2	1.7
MO 77	0.1	0.2	0.2	--	0.1	0.2	--	0.2	0.1	0.7	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1
MO 78	5.7	5.6	6.2	--	5.2	5.3	--	5.2	5.1	6.2	5.5	5.3	5.4	5.4	5.9	5.5	6.0	5.9
MO 79	0.0	0.1	0.0	--	<0.015	0.1	--	0.1	<0.013	<0.243	0.2	<0.016	<0.013	<0.020	<0.02	<0.010	<0.010	--
MO 80	1.6	1.5	1.7	--	1.7	1.5	--	1.6	1.6	--	--	--	--	--	--	--	--	--
MO 81	4.1	3.9	3.9	--	4.1	3.8	--	7.8	4.1	5.0	4.2	4.7	5.6	4.7	4.9	4.9	6.0	5.3
MO 82	0.0	0.1	0.0	--	<0.015	0.0	--	<0.014	0.0	0.7	0.2	<0.016	<0.016	<0.020	<0.020	<0.010	<0.010	ND
MO 83	14.3	12.7	14.8	--	13.9	15.0	--	12.7	14.0	15.3	14.0	14.1	14.4	14.3	15.3	14.8	15.8	14.8
MO 84	24.9	27.6	23.6	21.1	24.0	19.7	--	19.5	28.5	32.3	28.8	26.0	26.3	26.8	28.8	26.2	27.3	26.7
MO 85	24.3	24.4	23.0	--	21.3	22.1	--	20.8	20.7	22.5	19.7	20.0	17.8	20.8	21.4	20.5	21.5	21.7
MO 86	0.0	0.1	0.0	--	<0.015	0.1	--	<0.014	0.0	<0.243	0.2	<0.016	<0.016	<0.020	0.1	<0.010	<0.010	<0.017
MO 87	24.2	20.2	17.7	--	14.2	13.4	--	15.1	15.6	16.8	15.8	14.2	13.0	13.9	15.4	16.7	14.4	16.7
MO 88	12.0	11.4	12.3	--	14.7	12.0	--	12.2	12.5	13.7	13.2	12.4	11.5	12.1	13.0	13.2	13.8	15.3
MO 89	17.6	20.0	20.4	--	23.0	20.0	--	20.9	18.2	20.6	19.5	16.0	12.4	15.9	13.8	16.4	11.7	17.2
MO 90	9.6	11.5	12.1	--	9.3	9.8	--	11.7	10.6	12.0	11.2	10.4	10.1	12.7	14.1	13.5	6.8	11.2
MO 91	32.5	30.2	10.1	9.5	12.2	17.9	18.4	8.4	14.8	20.5	3.9	8.9	11.5	12.8	19.4	22.4	26.6	29.2
MO 92	16.3	16.0	16.8	--	16.9	16.8	--	15.6	13.5	15.0	15.1	18.0	16.4	18.3	19.9	19.5	19.6	18.8
MO 93	11.7	12.1	12.2	--	13.6	14.9	--	13.3	13.7	16.4	15.4	13.9	14.9	17.6	16.8	18.5	15.6	17.3
MO 94	20.0	17.4	17.4	--	17.2	17.8	--	19.5	18.6	18.8	18.7	20.0	19.0	19.1	20.1	20.3	21.6	26.6
MO 95	14.5	13.2	11.4	--	12.3	11.7	--	13.9	14.3	13.2	11.1	13.9	13.6	13.7	13.9	14.5	13.4	14.3
MO 96	39.8	41.0	41.9	--	40.2	42.0	--	45.2	43.7	47.6	44.7	44.4	40.3	37.6	29.4	27.3	22.5	26.8
B25	--	--	--	--	6.0	--	--	--	--	--	--	--	--	--	--	--	--	--
B141A	--	--	--	--	11.5	--	--	--	--	--	--	--	--	--	--	--	--	--
Fowler	13.9	14.9	15.9	18.9	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Plot G-1	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Average	16.5	15.5	15.4	21.3	15.3	14.8	19.9	15.6	15.4	16.3	15.4	15.6	16.2	16.0	16.5	15.9	16.1	16.6
Plotting Date	7/1/2006	1/7/2007	7/1/2007	10/1/2007	1/8/2008	7/8/2008	9/9/2008	2/9/2009	9/1/2009	1/1/2010	7/1/2010	3/1/2011	7/11/2011	1/1/2012	7/1/2012	1/1/2013	9/1/2013	3/1/2014

Table 2. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	Sep-14	Mar-15	Jul-15	Mar-16	Oct-16	Mar-17	Sep-17	Oct-17	Mar-18	Aug-18	Feb-19	Jul-19	Feb-20	Jul-20	Feb-21
MO 1	19.7	12.1	8.3	10.0	11.50	9.35	10.4	--	9.5	13.0	13.9	13.1	16.7	21.5	19.7
MO 2	14.4	15.3	15.7	16.2	14.10	12.00	12.3	--	11.9	16.6	12.6	12.9	14.1	14.2	13.7
MO 3	10.4	9.2	7.8	9.9	9.45	9.46	3.55	--	10.3	10.4	10.3	10.4	10.7	11.0	11.4
MO 4	9.9	11.5	10.2	12.8	9.58	10.60	10.4	--	11.0	11.0	11.1	11.3	11.7	12.4	12.7
MO 5	14.3	14.9	13.3	13.3	11.80	11.60	12.5	--	13.5	13.7	13.6	12.3	13.6	14.0	14.0
MO 6	9.1	11.9	9.8	10.7	8.95	8.60	8.8	--	9.5	9.8	8.96	9.67	8.6	8.83	9.01
MO 7/ CL 33	17.2	17.6	17.8	19.7	18.90	17.50	18.3	--	--	16.4	13.6	17.6	11.3	11.3	16.2
MO 8	20.1	19.8	20.9	18.9	17.30	17.80	18.4	--	18.9	16.4	16.4	17.4	17.6	15.6	20.3
MO 9	17.6	18.4	12.9	18.4	15.00	17.50	10.60	--	17.5	17.0	14.4	16.3	14.5	15.4	16.5
MO 10/ CL 26	16.9	13.4	15.9	17.8	17.80	--	--	--	--	--	--	--	--	--	--
MO 11	9.9	10.1	8.3	10.2	8.71	8.56	18.3	--	9.1	9.3	9.1	9.9	9.7	10.6	11.4
MO 12/ CL 25	5.9	5.8	5.4	6.4	5.77	16.30	6.5	--	6.9	7.1	7.8	8.01	--	7.48	8.72
MO 13/ CL 21	15.6	16.1	15.8	18.1	17.80	15.20	16.0	--	12.0	--	14.0	15.3	13.7	14.9	--
MO 14	24.5	25.3	24.6	20.8	24.30	4.08	--	--	--	--	--	--	20.7	--	--
MO 15/ CL 18	14.1	15.2	14.2	15.9	13.90	14.00	14.10	--	--	--	13.4	14.6	--	--	--
MO 16/ CL 32	13.2	16.3	12.5	15.7	--	10.90	12.6	--	11.1	10.7	10.8	11	11	12.1	11.9
MO 17	23.4	24.1	23.2	25.7	24.20	24.00	23.8	--	25.2	22.7	22.5	19.9	23.3	24.3	22.8
MO 18	5.3	6.0	4.5	4.9	5.09	10.90	5.7	12.9	16.3	18.7	5.1	5.03	12.8	7.96	10.6
MO 19	5.6	5.8	5.1	5.7	11.50	10.70	5.8	--	2.3	1.4	2.8	1.9	2.7	5.00	3.30
MO 20	9.4	10.7	3.4	8.7	6.73	6.47	6.3	--	7.7	9.4	8.2	8.67	8.94	9.39	10.6
MO 21	25.5	26.7	25.5	28.4	24.20	28.10	23.00	--	24.2	24.9	24.7	21.3	21.9	22.3	27.1
MO 22	29.2	29.2	29.3	30.3	29.10	28.30	30.9	--	33.1	15.9	30.8	24.8	27.5	27.4	25.2
MO 23	21.1	21.1	20.9	25.2	23.40	20.90	20.8	--	16.7	20.8	22.9	13.5	19.5	21.0	20.5
MO 24/ CL 5	16.3	16.2	26.7	20.7	23.80	18.30	13.5	--	--	--	--	--	--	--	--
MO 25	15.8	21.9	19.0	19.4	15.90	19.30	21.0	--	16.6	18.4	18.2	18.6	8.7	20.9	20.6
MO 26	5.4	22.2	22.7	25.0	23.80	21.70	25.2	--	23.4	22.2	23.7	24.6	25.8	19.2	22.2
MO 27	5.4	17.0	17.1	18.7	18.20	20.50	18.48	--	18.6	16.2	12.5	13	9.29	12.0	9.2
MO 28	6.1	18.2	17.6	18.2	17.80	16.10	18.7	--	16.7	15.4	17.2	13.4	19.4	23.7	18.4
MO 29	6.1	16.3	18.5	17.7	16.20	15.20	18.3	--	17.3	17.0	17.7	19.1	21.8	21.3	19.6
MO 30	6.5	24.1	23.0	22.1	22.20	19.30	21.0	--	18.2	17.4	17.1	18.2	18.6	18.2	19.3
MO 31	23.7	26.2	27.3	27.0	26.80	24.90	27.4	--	24.6	22.8	23.0	24.5	23.9	24.2	24.3
MO 32	8.3	25.5	24.9	24.9	25.40	23.50	25.8	--	22.7	22.0	25.4	26.6	25.8	24.3	24.2
MO 33	7.2	21.8	21.3	21.1	22.40	19.60	19.66	--	20.7	17.9	19.3	19.1	22.5	25.1	26
MO 34	23.7	20.5	19.4	22.4	22.00	21.00	23.2	--	22.4	16.3	19.5	18.2	19.9	20.2	20
MO 35	15.3	20.2	19.3	20.2	23.30	22.10	22.3	--	25.1	20.9	18.5	21.4	21.0	19.9	19
MO 36	52.4	29.6	33.3	22.8	22.90	20.30	21.5	--	22.9	17.5	18.2	21.4	19.4	19.5	21
MO 37	18.3	25.0	23.5	22.9	20.50	15.60	23.3	--	23.1	20.0	20.5	18.4	17.9	17.2	18
MO 38	19.8	22.9	23.9	24.4	25.30	23.00	24.7	--	27.0	23.2	23.4	21.7	21.8	22.0	21.3
MO 39	18.8	20.3	20.7	22.8	19.80	19.50	16.50	--	18.0	17.0	17.5	11.7	15.5	16.7	15.5
MO 43	9.7	16.5	9.9	13.6	12.70	13.10	13.1	--	8.7	10.6	14	11.7	10.4	10.5	17.8
MO 44	24.2	24.8	23.1	24.1	20.10	21.20	12.9	--	17.9	19.5	12.4	12.5	11.8	17.5	10.1
MO 45	11.6	12.7	10.7	12.3	3.37	11.80	17.9	--	10.2	13.0	12.8	13.3	13.7	14.7	15.0
MO 46	20.6	21.4	21.4	21.9	19.20	18.90	16.3	--	18.3	16.3	16.5	17.6	19.0	14.9	14.8
MO 47	9.3	10.1	8.2	9.5	8.29	8.95	8.2	--	9.2	9.1	8.44	9.23	9.31	10.6	11.2
MO 48	8.1	8.0	10.7	6.9	9.59	8.97	11.90	--	13.2	12.4	12.5	10.1	9.54	13.7	5.43
MO 49	7.2	6.5	6.6	7.4	11.70	6.44	7.8	--	10.1	8.6	9.4	10.4	10.4	11.1	10.1
MO 50	13.8	17.9	16.1	17.6	14.10	14.80	16.2	--	14.5	13.7	13.3	13.6	13.2	13.8	12.9
MO 51	16.1	16.0	15.1	16.2	13.70	15.30	--	--	--	--	--	--	--	--	--
MO 52	12.5	10.8	9.2	13.1	13.10	9.98	14.6	--	--	--	--	--	--	--	--
MO 53	17.3	19.1	17.0	16.6	9.84	14.50	15.0	--	14.5	15.3	14.3	15.5	13	15.2	13.1

MO 54	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 55	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 56	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 57/ CL 3	--	--	11.9	17.4	--	20.50	21.8	--	19.9	--	18.2	--	19.3	19.2	--
MO 58	1.0	0.9	0.8	0.7	14.30	1.13	1.1	--	1.6	1.7	0.7	1.2	1.0	10.9	1.28
MO 59	13.7	15.0	13.1	13.6	0.88	12.20	11.9	--	12.9	11.9	1.65	11.3	11.5	11.6	11.0
MO 60	1.0	1.2	1.2	0.7	0.77	0.71	0.56	--	0.7	0.6	11.7	0.542	0.589	0.627	0.540
MO 61	2.2	3.2	2.8	3.4	4.17	4.01	4.1	--	18.0	3.7	4.3	4.83	4.24	5.02	4.96
MO 62	12.3	13.4	6.1	18.3	17.20	13.10	15.9	--	4.1	14.0	16.5	16.4	17.3	16.3	12.5
MO 63	6.8	12.5	8.2	9.9	7.84	9.83	8.1	--	8.3	7.6	8.1	8.16	8.22	9.06	9.49
MO 64	--	<0.029	<0.002	<0.03	0.77	0.14	0.2	--	0.2	<0.002	11.5	--	--	--	--
MO 65	11.9	13.3	10.8	12.1	10.60	11.30	10.9	--	3.6	11.4	11.3	10.2	0.126	0.129	9.45
MO 66	5.1	5.9	6.1	5.6	5.43	0.14	0.17	--	12.7	0.1	10.6	10.2	9.06	9.95	8.13
MO 75	7.9	8.0	8.0	6.7	2.97	4.70	6.1	--	1.6	4.9	1.6	1.73	0.967	2.44	0.592
MO 76	1.4	1.7	1.5	1.5	1.46	1.39	1.4	--	1.4	1.3	1.1	4.4	0.933	0.894	0.712
MO 77	0.2	0.2	0.2	<0.5	0.20	0.18	0.3	--	0.2	0.2	0.233	0.994	0.251	0.170	0.213
MO 78	4.5	5.3	5.2	5.7	4.90	4.40	4.8	--	4.5	3.8	3.7	0.2	3.8	4.35	4.56
MO 79	--	0.0	<0.002	<0.500	<0.002	<0.002	0.2	--	0.2	<0.002	0.139	<0.002	0.129	<0.002	0.044
MO 80	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
MO 81	4.4	5.1	4.6	4.1	--	0.14	6.0	--	--	--	--	--	--	--	--
MO 82	<0.002	<0.029	<0.002	<0.500	0.13	0.13	<0.002	--	0.2	<0.002	0.1	<0.002	0.8	<0.002	0.041
MO 83	12.3	13.7	12.2	13.4	--	12.20	12.4	--	12.1	12.1	12.8	13.3	12.8	14.5	13.4
MO 84	21.0	23.6	19.4	21.4	19.40	19.20	--	--	19.9	20.3	21.1	26.4	30.1	29.7	28.0
MO 85	19.6	21.3	19.3	20.3	18.40	18.10	18.3	--	16.9	16.2	17	17.5	17.2	18.8	17.2
MO 86	0.2	0.2	0.2	<0.5	0.12	0.14	0.71	--	0.2	0.2	0.142	0.529	0.131	0.121	0.044
MO 87	16.1	18.7	18.5	21.1	21.40	21.20	20.8	--	22.6	21.5	22.6	--	24.1	25.9	25.1
MO 88	13.5	15.3	15.2	14.0	--	14.10	15.8	--	14.1	15.6	13.1	17.0	16.5	12.9	14.0
MO 89	14.8	16.9	17.2	16.5	14.70	15.30	38.0	--	17.2	14.1	16.4	10.4	16.4	13.3	17.6
MO 90	9.8	11.0	9.8	9.5	9.59	9.91	10.9	--	12.5	10.3	11.2	10.4	11.0	11.1	11.1
MO 91	31.2	34.4	37.8	12.4	21.60	20.30	23.1	--	30.3	32.1	33.1	43.7	41	44.9	41.7
MO 92	17.7	16.6	18.0	20.2	19.20	18.50	19.50	--	20.7	19.6	17.7	17.2	15	15.3	18.6
MO 93	15.6	17.3	15.6	17.2	16.10	15.20	17.4	--	17.6	15.4	16.5	16.5	17	17.7	12.6
MO 94	23.8	25.4	20.2	23.2	18.20	16.90	19.3	--	24.8	27.6	20.7	21.8	26.4	14.0	20.8
MO 95	12.9	15.8	12.8	14.1	12.20	12.60	28.5	--	13.2	12.5	13	13.5	13.7	14.5	31.3
MO 96	25.9	29.7	33.8	35.5	22.50	25.90	29.0	--	32.2	30.9	32.4	33.4	34.2	31.8	15.1
B25	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
B141A	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Fowler	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
Plot G-1	--	--	--	16.8	17.60	--	--	--	20.2	21.3	17.7	18.8	19.0	22.3	18.5
Average	13.7	15.6	14.9	15.9	14.3	13.7	14.6	12.9	14.3	14.2	13.9	14.1	14.3	15.0	14.4
Plotting Date	9/1/2014	3/1/2015	7/15/2015	3/16/2016	10/1/2016	3/17/2017	9/1/2017	10/1/2017	3/1/2018	8/1/2018	2/1/2019	7/9/2019	2/2/2020	7/22/2020	2/24/2021

Table 2. Groundwater Nitrate as Nitrogen (mg/L)

Well/Date	Jul-21	Feb-22	Jun-22	Feb-23
MO 1	12.3	11.1	20.0	12.9
MO 2	9.93	13.5	13.6	13.1
MO 3	7.4	11.7	11.6	9.68
MO 4	8.67	12.7	11.9	8.30
MO 5	9.33	12.20	13.2	12.9
MO 6	6.04	9.29	10.2	9.00
MO 7/ CL 33	15.8	--	18.2	--
MO 8	17.9	19.9	17.6	18.8
MO 9	14.9	15.4	15.3	15.1
MO 10/ CL 26	14.5	--	--	--
MO 11	10.3	10.9	11.1	10.7
MO 12/ CL 25	7.43	9.25	10.0	10.4
MO 13/ CL 21	--	--	--	--
MO 14	--	--	--	20.3
MO 15/ CL 18	--	--	--	--
MO 16/ CL 32	--	--	--	--
MO 17	21.9	22.1	21.5	22.8
MO 18	--	13.8	11.7	13.8
MO 19	4.69	2.08	2.60	1.67
MO 20	9.52	10.9	11.6	12.2
MO 21	25.2	23.8	21.3	23.8
MO 22	23.4	23.6	23.4	23.8
MO 23	16.9	22.7	24.3	22.6
MO 24/ CL 5	--	--	--	--
MO 25	17.6	19.4	20.0	20.3
MO 26	20.3	20.6	21.7	21.0
MO 27	10.1	16.7	22.4	12.1
MO 28	16.8	17.9	17.6	16.5
MO 29	18.7	18.3	20.7	16.9
MO 30	17.9	25.3	15.6	18.2
MO 31	23.5	20.1	18.0	16.4
MO 32	22.5	22.3	20.1	18.6
MO 33	22.7	21.8	22.0	21.9
MO 34	18.3	19.4	19.9	20.6
MO 35	17.3	17.7	17.3	18.5
MO 36	19.5	19.1	19.0	20.6
MO 37	15.8	17.4	17.0	20.7
MO 38	20.1	20.6/17.5	21.3	21.2
MO 39	13.3	16.0	15.0	17.5
MO 43	10.2	10.0	12.5	11.5
MO 44	17.2	10.0	--	--
MO 45	--	12.6	12.9	12.0
MO 46	--	14.8	14.5	14.3
MO 47	12.3	12.6	12.9	12.7
MO 48	6.68/13.3	8.62	11.0	6.57
MO 49	10.2	4.89	8.29	8.06
MO 50	12.2	12.8	12.7	12.0
MO 51	--	--	--	--
MO 52	--	--	--	--
MO 53	13.4	12.3	12.0	11.7

MO 54	--	--	--	--
MO 55	--	--	--	--
MO 56	--	--	--	--
MO 57/ CL 3	18.3	--	--	--
MO 58	2.22	1.98	0.491	11.6
MO 59	10.7	11.6	11.5	11.6
MO 60	0.448	0.563	--	0.480
MO 61	4.97	5.29	4.80	4.61
MO 62	14.0	15.3	14.3	14.9
MO 63	8.29	8.93	8.87	9.14
MO 64	--	--	--	--
MO 65	9.74	10.2	9.85	10.5
MO 66	0.139	9.79	9.31	8.89
MO 75	1.22	1.23	1.44	0.437
MO 76	0.366	0.561	0.537	0.446
MO 77	0.136	0.241	0.275	0.208
MO 78	1.68	4.69	4.40	4.11
MO 79	0.114	--	--	--
MO 80	--	--	--	--
MO 81	--	--	--	--
MO 82	0.106	0.02	0.017	<0.002
MO 83	13.5	14.1	14.0	13.7
MO 84	28.5	27.7	27.8	26.5
MO 85	17.0	16.9	16.8	<0.002
MO 86	0.106	0.610	0.023	<0.002
MO 87	21.0	22.7	22.1	16.4
MO 88	13.0	14.0	13.7	13.5
MO 89	16.3	17.2	16.7	16.8
MO 90	6.98	11.7	11.9	12.0
MO 91	30.7	43.8	45.5	49.2
MO 92	11.6	14.2	14.5	16.3
MO 93	8.88	18.6	18.0	18.6
MO 94	11.8	16.6	16.4	16.1
MO 95	14.6	15.6	14.8	14.1
MO 96	25.7	27.4	28.4	32.4
B25	--	--	--	--
B141A	--	--	--	--
Fowler	--	--	--	--
Plot G-1	15.8	15.8	15.3	14.7
Average	12.9	14.1	14.6	14.7
Plotting Date	7/30/2021	2/28/2022	6/1/2022	2/1/2023

Table 3. LLAS CL Recovery Well Nitrate as Nitrogen (nitrate-N) Summary (mg/L)

Well/Date	Mar-91	Jun-91	Sep-91	Dec-91	Mar-92	Jun-92	Sep-92	Dec-92	Jun-93	Sep-93	Dec-93	Mar-94	Jun-94	Sep-94	Dec-94	Mar-95	Jun-95	Sep-95	Dec-95	Mar-96
CL 1	7.57	14.92	15.35	13.37	15.33	14.57	13.19	10.37	14.32	12.30	Aband	No use	No use	No use	NA	No use	No use	No use	No use	No use
CL 2	8.32	12.29	15.11	13.34	11.90	8.09	9.45	6.35	14.58	Aband	Aband	Inop	13.40	14.45	Inop	Inop	Inop	Inop	Inop	Inop
CL 3/MO 57																				
CL 4	0.75	18.65	10.24	20.47	19.46	15.64	12.25	14.25	15.11	13.96	20.33	20.80	17.90	Inop	5.32	8.91	Inop	Inop	Inop	14.00
CL 5/MO 24																				
CL 6	2.78	29.78	28.70	25.68	22.04	27.39	24.55	22.75	Aband	21.45	Aband	Inop	Inop	Inop	NA	Inop	Inop	Inop	Inop	Inop
CL 7	15.28	17.08	21.35	17.66	16.87	No pwr	No pwr	21.74	18.87	18.68	25.02	19.89	20.30	20.20	17.20	Dry	Dry	Dry	Dry	Dry
CL 8	4.19	7.18	CaveIn	CaveIn	CaveIn	CaveIn	CaveIn	CaveIn	CaveIn	CaveIn	CaveIn	Aband	Aband	Aband	NA	Aband	Aband	Aband	Aband	Aband
CL 9	23.15	20.39	15.78	21.07	20.17	35.35	18.22	23.40	17.80	20.40	Aband	Inop	18.90	Inop	16.32	21.60	16.54	13.00	20.90	17.80
CL 10	15.77	25.35	20.52	20.45	15.11	20.72	19.69	13.45	19.35	18.89	Aband	Inop	18.60	Inop	Inop	No pwr	Inop	Inop	Inop	17.70
CL 11	11.32	11.57	14.76	14.30	N/S	No pwr	No pwr	17.26	Aband	Aband	Aband	Aband	Aband	Aband	NA	Aband	Aband	Aband	Aband	Aband
CL 12	15.17	32.00	21.48	19.95	21.22	15.7	Inop	6.80	19.17	18.50	Aband	Inop	Inop	Inop	NA	Inop	Inop	Inop	Inop	Inop
CL 13	0.94	21.24	2.79	1.69	0.55	2.07	4.74	1.57	22.60	0.50	Aband	Inop	Inop	Inop	4.07	4.33	3.71	5.24	25.50	3.80
CL 14	3.55	4.29	3.72	3.70	4.05	2.50	3.35	1.90	11.37	0.38	Aband	Inop	7.58	4.43	3.04	3.31	2.88	Inop	Inop	Inop
CL 15	9.83	8.83	11.83	11.74	N/S	9.67	10.15	8.42	10.40	11.99	Aband	Inop	Inop	Inop	12.74	No use	10.10	13.50	15.50	14.20
CL 16	32.74	9.56	10.49	8.94	3.78	6.90	8.26	11.75	10.49	1.32	8.69	5.17	0.59	Inop	0.13	6.14	5.18	8.51	5.50	4.70
CL 17	19.83	40.48	Aband	31.63	28.75	Aband	No pwr	Aband	Aband	Aband	Aband	Aband	Aband	Aband	NA	Aband	Aband	Aband	Aband	Aband
CL 18/MO 15																				
CL 19	35.04	37.60		Aband	29.64	No pwr	No pwr	Aband	Aband	Aband	Aband	Aband	Aband	Aband	NA	Aband	Aband	Aband	Aband	Aband
CL 20	26.09	16.50	31.82	31.27	26.68	30.91	26.96	33.25	30.79	35.65	48.64	37.40	38.60	38.29	24.61	31.70	27.80	44.20	45.20	35.10
CL 21/MO 13																				
CL 22	21.21	17.90	26.62	26.66	25.60	23.69	23.03	29.20	18.04	28.38	27.53	27.90	28.00	Inop	Inop	Inop	Inop	Inop	Inop	Inop
CL 23	32.02	N/S	Dry	Dry	Dry	26.21	No pwr	30.74	26.83	26.49	28.06	26.70	26.40	Inop	27.36	No use	23.60	Inop	15.60	Inop
CL 24	28.57	25.81	31.75	30.82	32.19	34.87	32.14	25.05	37.59	35.77	32.62	31.60	32.10	26.37	27.21	14.00	Inop	24.00	Inop	Inop
CL 26/MO 10																				
CL 27	4.31	14.40	8.64	11.72	15.90	12.91	12.57	31.79	16.10	21.03	30.76	21.10	16.10	14.39	14.47	19.60	16.30	26.60	19.30	21.10
CL 28											19.12	19.08	20.20	18.44	18.02	23.40	18.50	18.90	17.90	17.10
CL 29											24.44	23.40	24.50	24.90	21.49	21.10	18.80	Inop	No use	No use
CL 30											22.51	21.85	22.00	9.11	15.18	Inop	17.80	Inop	24.90	19.40
CL 31											28.79	24.50	31.20	37.40	26.93	34.00	18.10	26.30	Inop	Inop
CL 32/MO 16											19.09	12.62	10.70	15.10	15.77	12.00	14.10	9.97	18.50	13.10
CL 33/MO 7																				
CL 34																				
CL 35																				
CL 36																				
CL 37											9.67	10.13	10.50	13.30	10.17	11.90	Inop	3.51	39.00	5.60
CL 38																				
CL 39																				
CL 40																				
CL 41																				
CL 42																				
CL 43																				
CL 44																				
CL 45																				
CL 46																				
CL 47																				
CL 48																				
NE of Plot 6																				
Plot 7 - 9																				
N of Plot 15																				
N of Schoppa																				
Plot 7																				
Monthy Sum	318.43	385.82	290.95	324.46	309.24	287.19	218.55	310.04	303.41	285.69	345.27	302.14	357.57	236.38	260.03	211.99	193.41	193.73	247.80	183.60
Monthy Avg.	15.16	19.29	17.11	18.03	18.19	17.95	15.61	17.22	18.96	17.86	24.66	21.58	19.87	19.70	15.30	16.31	14.88	17.61	22.53	15.30
Count	21	20	17	18	17	16	14	18	16	16	14	14	18	12	17	13	13	11	11	12

Bolded values for Semi-Annual 2017 results are from Water Utitlities Lab

Table 3. LLAS CL Recovery Well Nitrate as Nitrogen (nitrate-N) Summary (mg/L)

Well/Date	Jun-96	Sep-96	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00	May-01
CL 1	No use	NA	NA	No use	No use	No use	No use	No use	No use	No use	No use	No use	No use	Inop		19.00	19.50	21.50	20.10	23.78
CL 2	Inop	Inop	Inop	Inop	Inop	Inop	Inop	Inop	Inop	Inop	No use	No use	No use	Inop		13.40	13.50	11.10	13.20	14.99
CL 3/MO 57																				
CL 4	8.80	Inop	Inop	10.48	9.85	5.73	3.63	2.22	2.38	3.86	9.48	10.63	10.90	10.60	9.96	12.70	11.60	11.60	10.02	14.20
CL 5/MO 24																				
CL 6	Inop	NA	NA	Inop	Inop	Inop	Aband	Inop	Inop	Inop	Inop	Inop	Inop	Inop		21.10	12.60	12.90	12.20	13.68
CL 7	Dry	Inop	Inop	Dry	Dry	16.41	Inop	Dry	Dry	Dry	Inop	19.98	20.40	19.80		17.80	18.20	20.30	19.00	22.49
CL 8	Aband	NA	NA	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband		Aband	Aband	Aband	Aband	
CL 9	18.30	Inop	Inop	18.78	21.50	19.87		18.20	21.30	21.80	22.90	22.70	22.80	22.10	23.30	19.60	20.40	24.40	19.90	22.09
CL 10	17.10	15.40	Inop	18.69	19.80	15.93	17.80	16.40		18.70	22.90	20.22	20.80	20.60	19.10	19.60	20.30	23.50	21.10	20.75
CL 11	Aband	NA	NA	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Inop		16.60	22.40	34.40	35.80	21.93
CL 12	Inop	NA	NA	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Inop		17.70	18.30	20.60	18.60	18.04
CL 13	13.60	4.90	Inop	0.25	0.46	Inop	Inop	Inop	Inop	Inop	Inop	Inop	Inop	Inop		16.10	16.00	16.30	16.40	3.55
CL 14	Inop	Inop	Inop	Inop	Inop	Inop	Farm	Inop	Inop	Inop	Inop	Inop	Inop	Inop		16.30	18.10	20.90	19.20	14.14
CL 15	16.80	14.40	12.10	Inop	Inop	Inop	Farm	Inop	Inop	Inop	Inop	Inop	Inop	Inop	20.70	19.10	20.80	22.10	22.80	22.15
CL 16	4.80	Inop	Inop	Inop	Inop	Inop	0.52	0.54	0.21	Inop	Inop	0.57	1.29	Inop	1.52	1.32	2.28	2.14	19.80	2.03
CL 17	Aband	NA	NA	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Plug'd		Plug'd	Plug'd	Plug'd	Plug'd	
CL 18/MO 15																				
CL 19	Aband	NA	NA	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Aband	Plug'd		Plug'd	Plug'd	Plug'd	Plug'd	
CL 20	34.10	35.50	Inop	32.09	16.65	34.04	37.60	64.50	40.60	42.50	19.20	29.90	29.40	29.20	43.00	38.60	38.90	39.50	41.00	41.85
CL 21/MO 13																				
CL 22	Inop	Inop	Inop	Inop	Inop	25.37	30.20	25.00	29.90	30.10	45.00	27.60	27.60	27.90	30.70	29.10	29.05	29.70	32.40	33.50
CL 23	Inop	24.90	24.60	24.56	27.66	24.86	22.40	22.60	26.70	27.70	32.10	26.45	26.60	26.90	28.00	26.20	27.20	29.80	29.40	38.44
CL 24	Inop	Inop	Inop	26.73	28.62	Inop	Inop	27.80	27.80	28.90	29.00	26.90	27.20	27.20	22.40	28.10	28.40	28.10	30.20	38.05
CL 26/MO 10																				
CL 27	21.30	16.70	17.95	16.33	N/S	15.96	Inop	Inop	Inop	13.70	29.90	Inop	18.80	22.01	15.10	17.10	15.40	16.20	15.30	15.03
CL 28	Inop	14.90	19.90	17.81	Inop	17.69	15.00	16.80	20.50	21.40	17.50	21.80	22.10	22.20	19.50	20.80	20.60	26.20	22.20	22.85
CL 29	No use	Inop	Inop	Inop	Inop	Inop	N/S	Inop	Inop	Inop	Inop	25.04	25.90	25.40	19.90	24.60	23.20	23.70	22.10	23.71
CL 30	20.36	17.50	21.48	21.84	Inop	22.26	Inop	Inop	Inop	Inop	24.30	23.50	23.70	Inop	21.00	21.70	22.40	20.90	23.00	25.29
CL 31	Inop	Inop	Inop	18.33	22.81	21.68	21.90	17.90	23.20	22.70	0.01	24.40	25.60	25.80		28.00	30.20	37.70	38.70	45.53
CL 32/MO 16	14.95	17.80	Inop	Inop	Inop	13.16	11.80	12.90	13.60	13.20	12.60	15.80	16.30	14.60	16.60	14.80	13.70	17.10	18.50	
CL 33/MO 7																				
CL 34														Inop		12.40	13.40	14.30	14.50	16.55
CL 35													9.16	13.60	10.40	8.58	9.82	10.80	10.07	9.66
CL 36														Inop	10.80	9.83	11.30	10.40	12.10	9.56
CL 37	2.17	17.70	Inop	Inop	Inop	10.37	6.11	5.23	11.70	12.90	3.50	10.60	9.16	14.40	14.20	11.90	15.20	12.20	12.02	28.37
CL 38																				
CL 39																				
CL 40																				
CL 41																				
CL 42																				
CL 43																				
CL 44																				
CL 45																				
CL 46																				
CL 47																				
CL 48																				
NE of Plot 6																				
Plot 7 - 9																				
N of Plot 15																				
N of Schoppa																				
Plot 7																				
Monthy Sum	172.28	179.70	96.03	205.89	147.35	243.33	166.96	230.09	217.89	257.46	268.39	306.09	337.71	322.31	326.18	502.03	512.75	558.34	569.61	562.21
Monthy Avg.	15.66	17.97	19.21	18.72	18.42	18.72	16.70	19.17	19.81	21.46	20.65	20.41	19.87	21.49	19.19	18.59	18.99	20.68	21.10	21.62
Count	11	10	5	11	8	13	10	12	11	12	13	15	17	15	17	27	27	27	27	26

Bolded values for Semi-Annual 2017 results are from Water Utitlities Lab

Table 3. LLAS CL Recovery Well Nitrate as Nitrogen (nitrate-N) Summary (mg/L)

Well/Date	Jul-01	Mar-02	Aug-02	Jan-03	Jul-03	Jan-04	Jul-04	Feb-05	Jul-05	Jan-06	Jul-06	Jan-07	Jul-07	Aug-07	Aug-07	Aug-07	Oct-07	Jan-08	Jul-08	Sep-08
CL 1	25.72	25.10	20.37	22.10	17.30	17.60	17.15	20.20	17.58	19.4	17.4	18.8	18.9					21.3	17.385	
CL 2	17.34	14.00	11.73	13.40	12.52	16.10	13.82	13.40	3.72	11.6	11.5	10.3	7.9					9.5	17.195	18.400
CL 3/MO 57																				
CL 4	11.88	20.20	18.41	24.98	10.64	7.30	8.15	8.00	9.43	12.6	9.8	10.7	8.4					8.3	7.701	
CL 5/MO 24																				
CL 6	12.83	9.20	12.17	17.20	14.46	15.40	15.61	16.90	20.16	20.7	17.8	17.9	18.9					16.5	18.145	
CL 7	23.97	25.30	28.04	23.50	17.82	18.80	16.73	16.90	18.86	17.4	18.8	17.8	20.1					20.4	18.320	
CL 8					NS														Aband	Aband
CL 9	22.44	20.10	18.24	19.40	16.06	17.80	16.10	17.50	17.69	18.6	17.5	20.2	19.4					22.8	17.905	
CL 10	24.07	23.70	22.79	26.30	19.58	17.70	19.18	21.10	17.93	18.0	18.2	18.0	19.2					19.4	17.675	
CL 11	22.73	37.40	50.52	21.30	19.01	19.20	51.62	17.50	36.35	21.5	32.3	19.8	28.7					16.5	26.455	25.600
CL 12	20.03	15.20	16.53	15.90	13.97	15.30	14.15	16.90	15.24	16.6	15.2	18.7	16.6					18.2	14.600	
CL 13	5.17	4.60	1.93	2.10	1.23	6.90	7.43	8.00	7.32	10.7	9.5	9.1	10.8					11.9	10.545	
CL 14	14.04	10.00	6.79	10.50	10.03	9.20	6.28	9.10	8.63	10.7	4.4	4.0	5.9					11.9	5.480	16.600
CL 15	21.20	30.00	14.24	33.10	20.22	24.40	17.52	20.80	16.85	20.6	17.8	20.7	18.3					20.2	17.500	
CL 16	4.95	2.90	2.68	6.70	6.27	7.20	4.98	6.60	3.71	6.3	5.5	7.5	119.5	56.1	55.2	47.7		40.7	39.900	
CL 17					NS														Plug'd	Plug'd
CL 18/MO 15																				
CL 19					NS														Plug'd	Plug'd
CL 20	42.49	37.60	32.64	27.00	30.42	21.50	26.90	20.20	24.94	20.4	26.2	20.1	24.5					19.8	21.025	
CL 21/MO 13																				
CL 22	41.22	30.10	28.47	24.70	25.82	22.20	22.93	21.10	21.72	19.1	22.7	18.3	20.9					18.4	20.395	
CL 23	40.49	39.10	40.74	34.40	33.16	30.90	32.63	31.40	31.31	31.9	34.4	29.5	32.5					33.1	29.940	
CL 24	37.26	33.60	26.36	25.30	25.50	20.50	20.10	19.70	18.86	16.6	17.2	14.1	15.0					12.8	13.135	
CL 26/MO 10																				
CL 27	16.24	10.70	11.40	11.10	11.97	10.10	11.15	11.20	12.89	9.8	12.4	11.4	11.7					11.8	11.690	
CL 28	25.71	33.60	16.37	14.40	14.21	12.50	16.18	12.20	15.36	12.2	15.2	13.4	15.2					12.5	14.355	
CL 29	27.15	32.60	26.51	21.20	21.19	17.60	23.16	22.00	21.21	16.7	21.7	18.1	21.8					22.6	21.745	
CL 30	26.61	24.50	17.80	19.10	7.43	14.70	16.22	16.80	17.56	18.5	17.4	16.7	18.5					17.3	17.225	
CL 31	48.78	45.50	33.01	37.10	30.27	30.20	30.20	33.50	31.86	30.4	32.7	32.7	31.4					31.1	27.080	
CL 32/MO 16																			12.305	
CL 33/MO 7																				
CL 34	16.78	16.90	13.59	14.50	13.70	13.60	12.71	14.70	13.02	14.1	15.6	14.3	15.1					15.3	14.010	
CL 35	11.46	9.90	9.39	9.40	8.56	8.60	6.47	10.50	9.08	8.5	9.7	11.1	9.8					8.7	8.772	
CL 36	8.85	13.10	13.76	12.50	12.82	12.00	15.90	16.10	17.86	17.2	24.4	16.1	15.6					12.0	13.055	
CL 37	16.57	14.70	17.89	14.40	16.18	12.40	15.36	12.00	12.85	11.1	18.8	18.6	15.4					15.2	13.500	
CL 38		35.70	48.19	21.50	24.26	21.50	26.83	25.40	28.05	27.9	26.8	29.4	25.9				24.3	29.6	23.500	24.300
CL 39		29.50	25.13	28.90	21.20	21.90	25.76	21.80	18.92	22.3	19.8	23.3	19.6					20.6	18.385	
CL 40		17.70	20.67	22.00	20.12	21.30	21.33	23.20	19.82	22.9	21.0	24.0	22.4					23.5	21.670	
CL 41		41.90	21.79	20.80	21.56	18.50	19.76	19.20	18.68	21.5	19.8	22.2	20.3					22.0	19.000	
CL 42		31.00	23.16	22.90	26.53	18.20	26.28	16.60	23.47	18.9	24.7	22.5	24.8					21.1	20.000	22.900
CL 43		35.90	26.57	29.30	19.99	19.60	22.66	27.20	23.66	28.3	23.7	29.3	23.0					25.8	21.170	
CL 44		59.20	26.85	22.80	20.24	12.60	19.64	11.60	18.46	14.0	19.5	23.4	18.0					14.7	17.605	
CL 45		24.80	25.11	25.00	22.87	20.40	20.98	19.50	20.28	19.8	21.0	17.9	18.9					18.5	17.725	
CL 46												13.9	19.7			16.4		17.6	15.200	
CL 47												15.8	18.3					15.3	16.365	
CL 48												27.6	12.7			12.0		11.9	11.420	
NE of Plot 6		27.20	24.94	23.90	19.68	17.00	26.70	15.20	16.17	14.3	18.2	17.6	17.5			16.7		14.3	15.700	
Plot 7 - 9		33.40	23.58	27.20	23.55	22.60	25.92	18.80	17.85	15.6	15.5	17.3	16.7					17.4	16.100	
N of Plot 15		25.10	24.42	29.10	26.71	23.50	16.84	23.80	27.39	24.3	27.2	24.9	28.0					27.2	24.175	
N of Schoppa		31.90	23.65	24.30	25.86	21.10	12.14	24.30	23.32	20.3	27.7	23.1	24.3					21.5	23.145	
Plot 7		13.90	12.02	13.20	11.83	11.50	24.54	10.60	10.65	11.5	13.0	12.1	12.1					11.3	10.900	
Monthy Sum	585.94	986.80	838.43	812.48	714.69	669.40	748.01	691.50	708.72	692.80	742.00	772.20	882.16	56.09	55.15	92.80	24.29	780.50	759.10	107.80
Monthy Avg.	22.54	25.30	21.50	20.83	18.33	17.16	19.18	17.73	18.17	17.76	19.03	18.39	21.00	56.09	55.15	23.20	24.29	18.58	17.65	21.56
Count	26	39	39	39	39	39	39	39	39	39	39	42	42	1	1	4	1	42	43	5

Bolded values for Semi-Annual 2017 results are from Water Utitlities Lab

Table 3. LLAS CL Recovery Well Nitrate as Nitrogen (nitrate-N) Summary (mg/L)

Well/Date	Feb-09	Sep-09	Jan-10	Jul-10	Mar-11	Jul-11	Jan-12	Jul-12	Jan-13	Aug-13	Mar-14	Sep-14	Jan-15	Jul-15	Mar-16	Aug-16	Mar-17	Sep-17	Mar-18	Aug-18
CL 1	20.600	21.900	21.300	17.429	17.1	16.898	17.4	20.787	21.5	16.934	14.7	16.20	15.8	14.10	15.8		12.7	11.9	14.3	
CL 2	14.100	8.770	7.100	3.999	9.6	11.529	16.4	15.451	6.0	4.467	2.2	1.84	1.8	2.44	3.5	19.6	4.4	21.6		
CL 3/MO 57															17.4		20.5	21.8	19.9	
CL 4	14.000	8.770	7.500	8.640	12.5	8.163	8.2	8.101	11.5	14.272	13.9	9.67	13.6	13.10	14.9	13.8	13.6	15.1		
CL 5/MO 24															20.7	23.8	18.3	13.5		
CL 6	21.100	19.700	15.000	18.800	18.3	18.283	18.3	21.776	18.1	22.43	30.3	22.00	24.4	23.90	*66.2*	18.4	*17.0*	14.3	14.2	13.3
CL 7	22.900	21.300	20.900	21.200	21.9	21.100	22.1	20.573	21.5	24.801	19.0	20.60	22.0	20.50	18.35		17.80	20.946	18.7	18.2
CL 8	Aband	Aband	Aband																	
CL 9	22.200	20.700	21.900	21.000	21.5	21.214	21.3	22.444	21.3	22.766	24.1	19.90	22.1	20.20	22.6		19.8	18.0	18.5	18.7
CL 10	22.200	20.000	20.700	20.500	20.4	19.564	18.7	20.658	20.2	22.996	23.2	18.60	21.1	19.20	21.2		18.2	14.448		
CL 11	31.000	28.400	29.600	31.300	34.3	29.184	30.4	32.176	30.5	40.005	27.2	28.50	22.1	28.70	29.9			27.9	32.5	29.3
CL 12	17.100	16.100	19.000	16.200	15.0	16.119	14.5	19.578	<0.010	20.235	18.9	13.70	15.3	13.90	15.5	19.2	12.2	13.0	17.6	14.3
CL 13	12.400	9.480	14.000	14.900	17.0	16.364	21.1	23.902	20.6	20.291	17.1	18.60	20.6	17.00	15.8		18.3	21.246	19.7	12.4
CL 14	8.900	0.090	7.700	6.730	8.5	6.567	6.7	9.345	9.9	5.4	22.3	5.67	6.6	7.20	6.3	3.73	3.2	5.75	6.2	6.5
CL 15	20.700	18.700	22.100	20.643	22.0	22.433	21.1	20.469	19.7	19	20.6	18.50	19.1	14.80	19.8	7.65	18.2	18.4		
CL 16	51.100	43.100	35.100	29.300	23.8	18.183	14.1	10.736	9.6	7	5.9	7.37	9.6	9.80	13.2	19.20	15.2	18.5		
CL 17	Plug'd	Plug'd	Plug'd																	
CL 18/MO 15															15.90	13.90	14.00	14.1		
CL 19	Plug'd	Plug'd	Plug'd																	
CL 20	22.500	21.200	22.200	20.300	20.3	19.628	17.1	22.35	17.1	14.381	20.0			18.20	20.5	20.4	18.70	14.1	18.7	18.5
CL 21/MO 13															18.1	17.8	15.20	16.0	12.0	12.7
CL 22	21.100	18.300	18.000	19.500	18.9	20.243	20.4	21.427	19.4	19.233	19.9	18.10	18.4	18.00	19.7	18.9	18.70	17.6	17.5	16.7
CL 23	29.000	30.300	13.900	28.700	27.9	26.657	25.9	25.491	21.8	22.9	19.2	17.20		20.60		4.76	18.90	18.8	14.3	20.5
CL 24	13.100	11.200	11.900	10.100	11.0	11.696	11.7	12.12	11.3	11.524	10.8	9.83	10.1	9.91	12.2	11.7	11.2			
CL 26/MO 10															17.8	17.8	Dry			
CL 27	14.100	12.800	16.300	13.600	13.8	13.882	14.3	15.165	18.2	19.851	14.9	13.70	13.7	13.70	15.0	12.8	10.9	18.2	12.3	12.2
CL 28	12.900	15.600	13.500	15.100	14.7	14.313	14.2	15.38	14.5	14.804	18.0	13.80	14.9	14.20	16.3	15.3	15.4		15.2	13.7
CL 29	23.800	21.400	24.000	21.800	22.6	23.419	23.7	24.584	8.9	22.73	17.7		27.8	25.70	27.6					15.9
CL 30	19.100	19.900	19.800	20.400	20.1	19.544	20.7	21.873	18.0	21.181	22.0			16.50			18.6	21.126	18.1	18.3
CL 31	30.300	27.800	28.100	27.497	28.0	27.746	27.9	25.579	27.5	28.128	34.2	28.30	33.5	27.70	28.0		25.4	*1.05*		
CL 32/MO 16	14.300	16.400	15.800	13.500	13.2	12.596	12.8	14.562		12.465	18.7	13.20	16.3	12.50	15.7		10.9	12.557	11.1	10.7
CL 33/MO 7															19.7	18.9	17.5	18.3		16.4
CL 34	14.200	15.400	16.500	16.300	16.3	15.800	16.9	17.572	16.7	22.033	16.4	14.60	15.5	14.60	16.0	15.2		17.7	11.9	7.0
CL 35	15.300	12.000	10.600	12.000	13.0	13.900	11.3	12.465	11.0	16.34	11.2	10.10	10.0	9.01	10.1	10.5	9.5	3.66	6.92	7.32
CL 36	7.600	18.400	11.900	14.400	14.6	18.550	16.2	20.673	17.6	21.7	18.9	19.80	19.4	16.30	17.9		11.4	10.5	10.2	16.5
CL 37	15.200	18.200	15.900	12.600	16.8	14.292	14.6	14.607	16.1	14.1	16.9	13.10	10.0	13.40	16.8	14.0	12.7	13.8	13.9	
CL 38	29.800	25.800	29.400	26.600	27.6	26.701	26.7	27.358	26.2	20.571	29.0	23.70	25.9	22.60	21.1	21.0	20.06	21.648		
CL 39	20.400	18.600	20.600	15.146	19.2	18.465	19.1	18.285	19.0	18.1	18.6	17.10	17.4	18.20	18.3	16.7	14.69	16.5	23.0	15.4
CL 40	24.000	21.800	25.500	17.418	21.4	22.029	22.8	23.266	22.8	22.864	24.1	20.50	22.4	21.60	23.6	20.1	22.81	21.5		
CL 41	22.700	20.400	24.700	14.500	21.4	21.367	21.9	22.945	22.2	17.8	19.6	20.90	21.2	22.00	22.8	21.6	20.20	20.8	13.6	20.2
CL 42	26.500	24.500	26.200	24.567	25.4	25.087	25.2	26.441	25.4	27.9	26.1	23.50	25.1	16.20	24.0	24.0		23.1	22.2	21.0
CL 43	25.900	21.000	23.700	22.100	22.6	21.857	21.5	21.953	20.8	27.005	23.7	19.00	23.0	19.80	20.1	20.0	18.50	21.067	19.6	18.4
CL 44	19.800	16.400	15.800	17.675	14.6	17.453	17.1	17.386	16.3	24.165	15.5	12.90	14.1	13.30	13.8	13.2	14.05	13.0	13.5	12.3
CL 45	20.400	18.200	19.700	18.300	17.5	17.654	17.7	18.632	17.7	15.4	17.7	15.90	16.1	16.60	18.6	16.9	16.70	5.47	14.4	15.9
CL 46	16.700	15.500	18.700	16.121	16.6	15.802	20.3	17.069		14.9	17.2	21.00	16.6	11.20	17.5		21.80	15.9	16.5	15.5
CL 47	16.800	15.500	15.700	14.403	14.2	13.200	13.6	14.584	14.1	11.7	14.4	11.90		12.60	14.0	13.1	13.01	12.9	13.2	14.1
CL 48	14.500	13.900	22.400	12.766	14.4	12.288	12.9	13.937	13.0	11.442	10.7	8.90	5.9	5.29	8.9	10.7		18.239		13.0
NE of Plot 6	14.600		16.200	14.700	14.1	13.937	13.2	14.747	13.4	14.223	13.3	12.00	21.9	11.40	12.2	10.6				
Plot 7 - 9	16.500	17.700	19.100	16.956	17.4	18.800	19.2	20.774	19.8	17.8	20.4	17.70	14.0	16.90		13.70		20.90	14.7	13.8
N of Plot 15	24.600	23.700	24.700	20.400	21.9	21.825	21.9	21.848	21.7	22.206	22.3	20.40	13.1	21.30	23.0	21.8		16.6	23.2	22.3
N of Schoppa	23.100	21.000	25.000	22.161	21.4	20.700	23.2	23.691	24.0	24.173	22.7	17.70	20.4	12.00	18.1	15.1		20.5	20.2	22.4
Plot 7	12.400	11.500	13.500	12.431	11.7	11.127	12.0	12.838	14.3	14.534	15.5	12.10	22.7	14.13	14.8	12.1		12.3	14.2	12.3
Monthy Sum	859.50	781.41	821.20	762.68	794.50	776.16	786.30	825.60	719.20	806.75	809.00	648.08	683.46	690.28	859.24	567.94	600.28	714.31	532.00	515.65
Monthy Avg.	19.99	18.61	19.10	17.74	18.48	18.05	18.29	19.20	17.54	18.76	18.81	16.20	17.52	16.05	18.68	15.78	15.80	16.23	16.12	15.63
Count	43	42	43	43	43	43	43	43	41	43	43	40	39	43	46	36	38	44	33	33

Bolded values for Semi-Annual 2017 results are from Water Utitlities Lab

Table 3. LLAS CL Recovery Well Nitrate as Nitrogen (nitrate-N) Summary (mg/L)

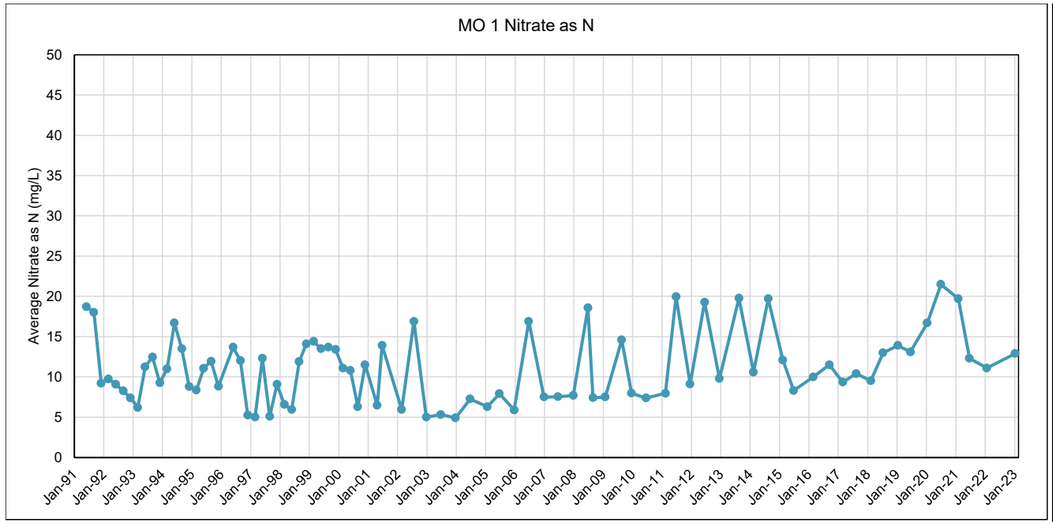
Well/Date	Feb-19	Jul-19	Feb-20	Jul-20	Feb-21	Jul-21	Feb-22	Jun-22	Feb-23
CL 1	12.7	12.7	13	10.7			13.3		
CL 2									
CL 3/MO 57	18.2	15.8	19.3	19.2		18.3	25.0		
CL 4									
CL 5/MO 24									
CL 6	13.6	15.5		16.1	19.9	17.1			
CL 7	18.0			33.8					
CL 8									
CL 9	17.9	18.5	18.9	21.3	19.0	17.5	18.3	17.3	17.2
CL 10						18.0		18.8	
CL 11	18.1			34.3	35.7		30.5	30.1	30.1
CL 12									
CL 13	18.5	15.4	18.1	21.0	20.2	19.5	20.3		
CL 14	4.1	1.37				17.7			
CL 15									
CL 16									
CL 17									
CL 18/MO 15	13.40	14.6				6.85			
CL 19									
CL 20	18.5	19	18	19.6	20.6				
CL 21/MO 13	14.0	15.3	13.7	14.9				15.0	
CL 22	17.3	18	16.7	16.6		16.0		17.3	
CL 23	19.0	6.21		17.8					
CL 24				5.18		11.1		12.2	
CL 26/MO 10						14.5			
CL 27	11.0	9.94	11.2	12.0	11.8	10.7		12.2	
CL 28	13.6	14.6	15.2	15.4	14.7	13.8	14.6	14.2	14.0
CL 29	1.6	24.7	23.8						
CL 30	16.3	17.3	17						
CL 31	29.9		28.6	27.2		25.8			
CL 32/MO 16	10.8	11	11	12.1	11.9	11.3	12.8		
CL 33/MO 7	13.6	17.6	11.3	11.3		15.8			18.7
CL 34	11.5	11.4				6.24			
CL 35	8.25	9.42	8.72	13.2	11.4	6.80	11.7	12.0	
CL 36	14.1	14.1	18.2	21.7	19.8	10.9	16.9	21.1	
CL 37	14.0	14.5			16.2			14.2	
CL 38						19.1			
CL 39		17.5	15.4	17.0				15.0	
CL 40	20.40	23.2	21.3	22.5	21.0	20.8	21.5	21.8	21.8
CL 41	19.7	20.5	20.2	20.9	20.5	16.5		20.4	
CL 42	20.8	22	21.8	22.6				21.3	23.9
CL 43	18.4	18.8	19.6	22.1					
CL 44	12.3	13.4	11.9	17.5	17.6	17.3			
CL 45	14.5	16.2	15.2	16.0	16.3	15.0	15.4		
CL 46	18.6	16.9	27.7	24.8	20.0	20.5			
CL 47	14.0	3.66	9.45					14.7	
CL 48						6.00			
NE of Plot 6									
Plot 7 - 9	12.6	12.2	12.2	15.3	12.6		13.0	12.7	12.3
N of Plot 15	22.6	24.2	24.7	25.3	26.1	23.8	22.0	23.0	23.5
N of Schoppa	21.6	24	25.2	25.0	22.4	27.4	26.5	27.9	26.2
Plot 7	11.9	13.1	12.6	12.1	12.9	11.7	12.1	11.7	11.6
Monthy Sum	555.37	522.60	499.97	584.48	370.60	435.99	273.90	352.90	199.30
Monthy Avg.	15.43	15.37	17.24	18.85	18.53	15.57	18.26	17.65	19.93
Count	36	34	29	31	20	28	15	20	10

Bolded values for Semi-Annual 2017 results are from Water Utitlities Lab

C

Nitrate-N concentrations in Monitoring Wells and CL Recovery Wells for Section 3 – Groundwater Quality Sampling Results

Time Series Figures of Nitrate-N Concentrations in Monitoring Wells


MO 1 Nitrate as N
Average Nitrate as N (mg/L)
0
5
10
15
20
25
30
35
40
45
50
Jan-91
Jan-92
Jan-93
Jan-94
Jan-95
Jan-96
Jan-97
Jan-98
Jan-99
Jan-00
Jan-01
Jan-02
Jan-03
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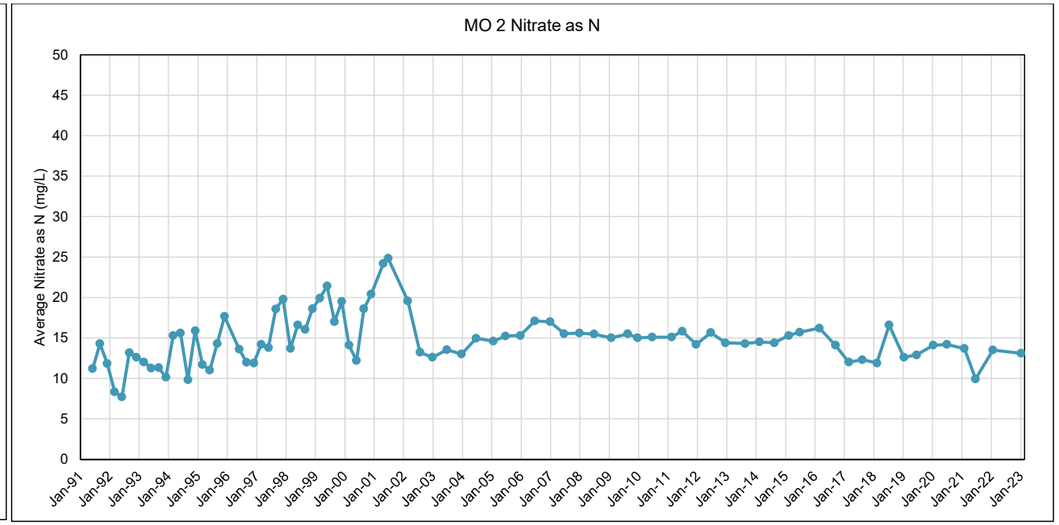
MO 2 Nitrate as N
Average Nitrate as N (mg/L)
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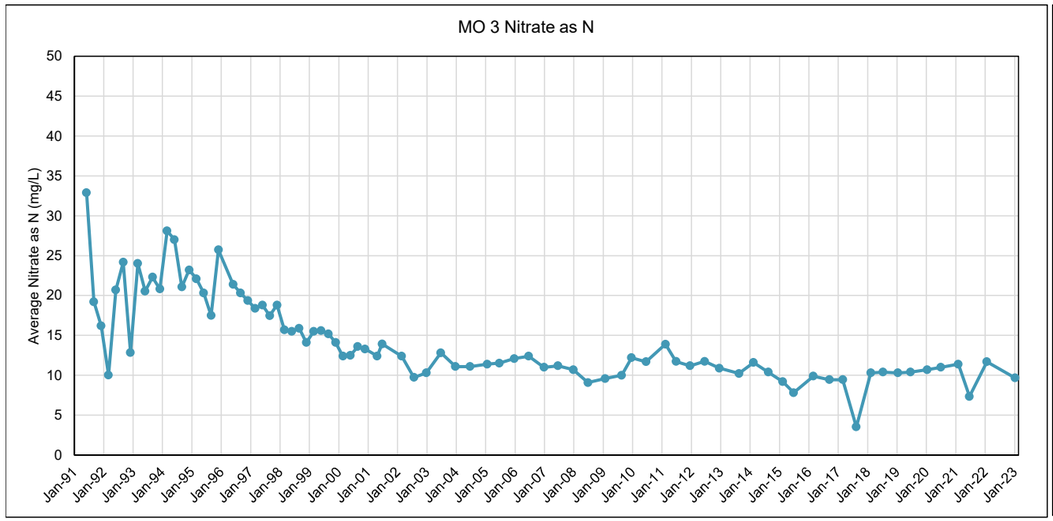
MO 3 Nitrate as N
Average Nitrate as N (mg/L)
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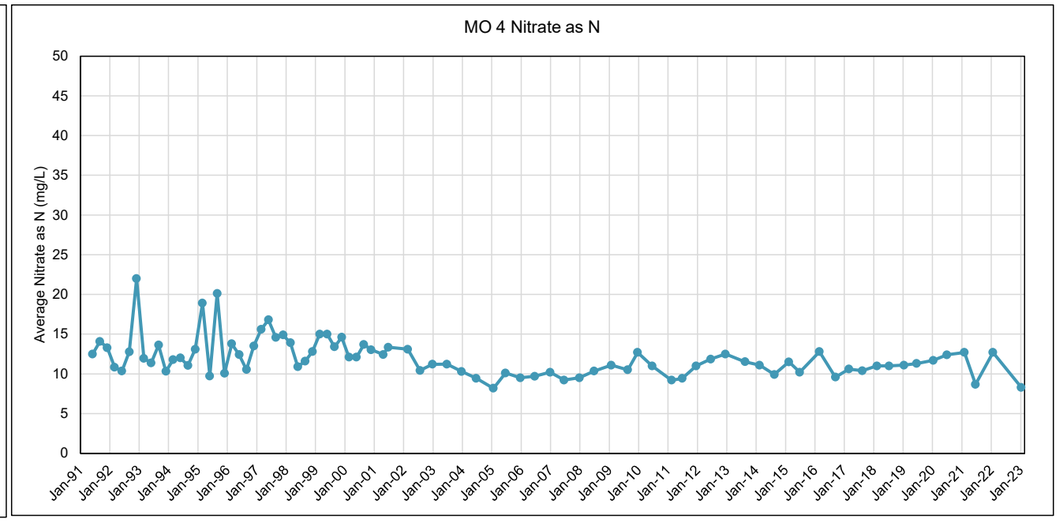
MO 4 Nitrate as N
Average Nitrate as N (mg/L)
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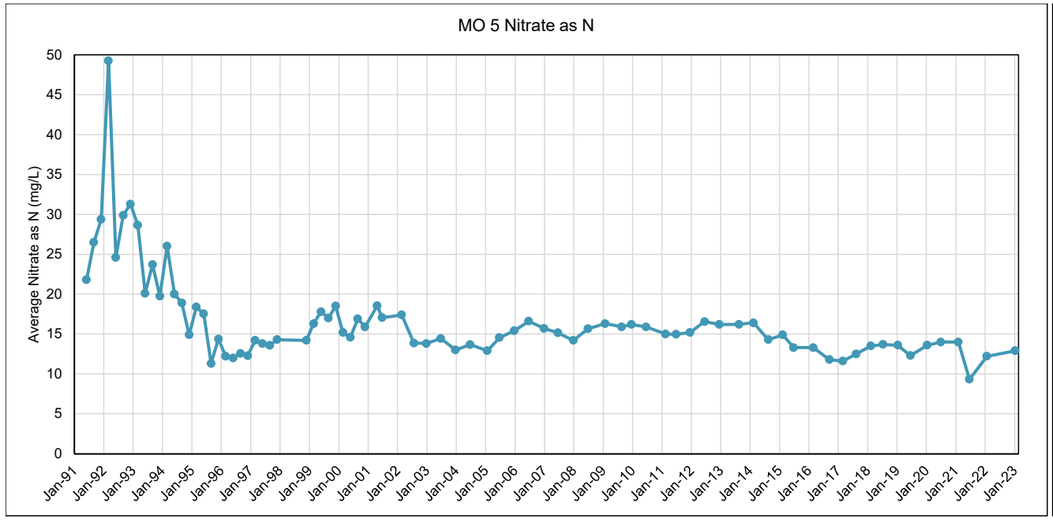
MO 5 Nitrate as N
Average Nitrate as N (mg/L)
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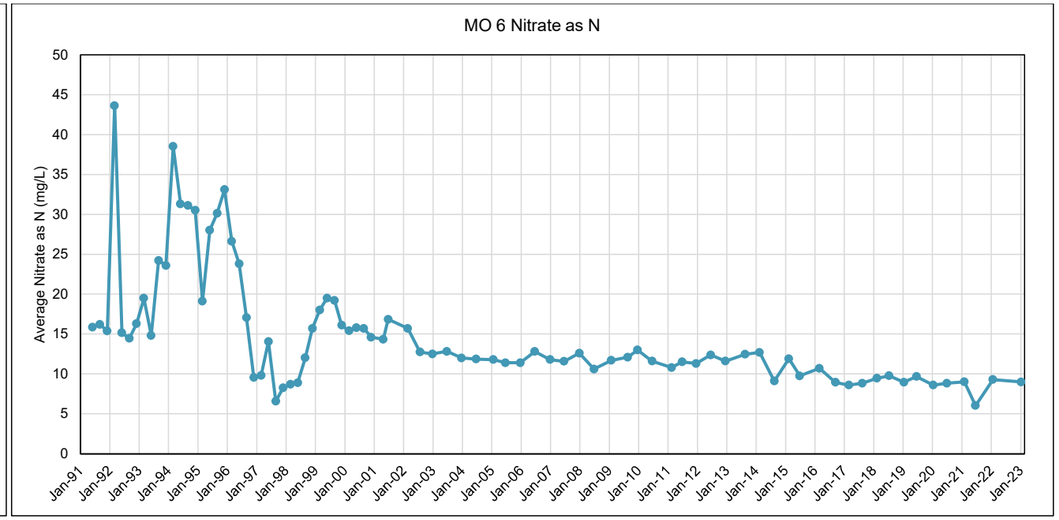
MO 6 Nitrate as N
Average Nitrate as N (mg/L)
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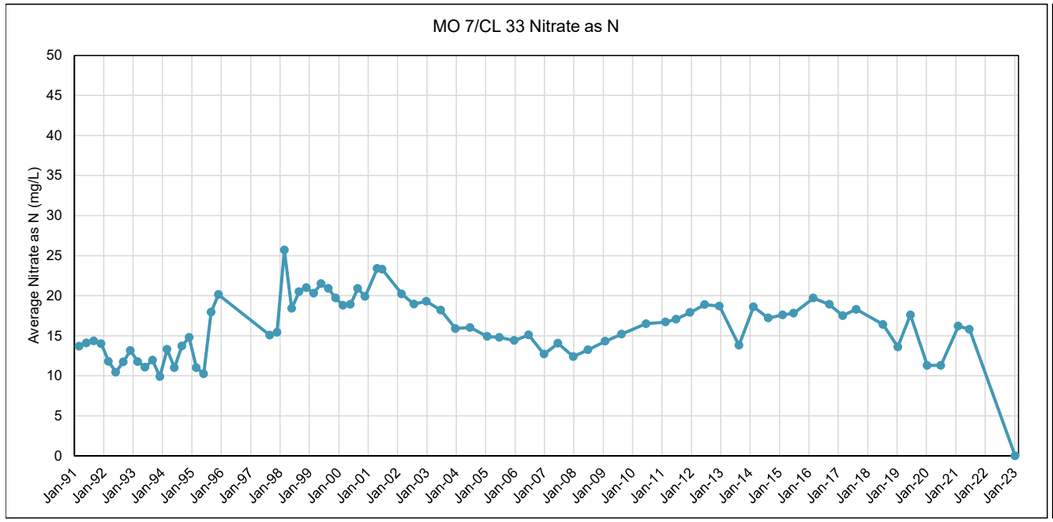
MO 7/CL 33 Nitrate as N
Average Nitrate as N (mg/L)
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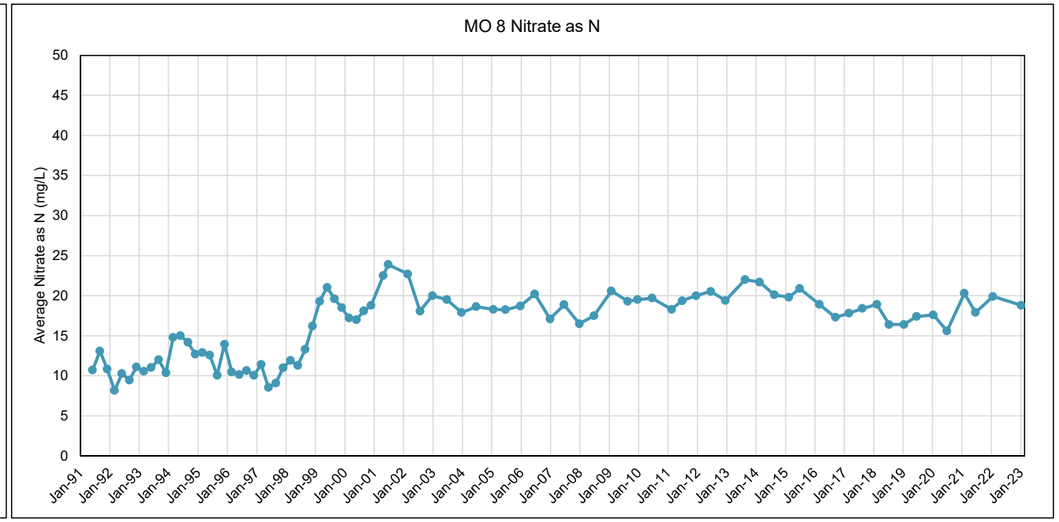
MO 8 Nitrate as N
Average Nitrate as N (mg/L)
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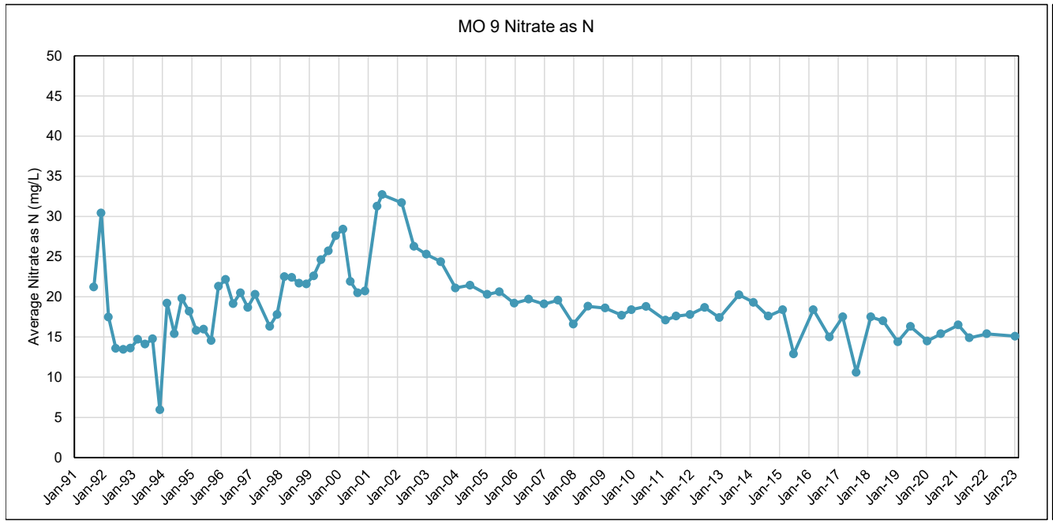
MO 9 Nitrate as N
Average Nitrate as N (mg/L)
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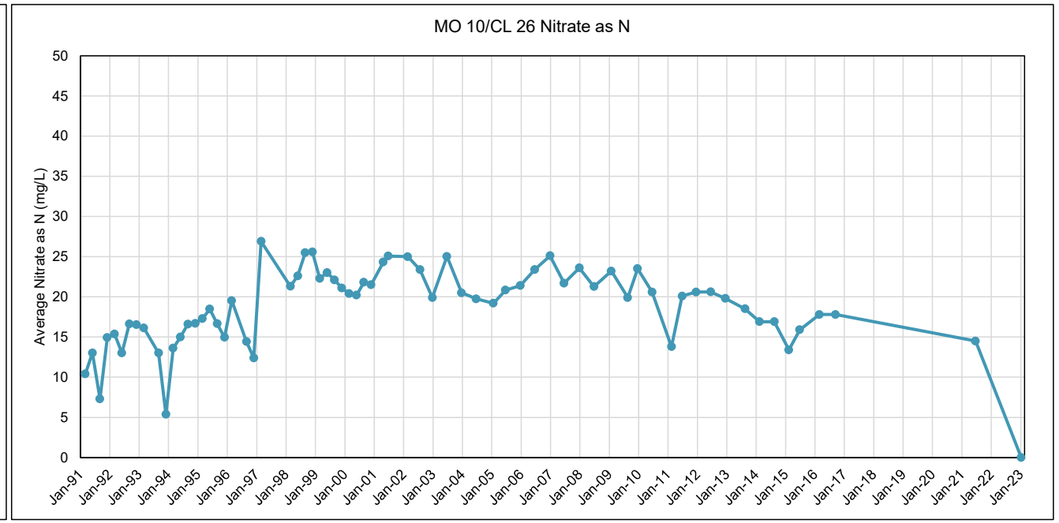
MO 10/CL 26 Nitrate as N
Average Nitrate as N (mg/L)
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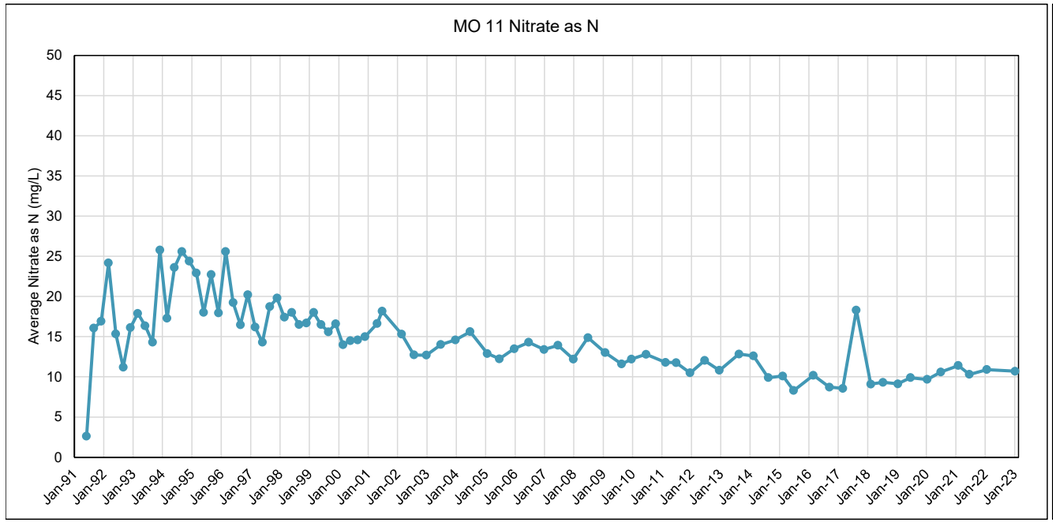
MO 11 Nitrate as N
Average Nitrate as N (mg/L)
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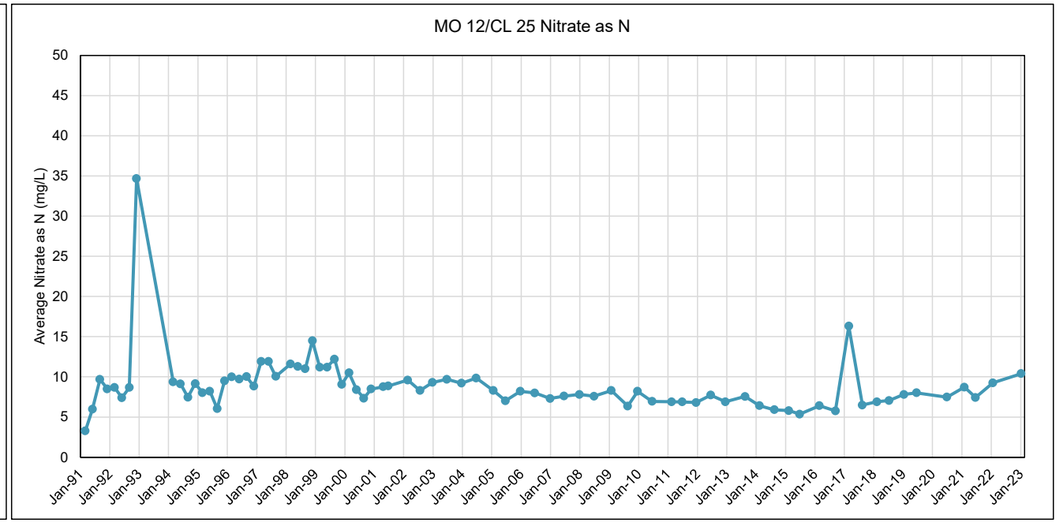
MO 12/CL 25 Nitrate as N
Average Nitrate as N (mg/L)
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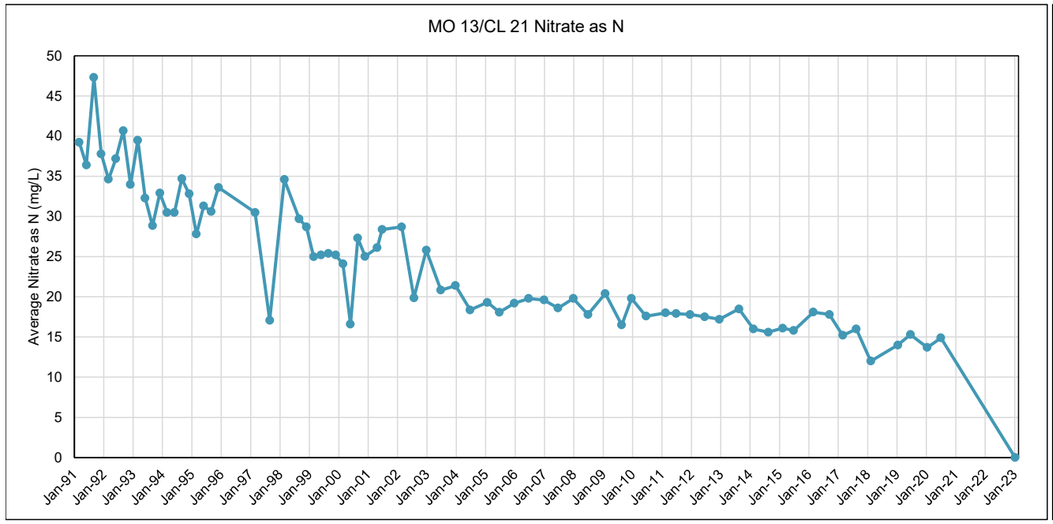
MO 13/CL 21 Nitrate as N
Average Nitrate as N (mg/L)
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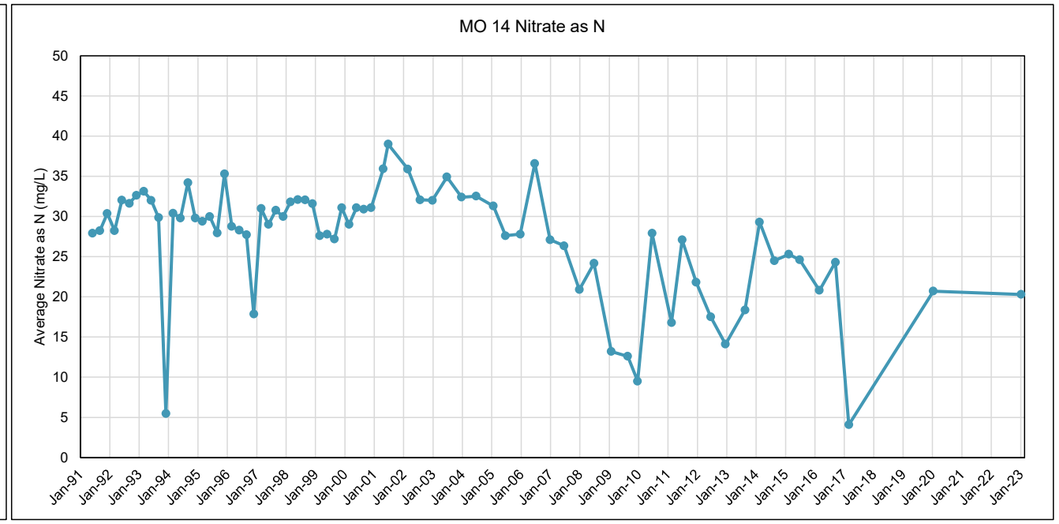
MO 14 Nitrate as N
Average Nitrate as N (mg/L)
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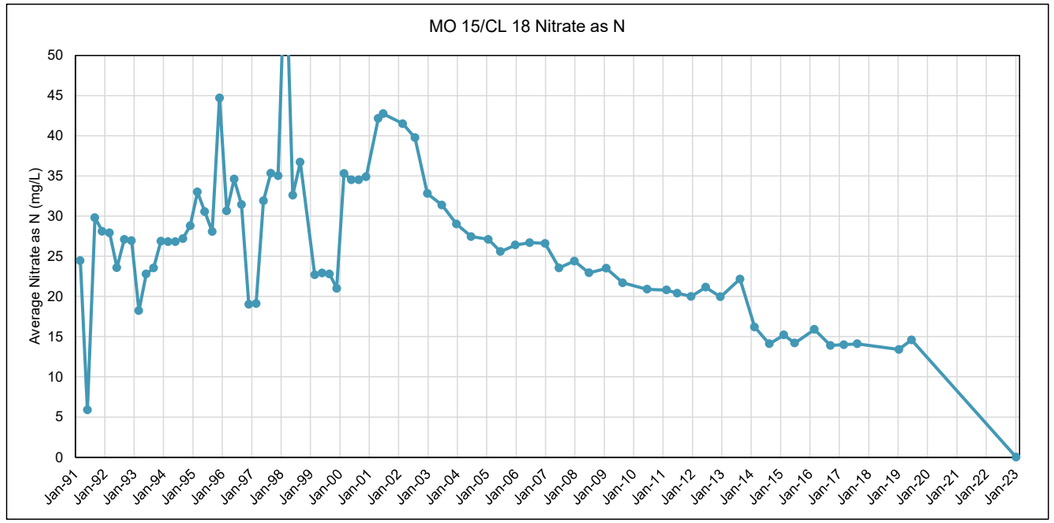
MO 15/CL 18 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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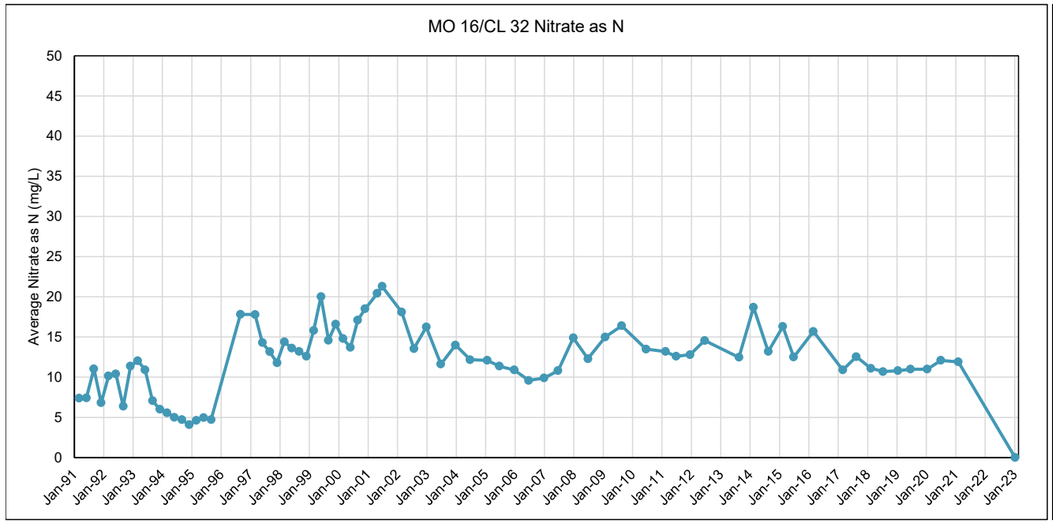
MO 16/CL 32 Nitrate as N
Average Nitrate as N (mg/L)
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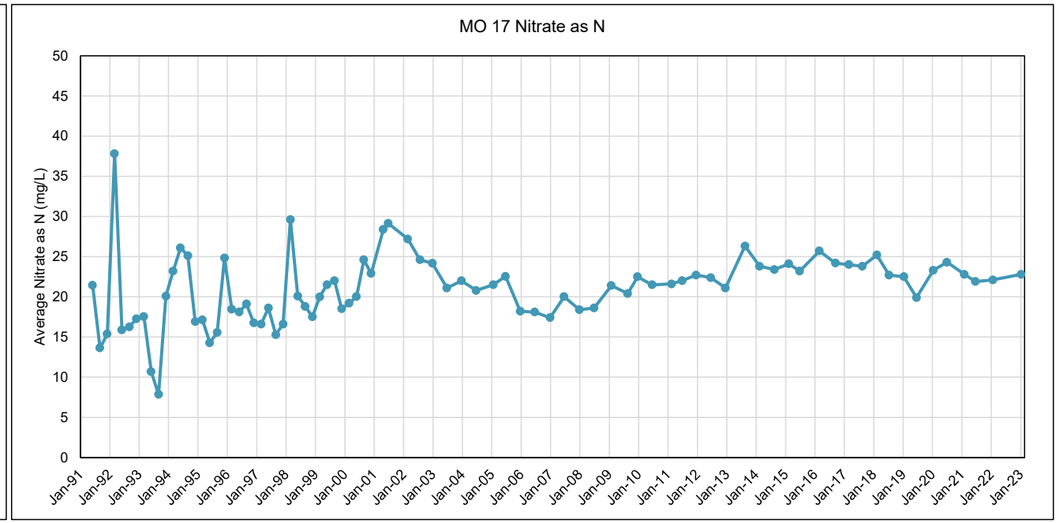
MO 17 Nitrate as N
Average Nitrate as N (mg/L)
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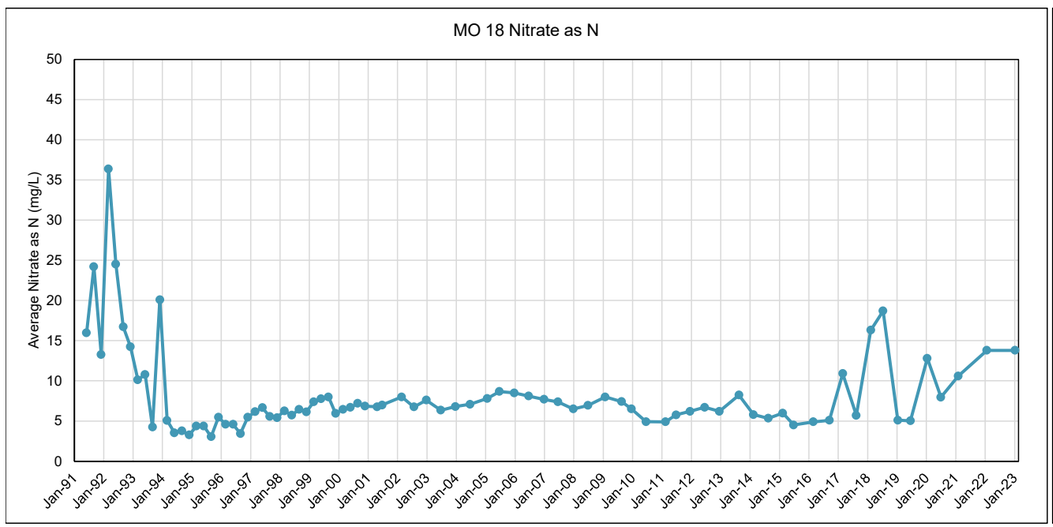
MO 18 Nitrate as N
Average Nitrate as N (mg/L)
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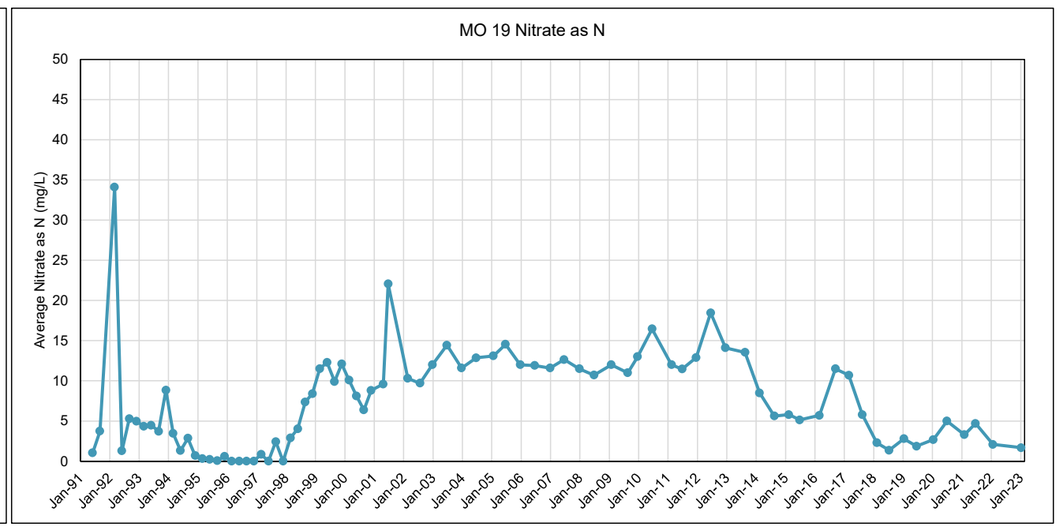
MO 19 Nitrate as N
Average Nitrate as N (mg/L)
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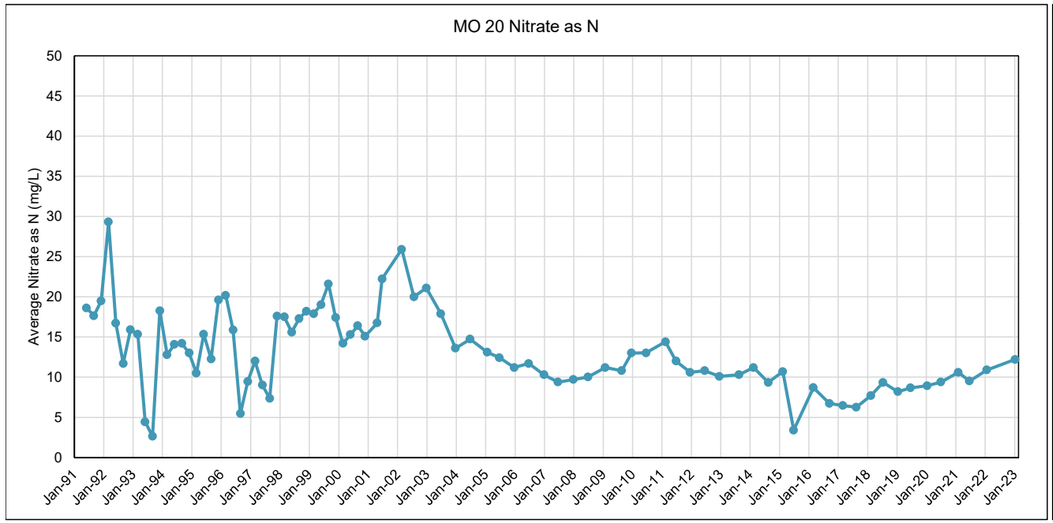
MO 20 Nitrate as N
Average Nitrate as N (mg/L)
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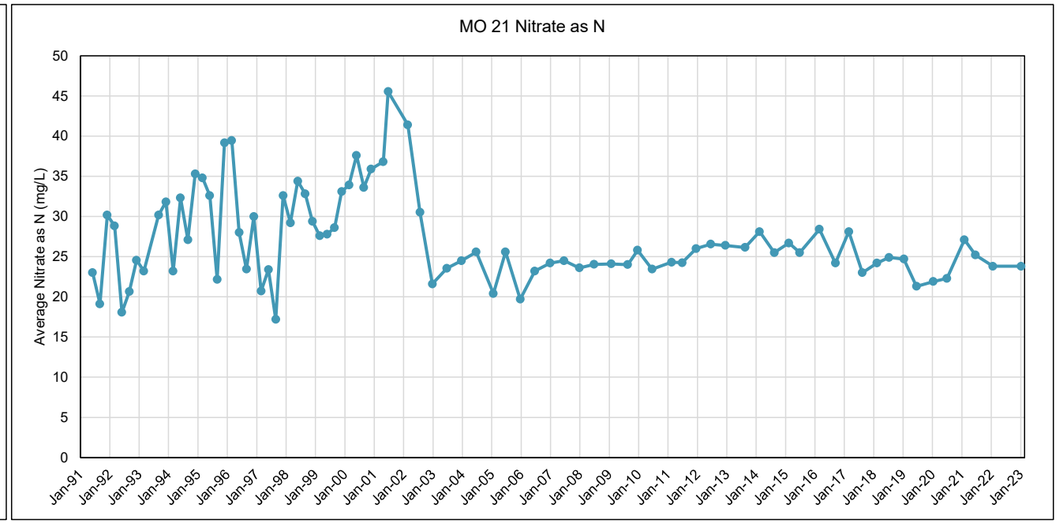
MO 21 Nitrate as N
Average Nitrate as N (mg/L)
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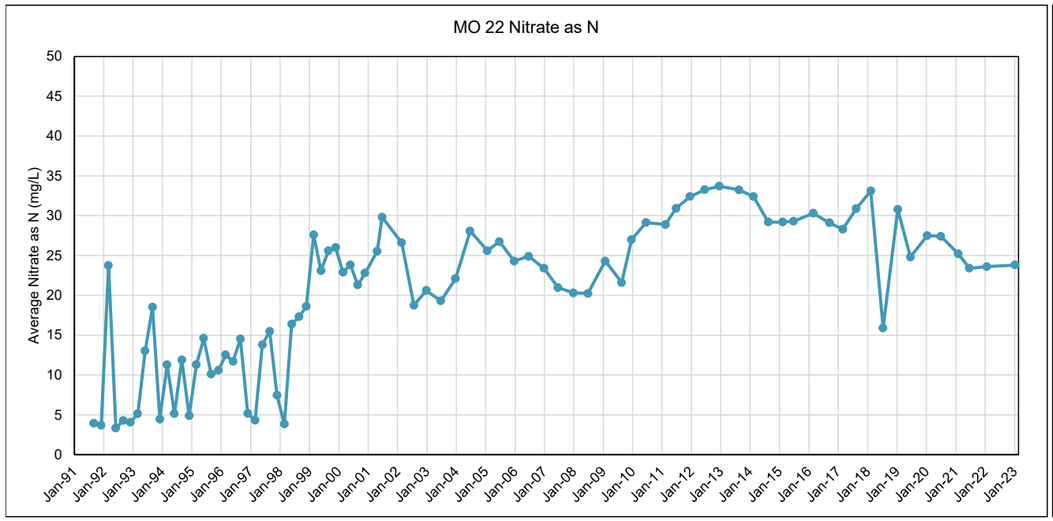
MO 22 Nitrate as N
Average Nitrate as N (mg/L)
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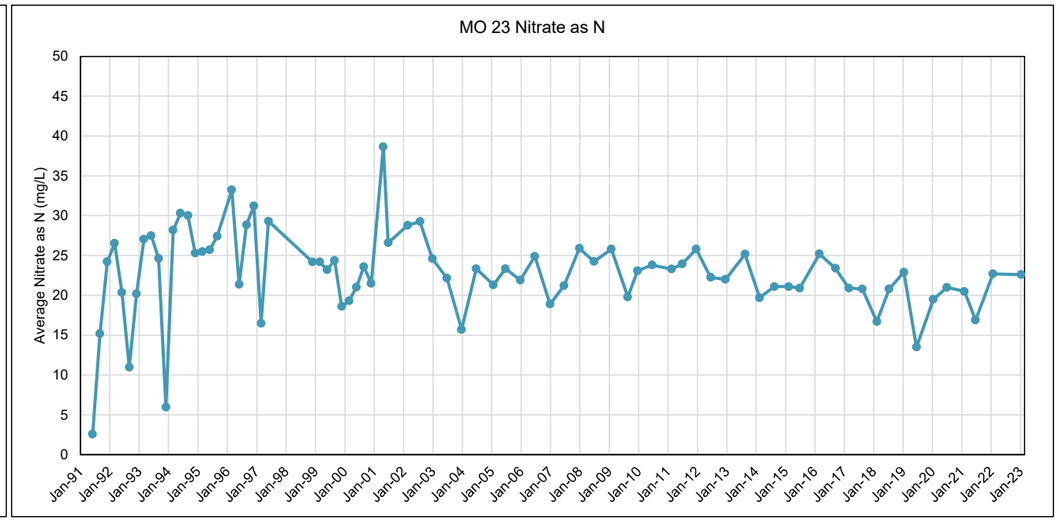
MO 23 Nitrate as N
Average Nitrate as N (mg/L)
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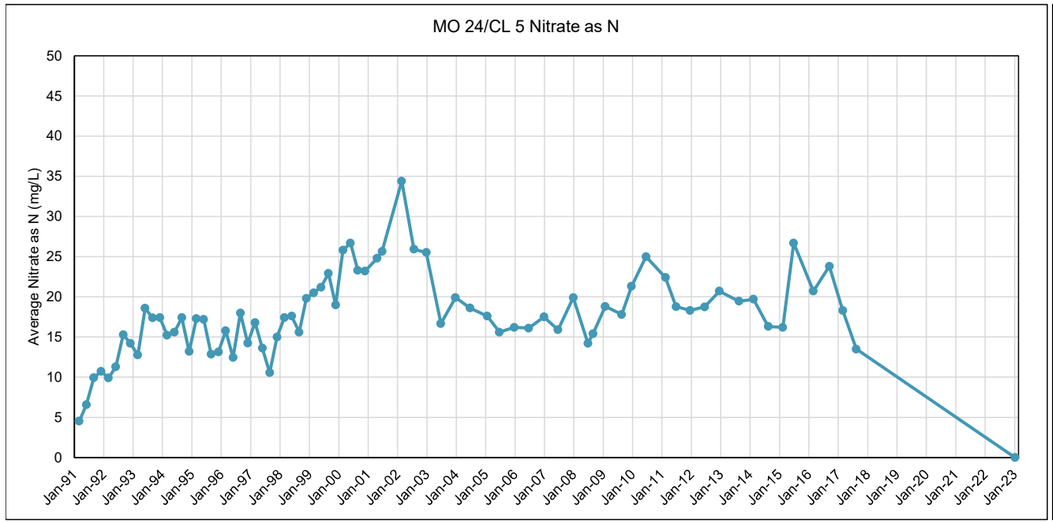
MO 24/CL 5 Nitrate as N
Average Nitrate as N (mg/L)
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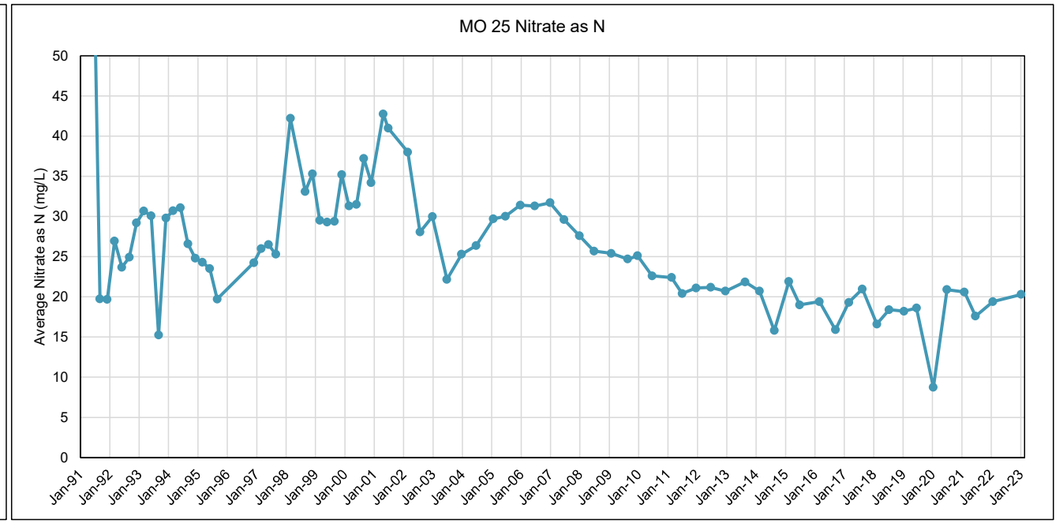
MO 25 Nitrate as N
Average Nitrate as N (mg/L)
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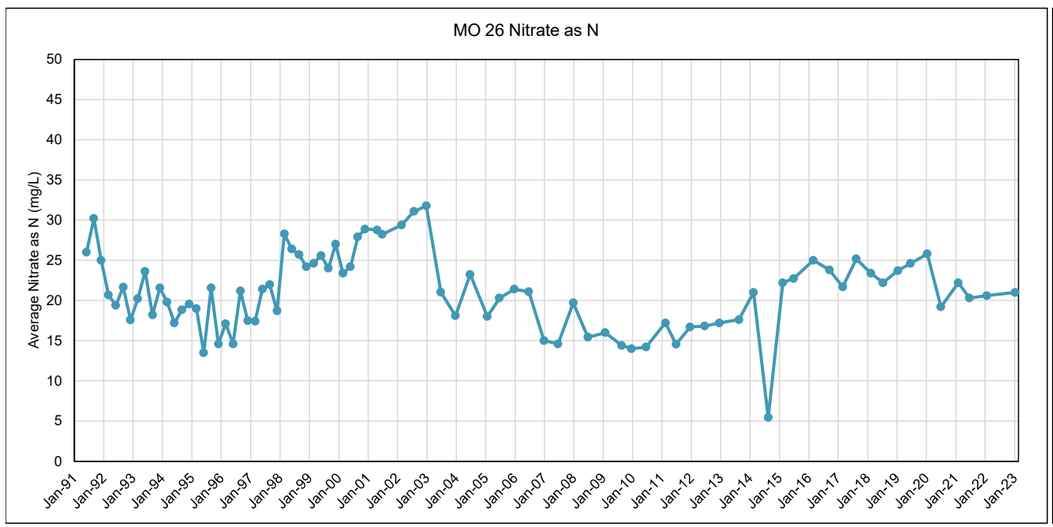
MO 26 Nitrate as N
Average Nitrate as N (mg/L)
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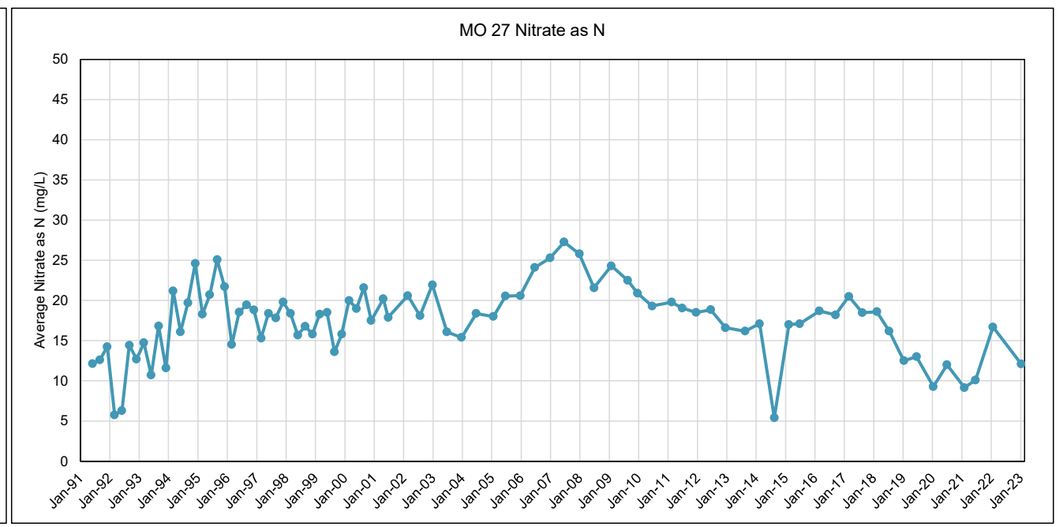
MO 27 Nitrate as N
Average Nitrate as N (mg/L)
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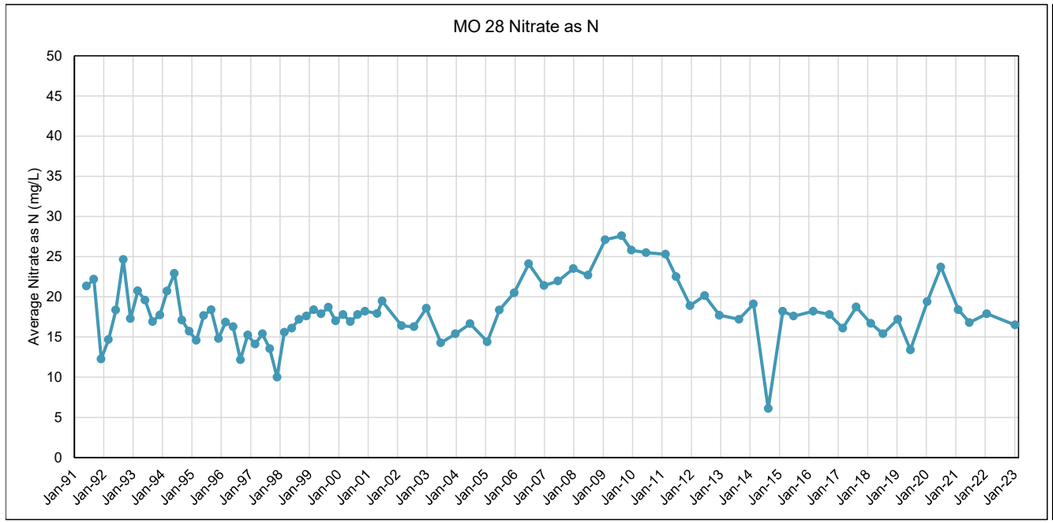
MO 28 Nitrate as N
Average Nitrate as N (mg/L)
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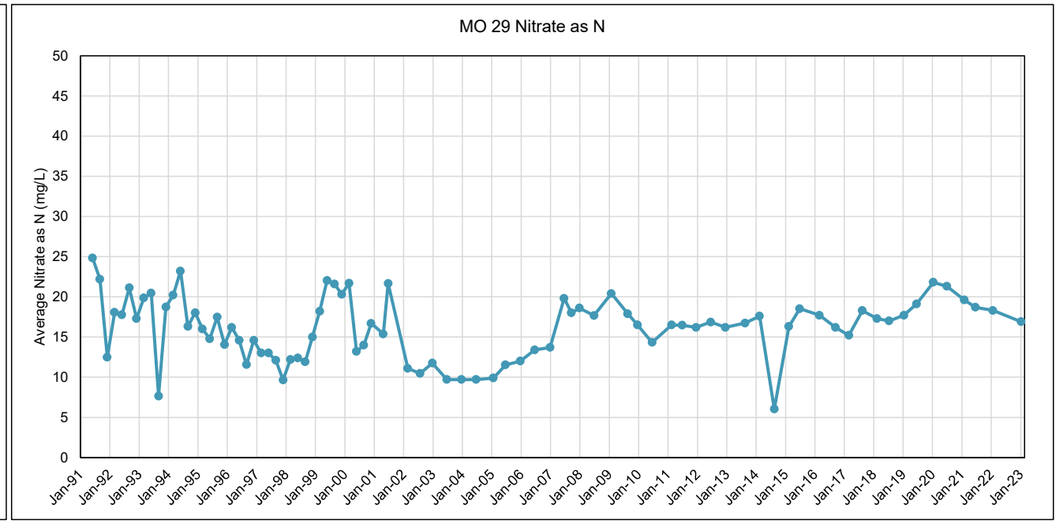
MO 29 Nitrate as N
Average Nitrate as N (mg/L)
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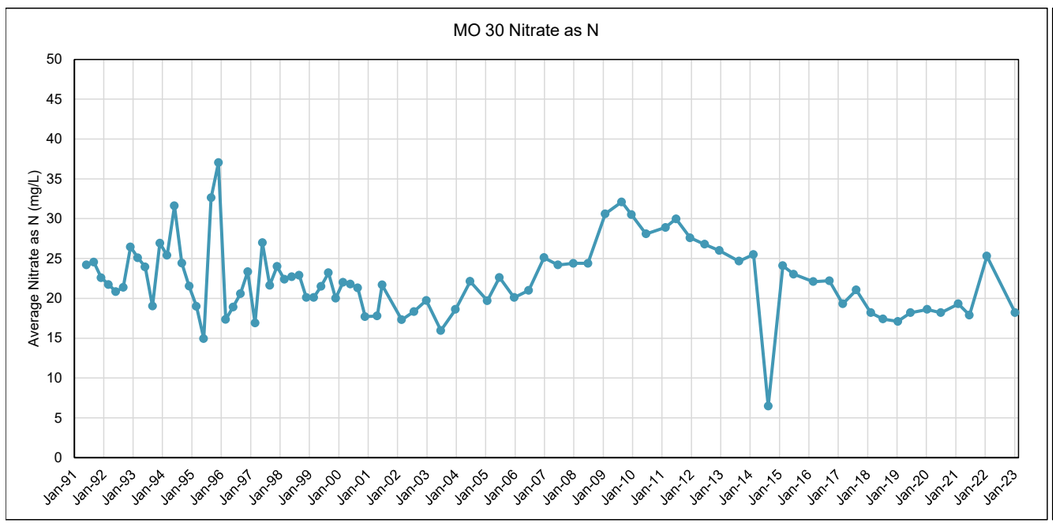
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Average Nitrate as N (mg/L)
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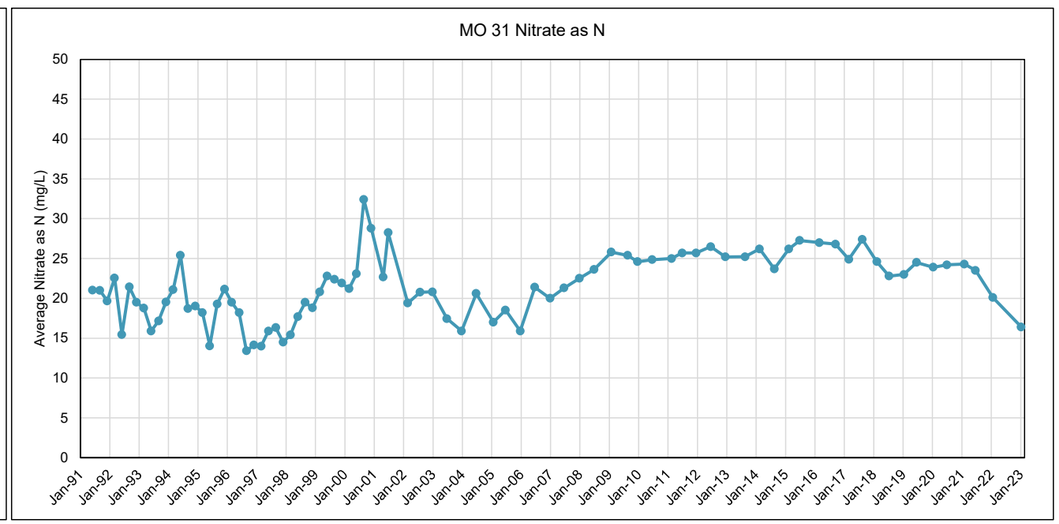
MO 31 Nitrate as N
Average Nitrate as N (mg/L)
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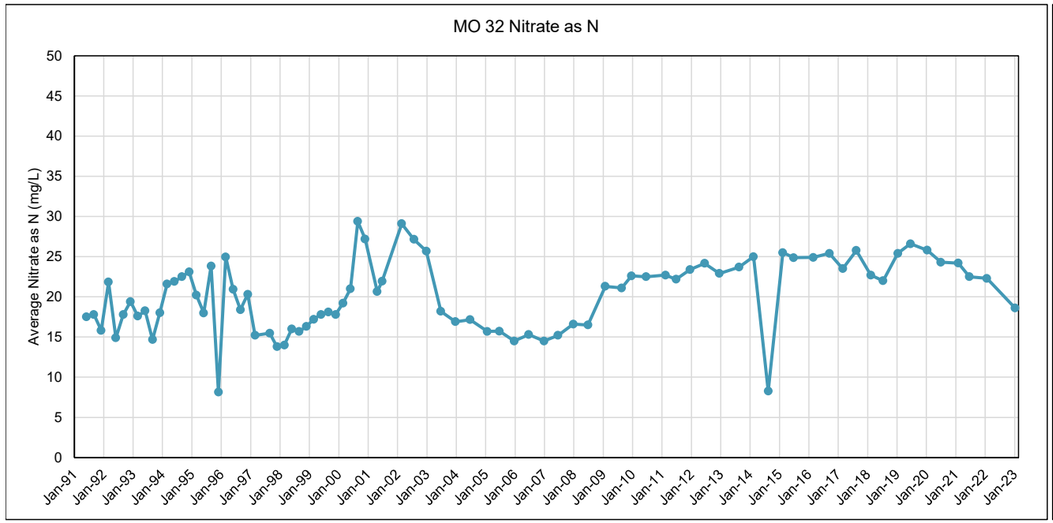
MO 32 Nitrate as N
Average Nitrate as N (mg/L)
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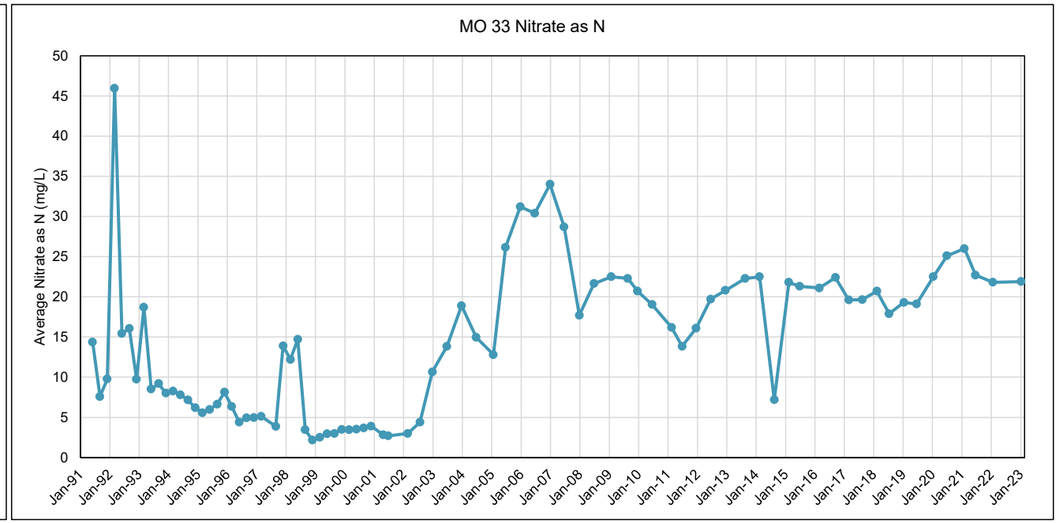
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Average Nitrate as N (mg/L)
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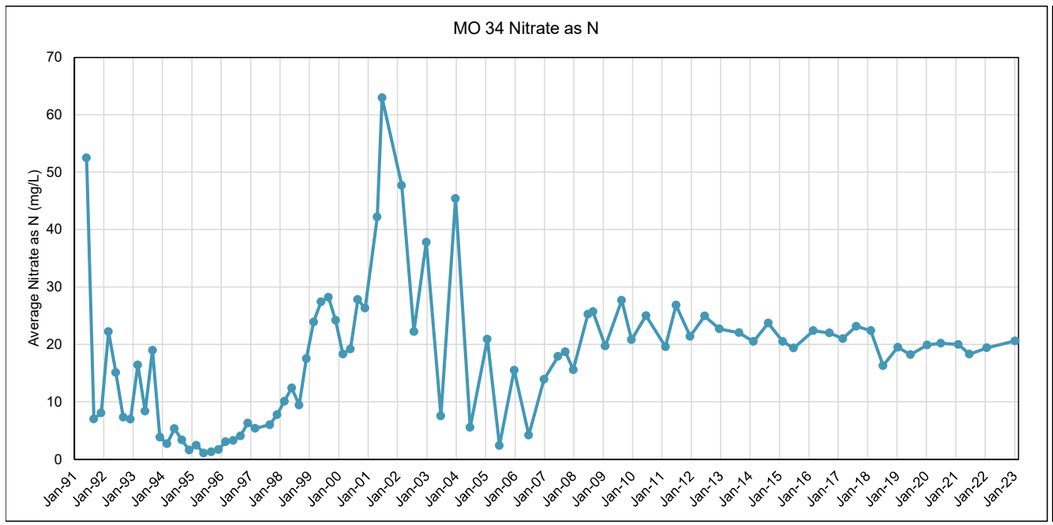
MO 34 Nitrate as N
Average Nitrate as N (mg/L)
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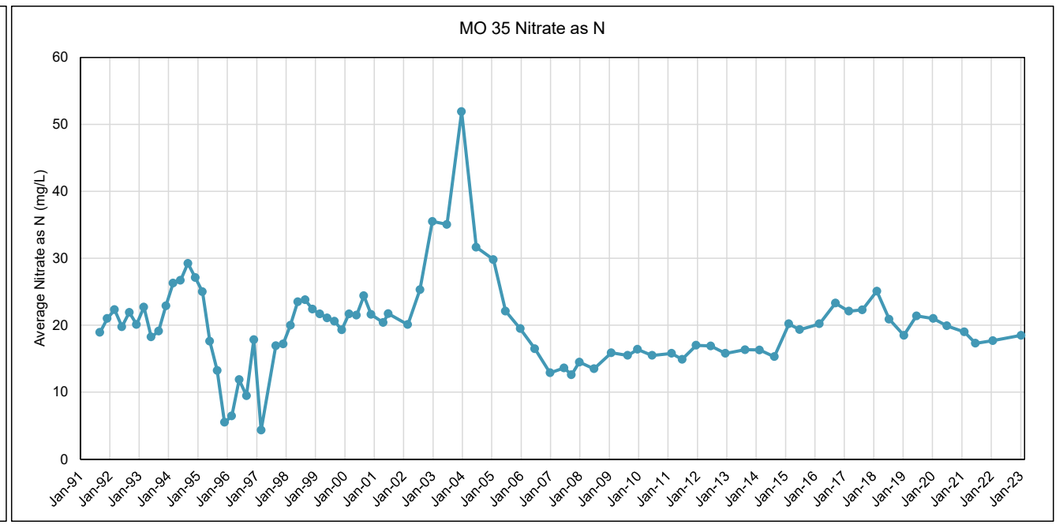
MO 35 Nitrate as N
Average Nitrate as N (mg/L)
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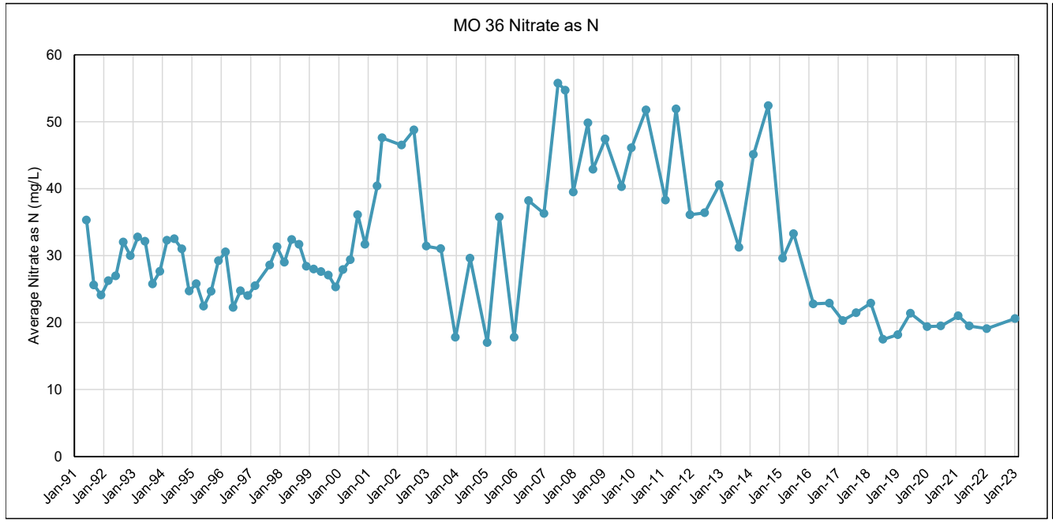
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Average Nitrate as N (mg/L)
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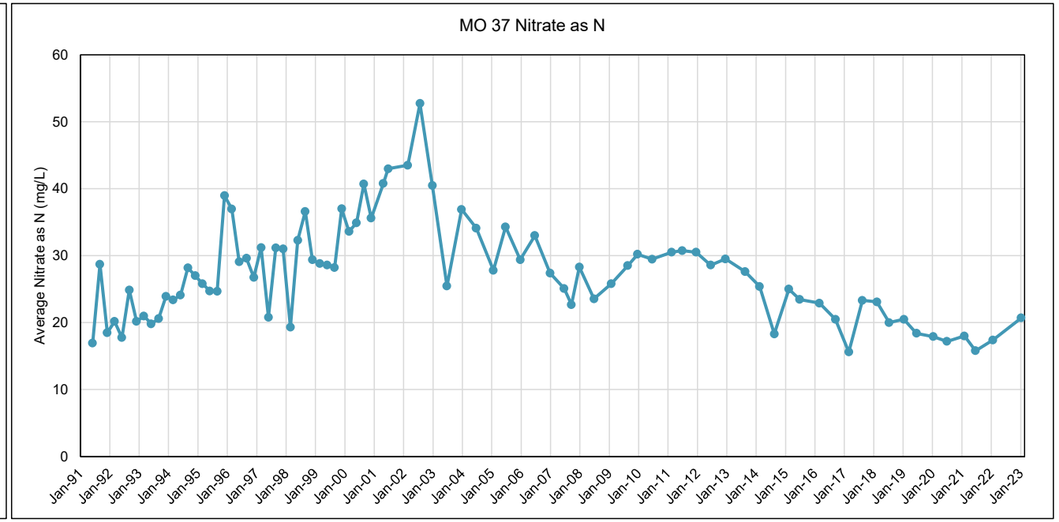
MO 37 Nitrate as N
Average Nitrate as N (mg/L)
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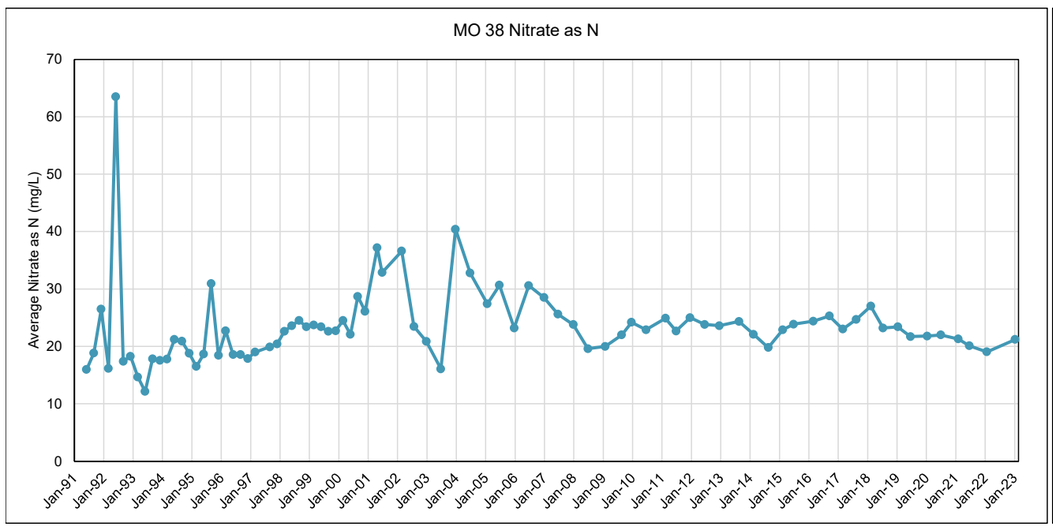
MO 38 Nitrate as N
Average Nitrate as N (mg/L)
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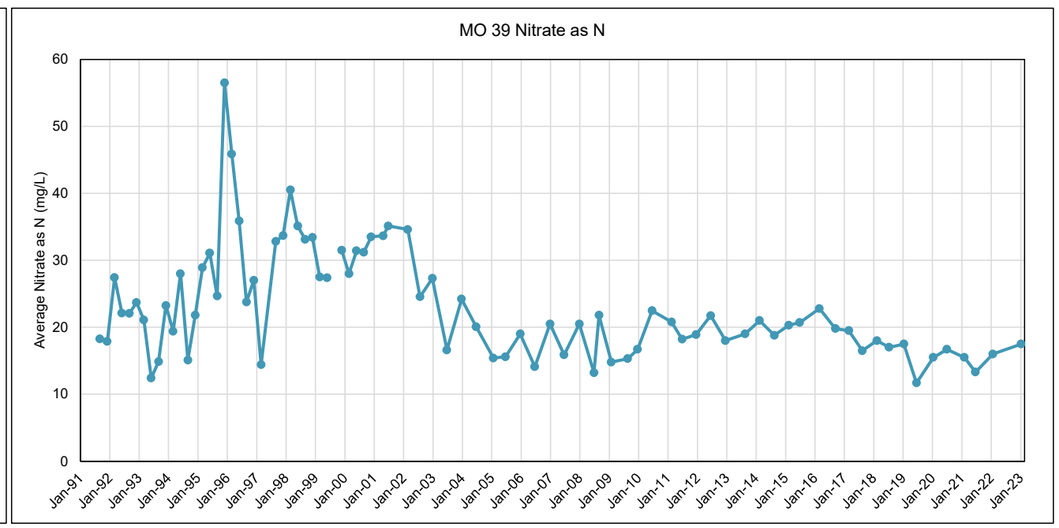
MO 39 Nitrate as N
Average Nitrate as N (mg/L)
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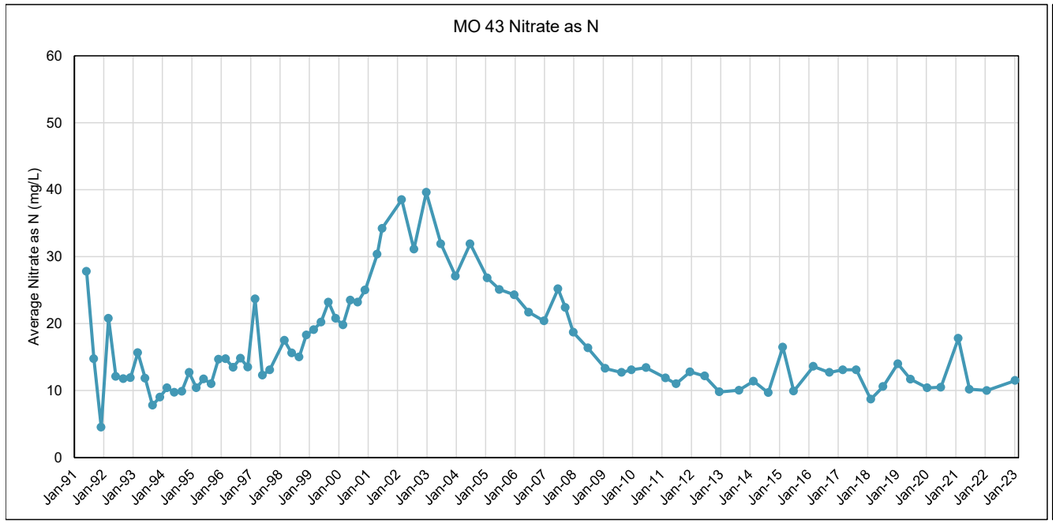
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Average Nitrate as N (mg/L)
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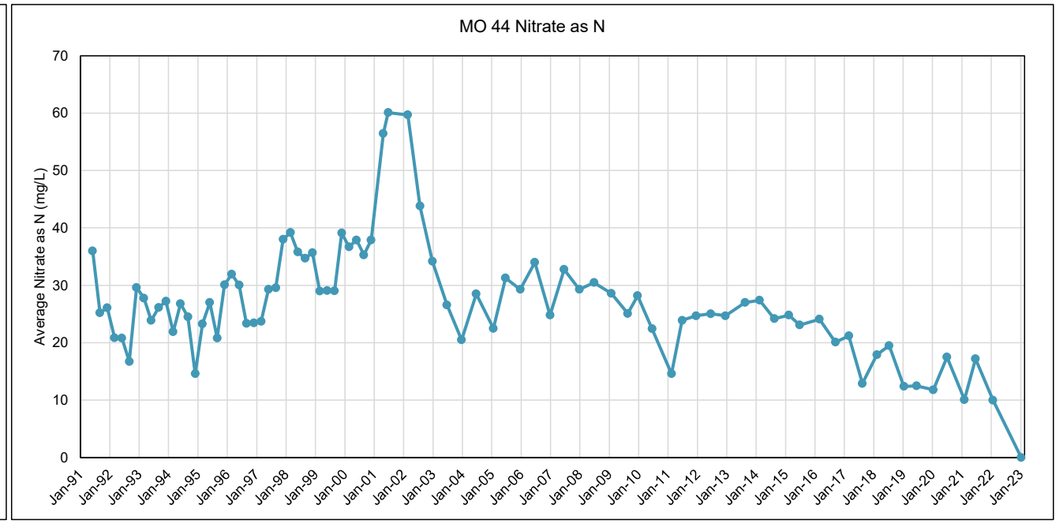
MO 44 Nitrate as N
Average Nitrate as N (mg/L)
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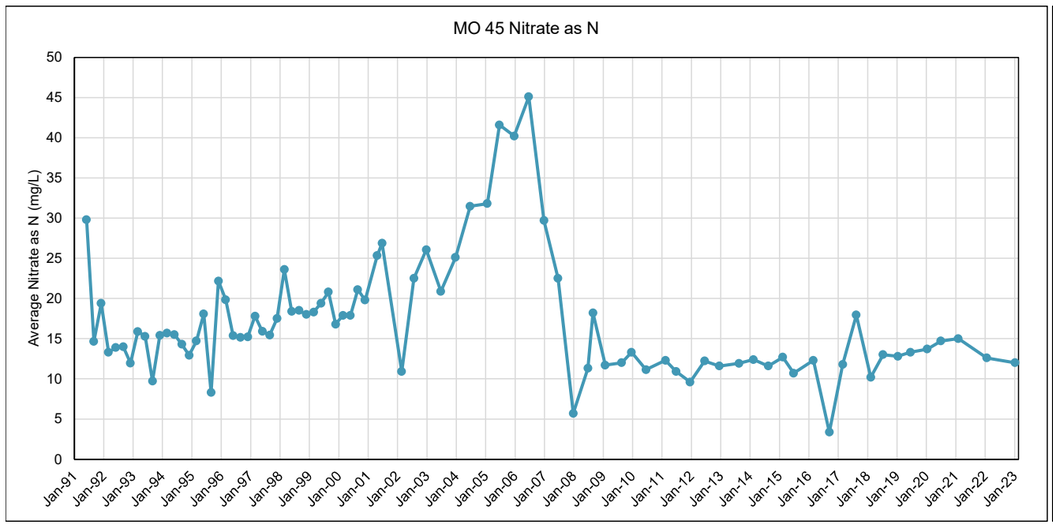
MO 45 Nitrate as N
Average Nitrate as N (mg/L)
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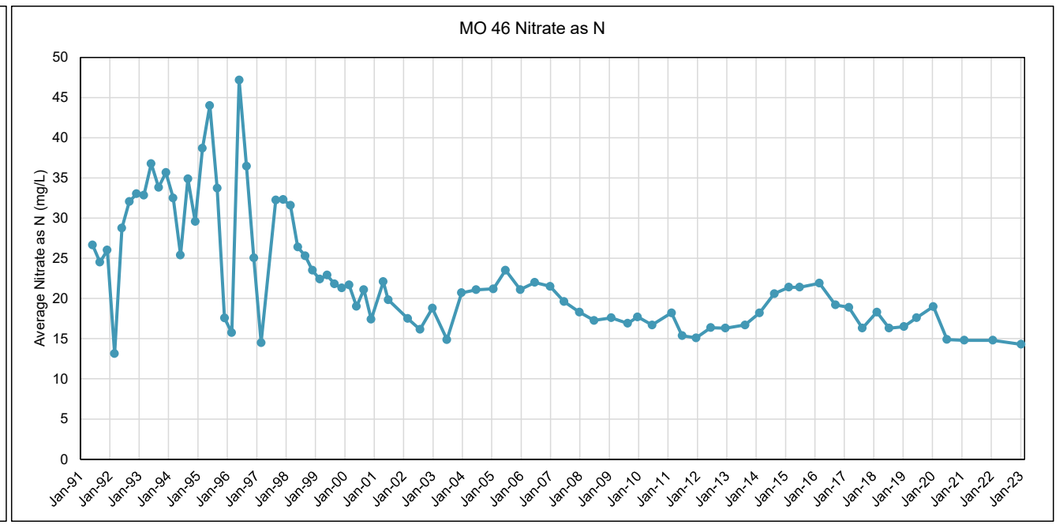
MO 46 Nitrate as N
Average Nitrate as N (mg/L)
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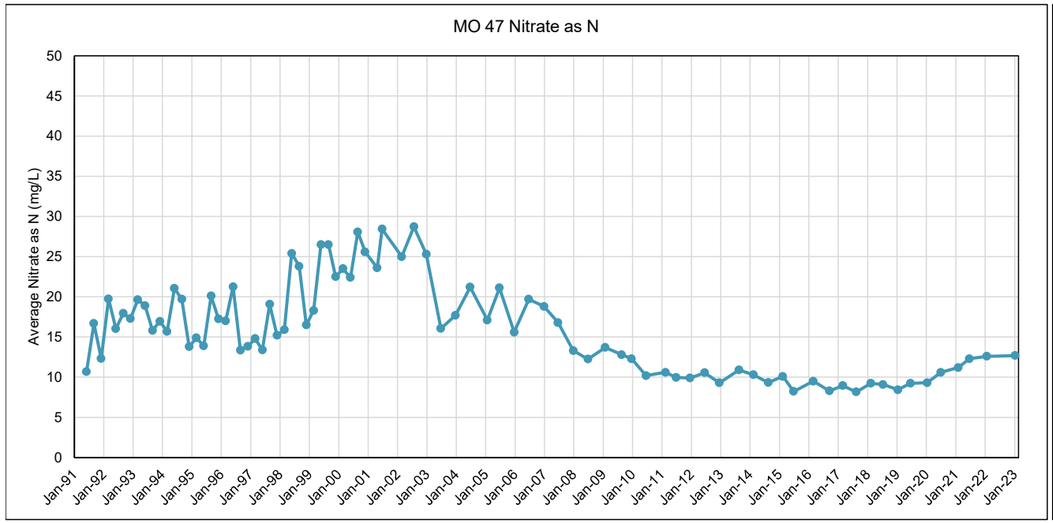
MO 47 Nitrate as N
Average Nitrate as N (mg/L)
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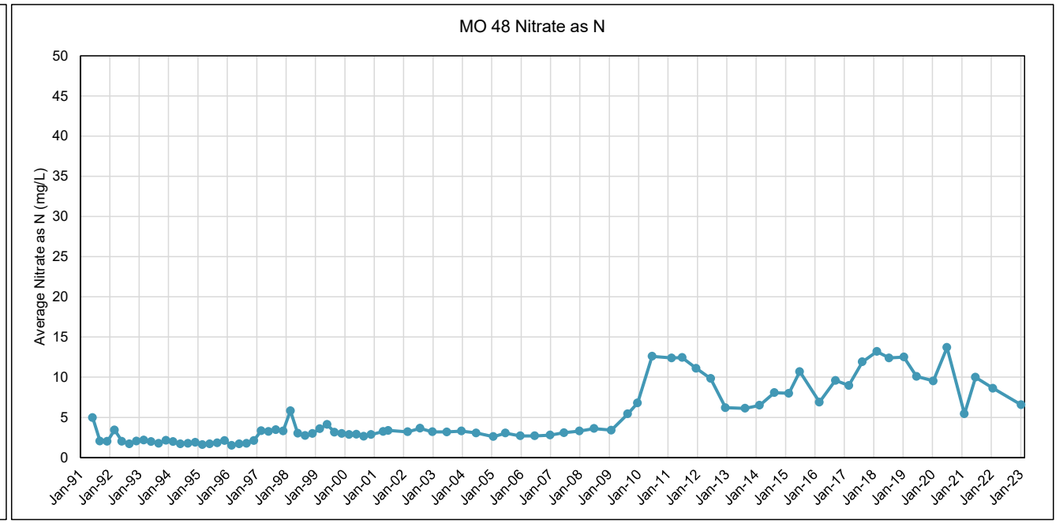
MO 48 Nitrate as N
Average Nitrate as N (mg/L)
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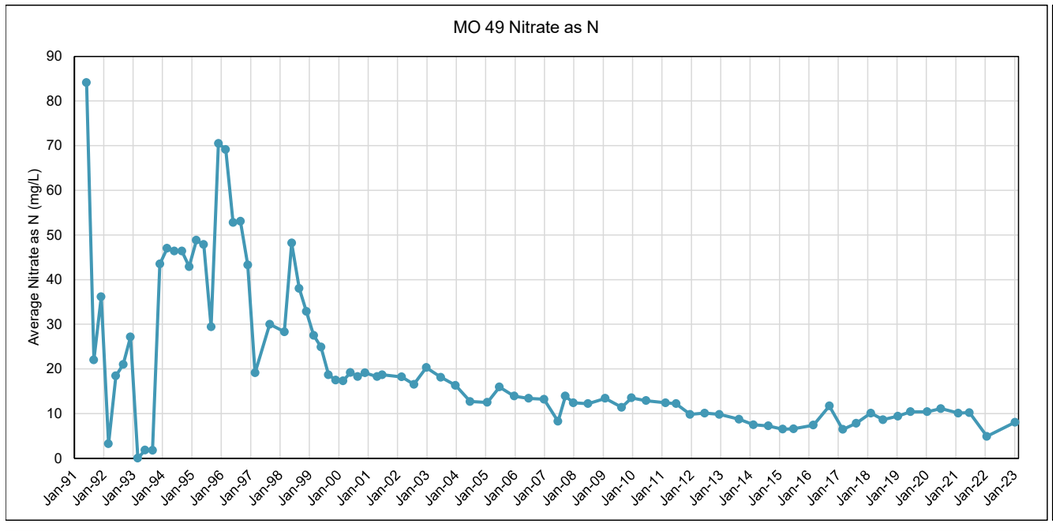
MO 49 Nitrate as N
Average Nitrate as N (mg/L)
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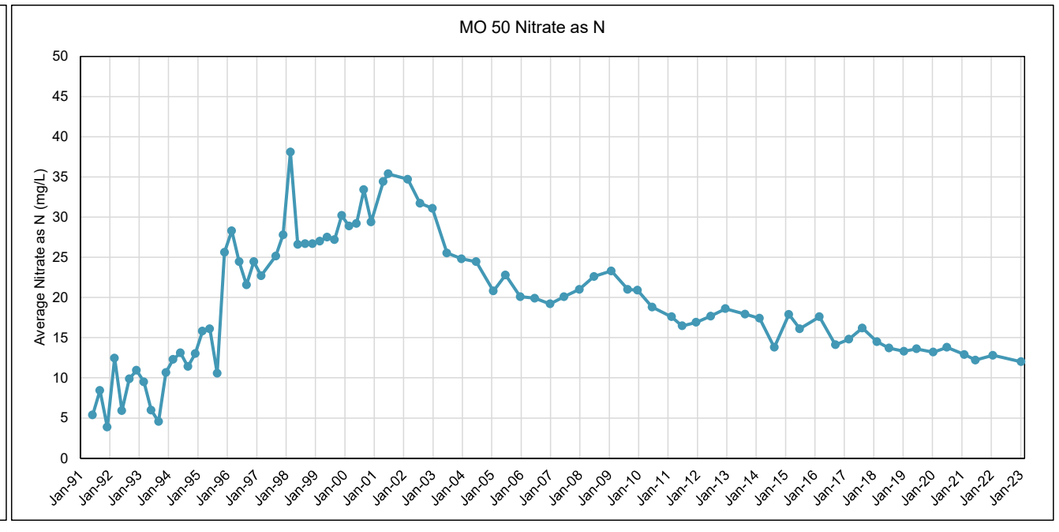
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Average Nitrate as N (mg/L)
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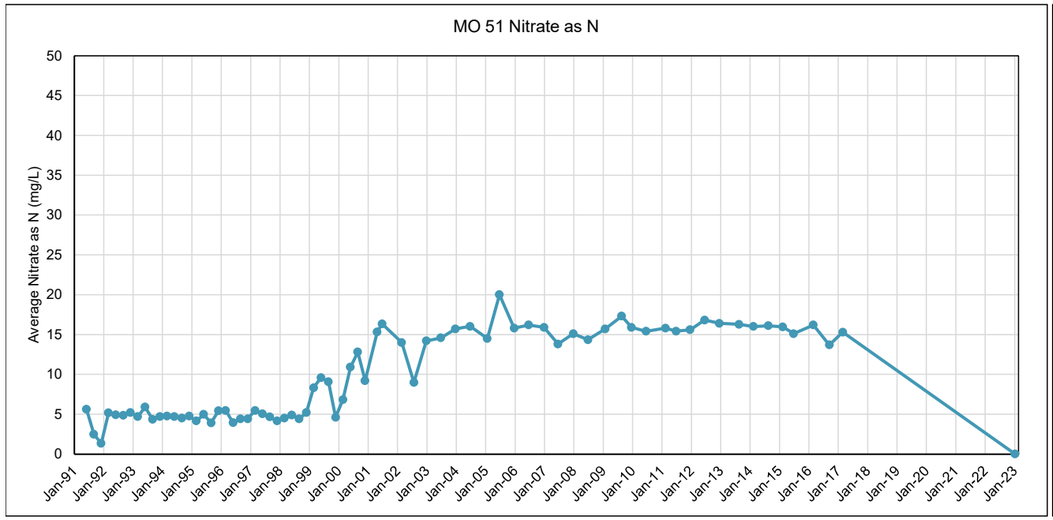
MO 51 Nitrate as N
Average Nitrate as N (mg/L)
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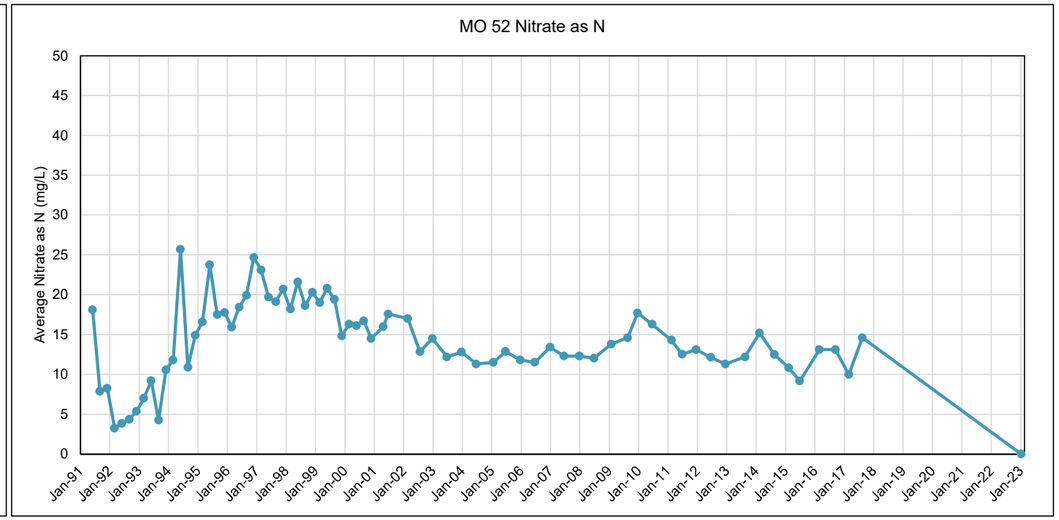
MO 52 Nitrate as N
Average Nitrate as N (mg/L)
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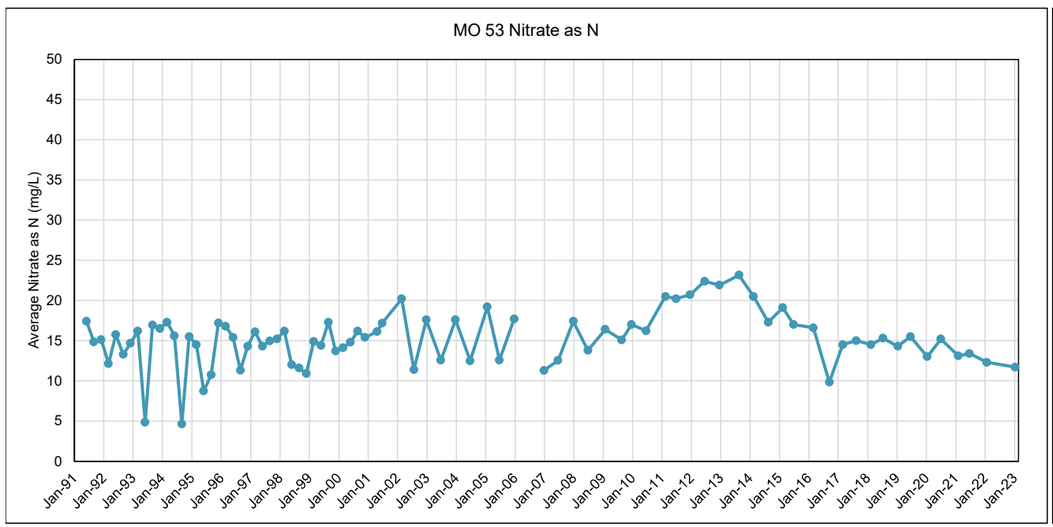
MO 53 Nitrate as N
Average Nitrate as N (mg/L)
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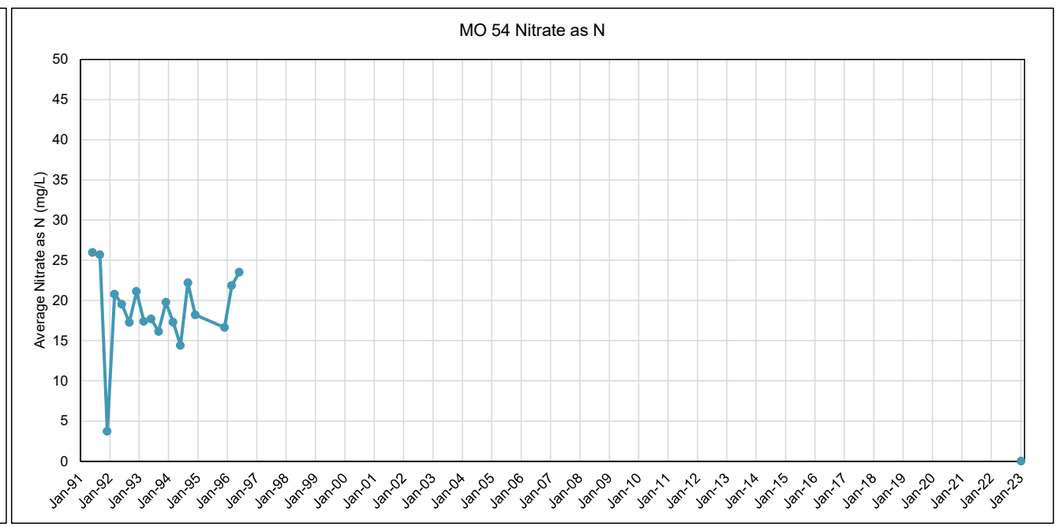
MO 54 Nitrate as N
Average Nitrate as N (mg/L)
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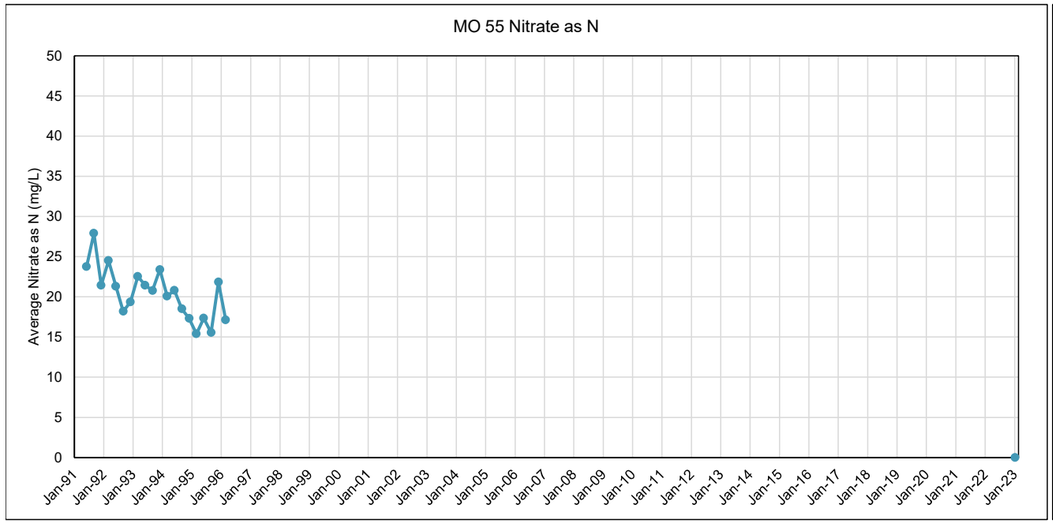
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Average Nitrate as N (mg/L)
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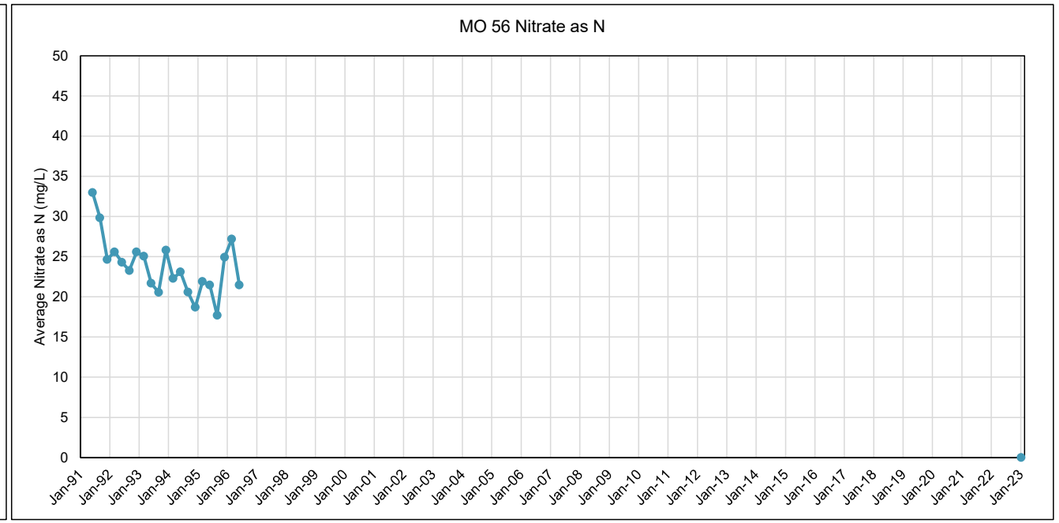
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Average Nitrate as N (mg/L)
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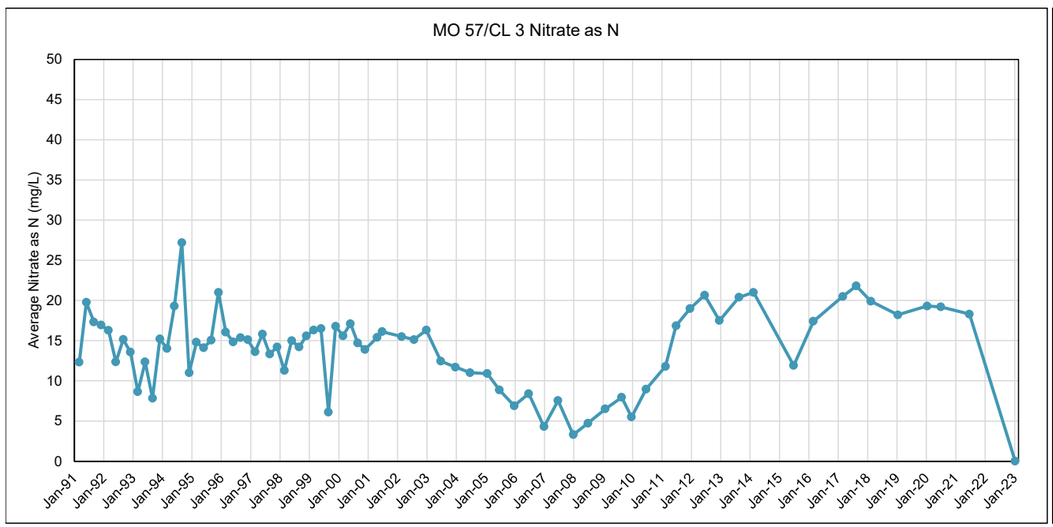
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Average Nitrate as N (mg/L)
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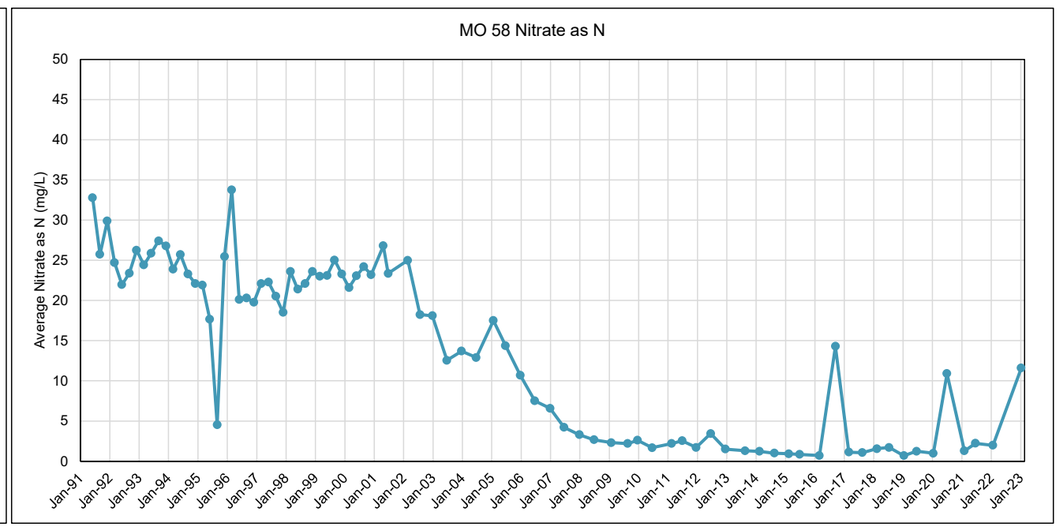
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Average Nitrate as N (mg/L)
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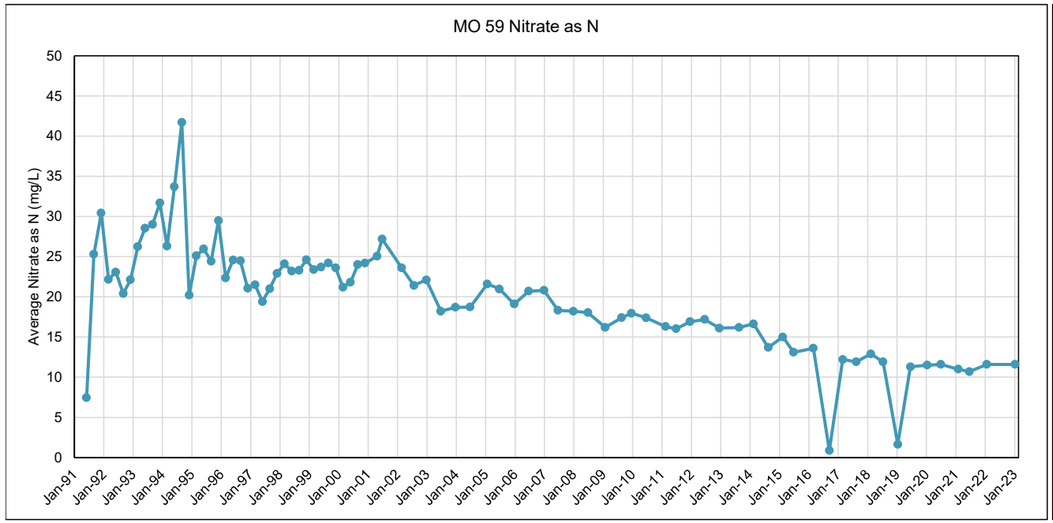
MO 59 Nitrate as N
Average Nitrate as N (mg/L)
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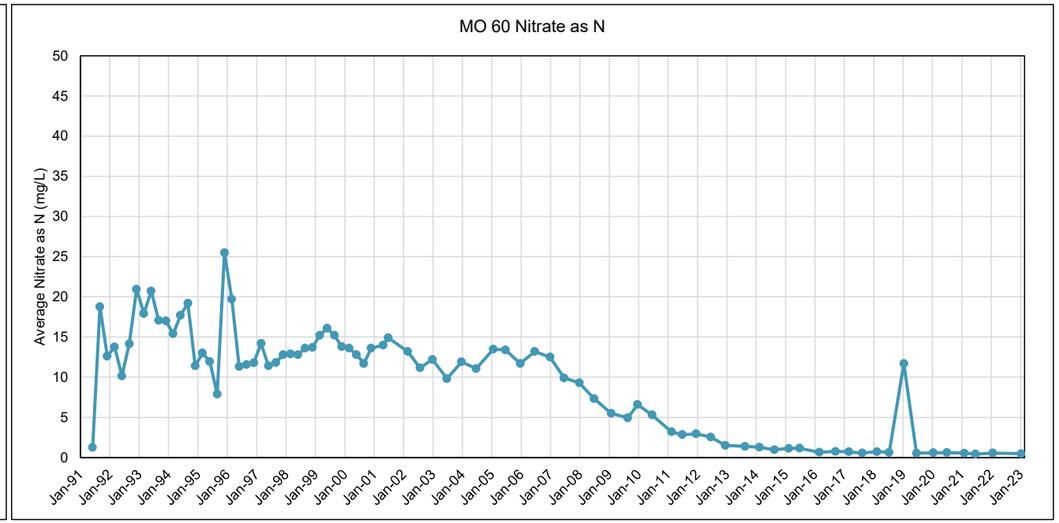
MO 60 Nitrate as N
Average Nitrate as N (mg/L)
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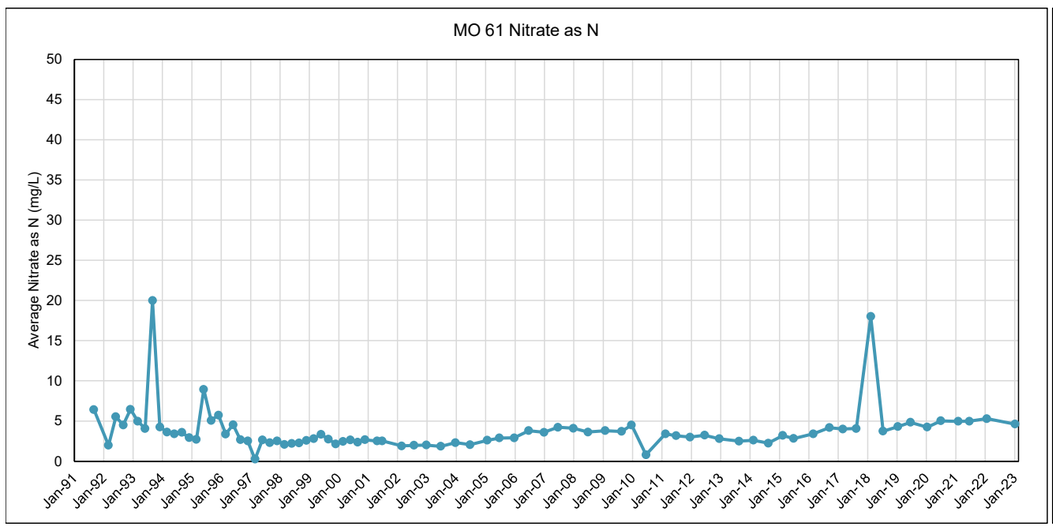
MO 61 Nitrate as N
Average Nitrate as N (mg/L)
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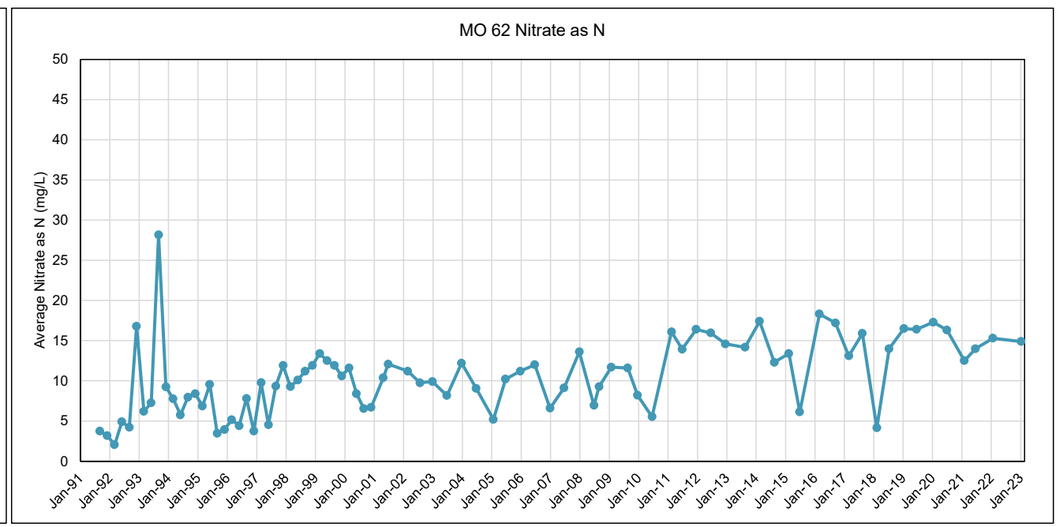
MO 62 Nitrate as N
Average Nitrate as N (mg/L)
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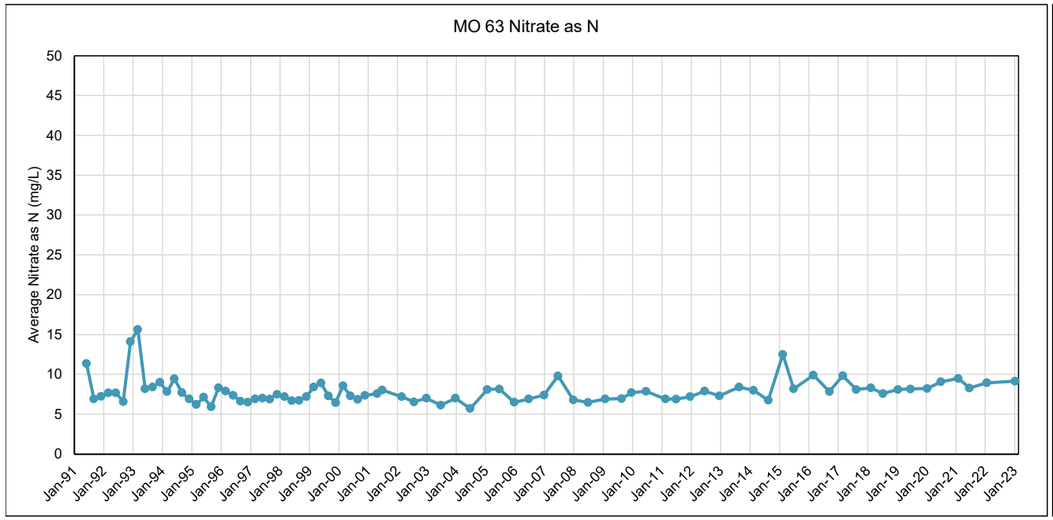
MO 63 Nitrate as N
Average Nitrate as N (mg/L)
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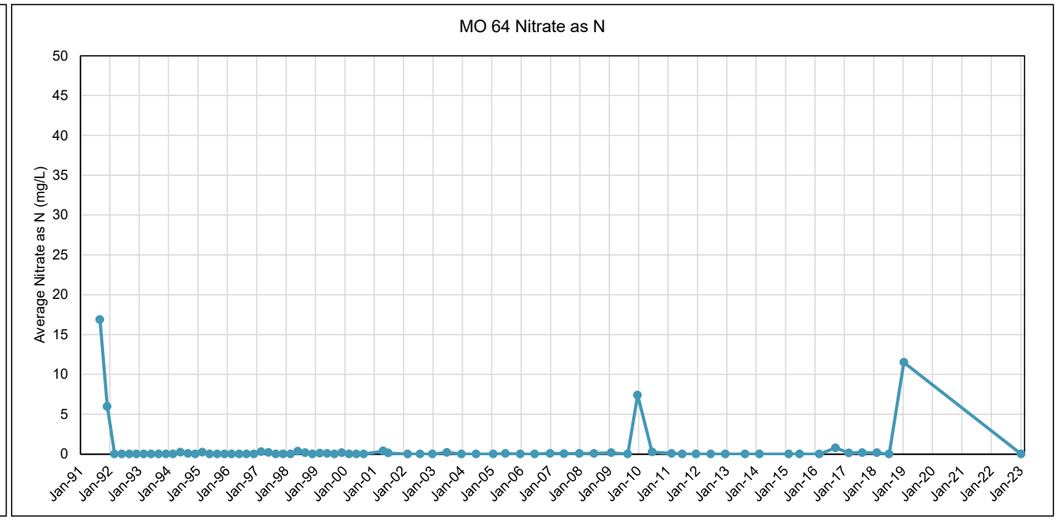
MO 64 Nitrate as N
Average Nitrate as N (mg/L)
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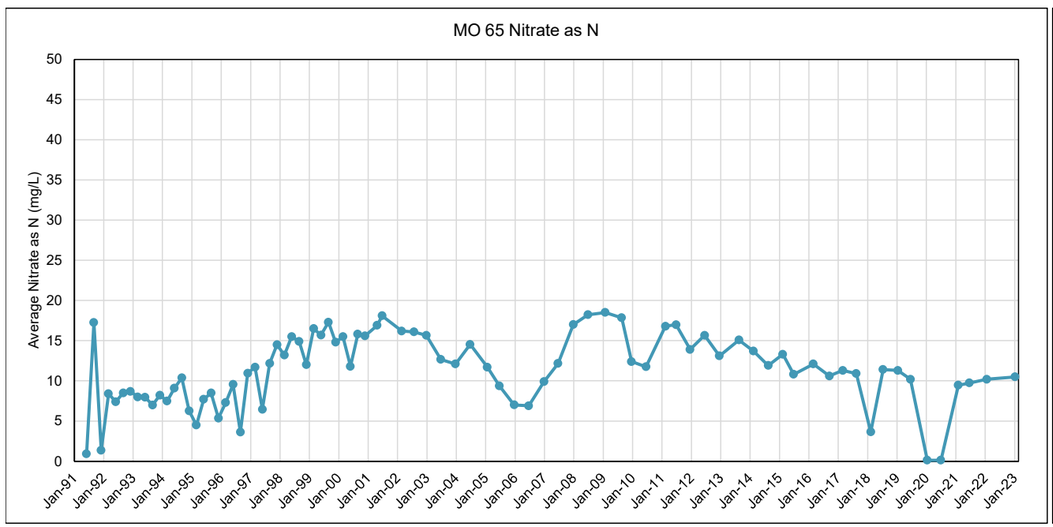
MO 65 Nitrate as N
Average Nitrate as N (mg/L)
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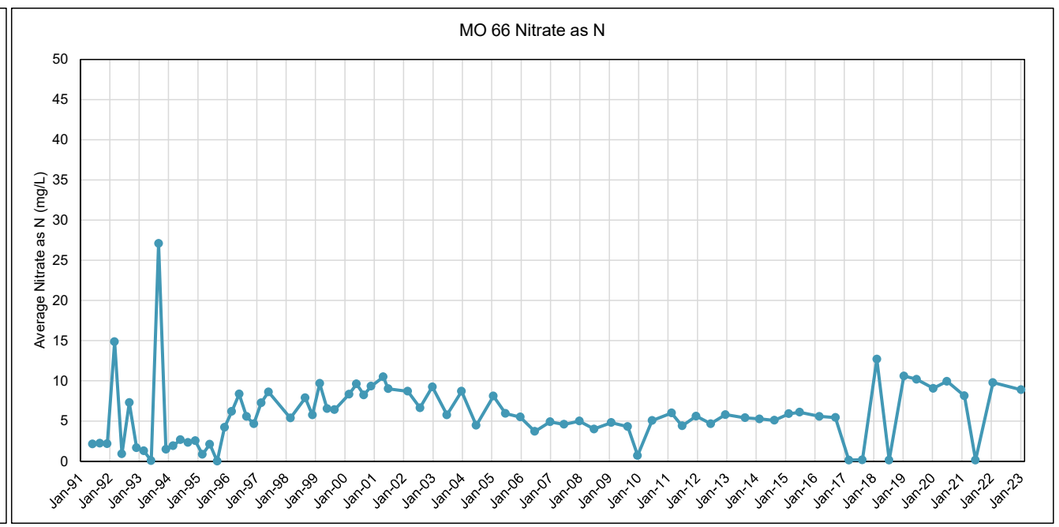
MO 66 Nitrate as N
Average Nitrate as N (mg/L)
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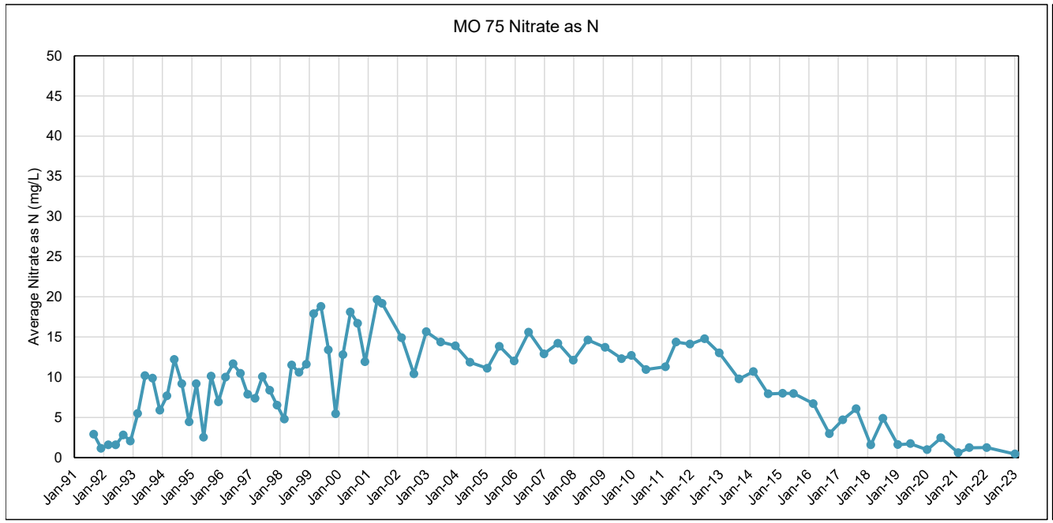
MO 75 Nitrate as N
Average Nitrate as N (mg/L)
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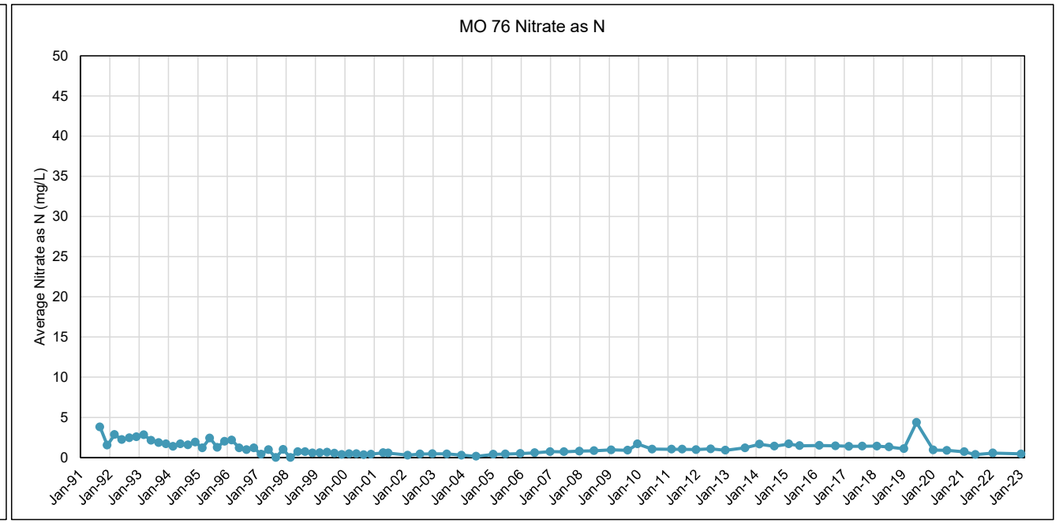
MO 76 Nitrate as N
Average Nitrate as N (mg/L)
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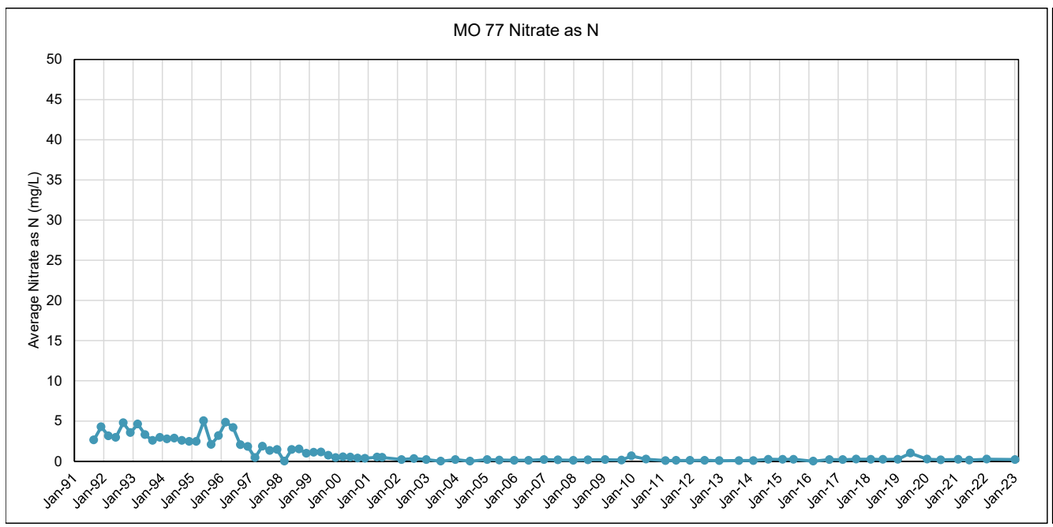
MO 77 Nitrate as N
Average Nitrate as N (mg/L)
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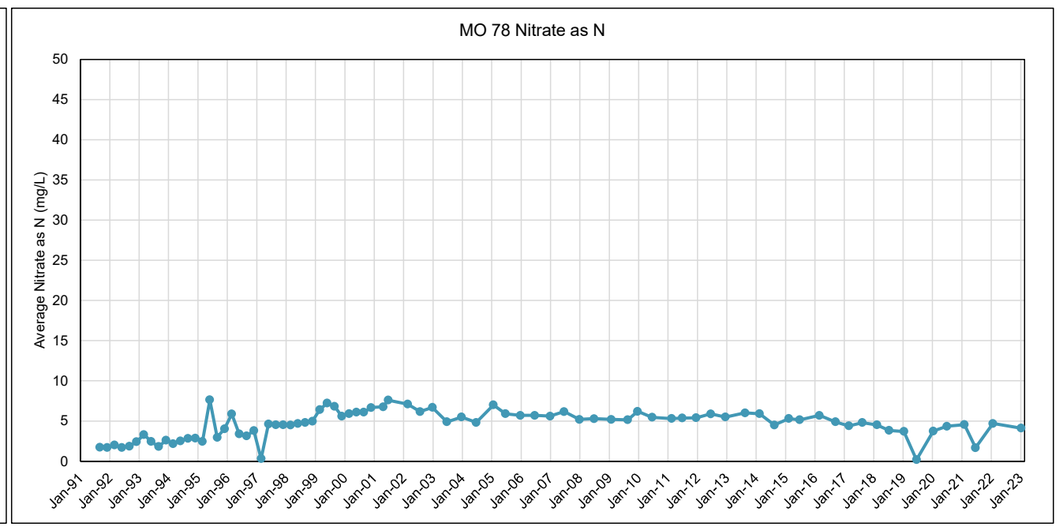
MO 78 Nitrate as N
Average Nitrate as N (mg/L)
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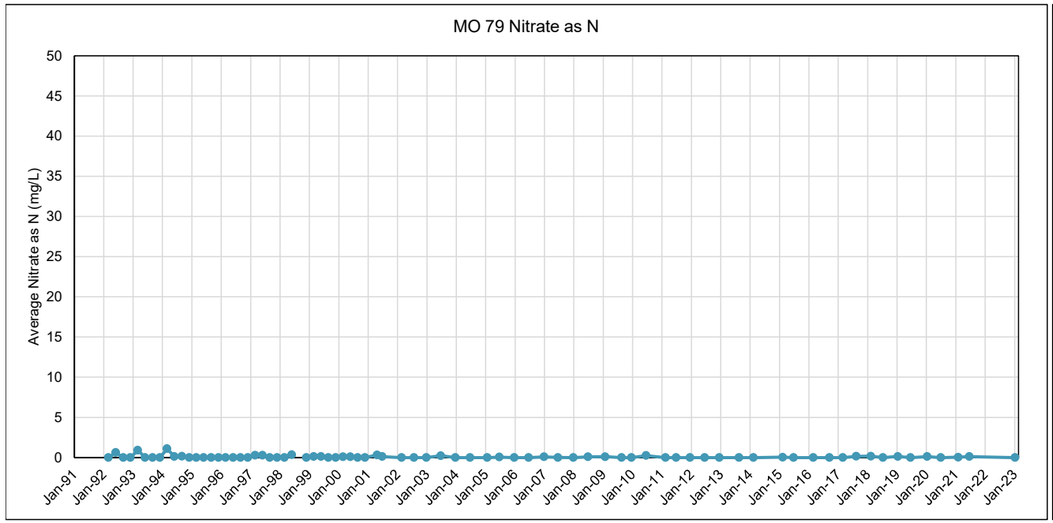
MO 79 Nitrate as N
Average Nitrate as N (mg/L)
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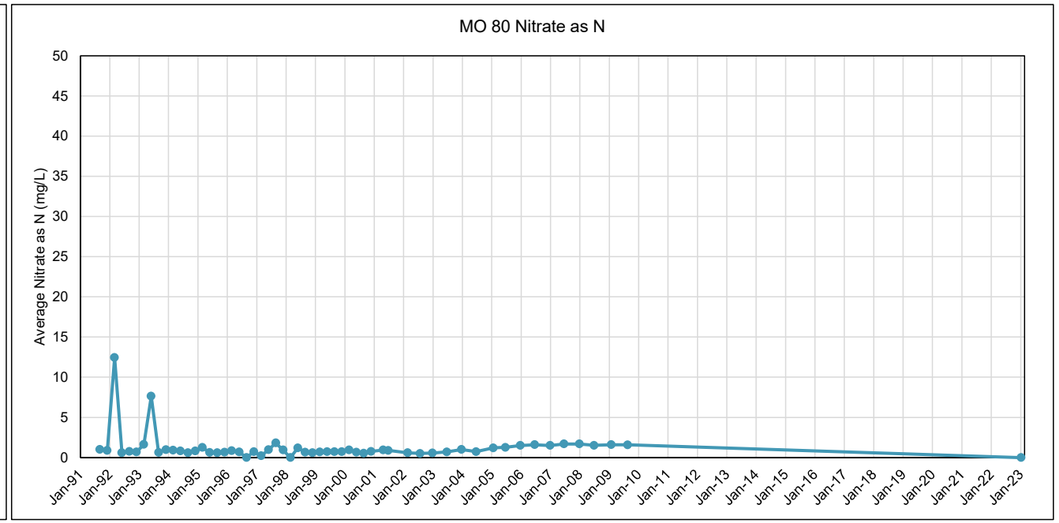
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Average Nitrate as N (mg/L)
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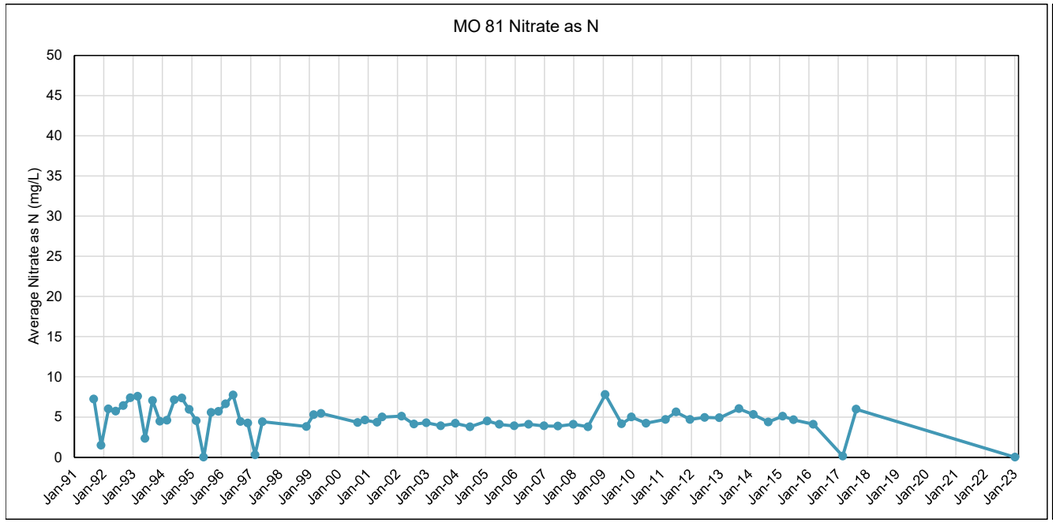
MO 81 Nitrate as N
Average Nitrate as N (mg/L)
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45
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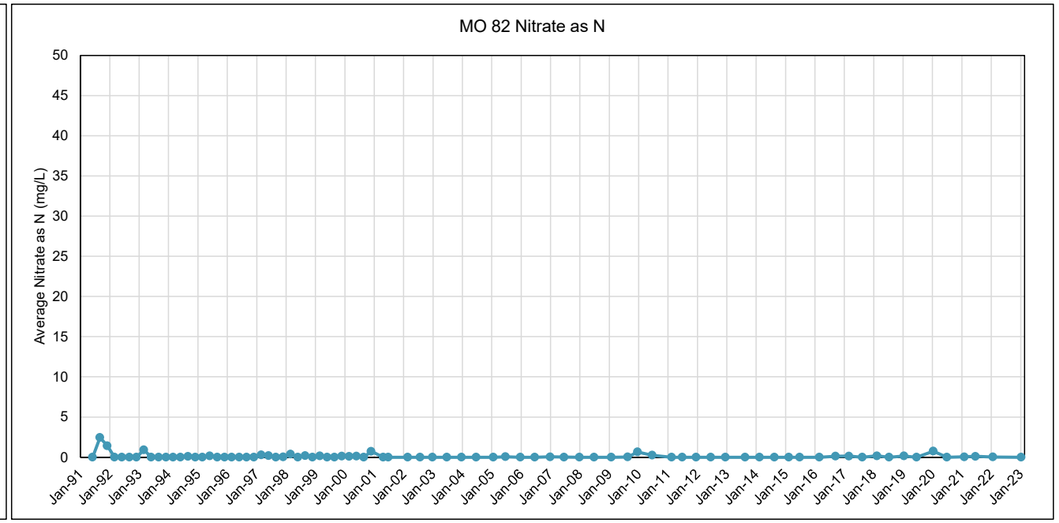
Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23


MO 82 Nitrate as N
Average Nitrate as N (mg/L)
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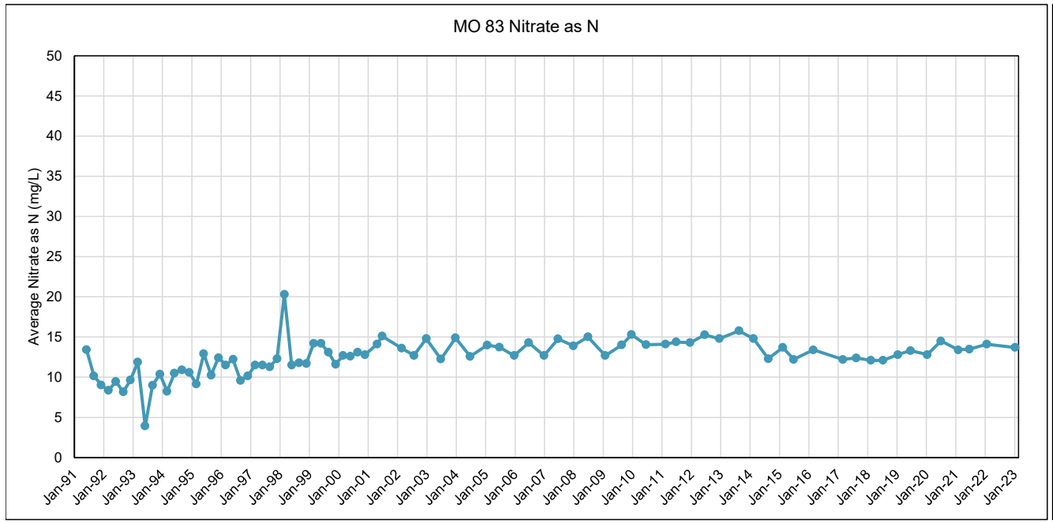
Jan-91 Jan-92 Jan-93 Jan-94 Jan-95 Jan-96 Jan-97 Jan-98 Jan-99 Jan-00 Jan-01 Jan-02 Jan-03 Jan-04 Jan-05 Jan-06 Jan-07 Jan-08 Jan-09 Jan-10 Jan-11 Jan-12 Jan-13 Jan-14 Jan-15 Jan-16 Jan-17 Jan-18 Jan-19 Jan-20 Jan-21 Jan-22 Jan-23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Average Nitrate as N (mg/L)
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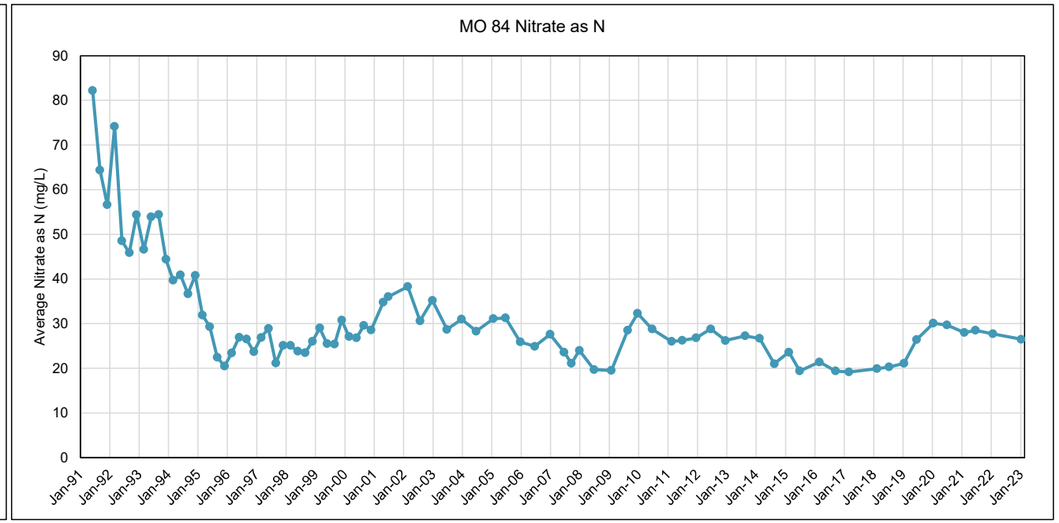
MO 84 Nitrate as N
Average Nitrate as N (mg/L)
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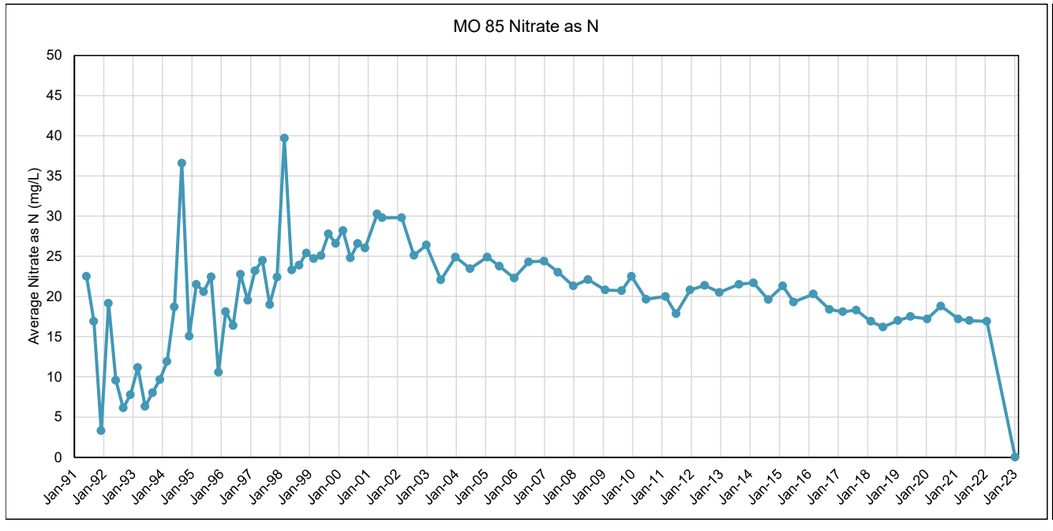
MO 85 Nitrate as N
Average Nitrate as N (mg/L)
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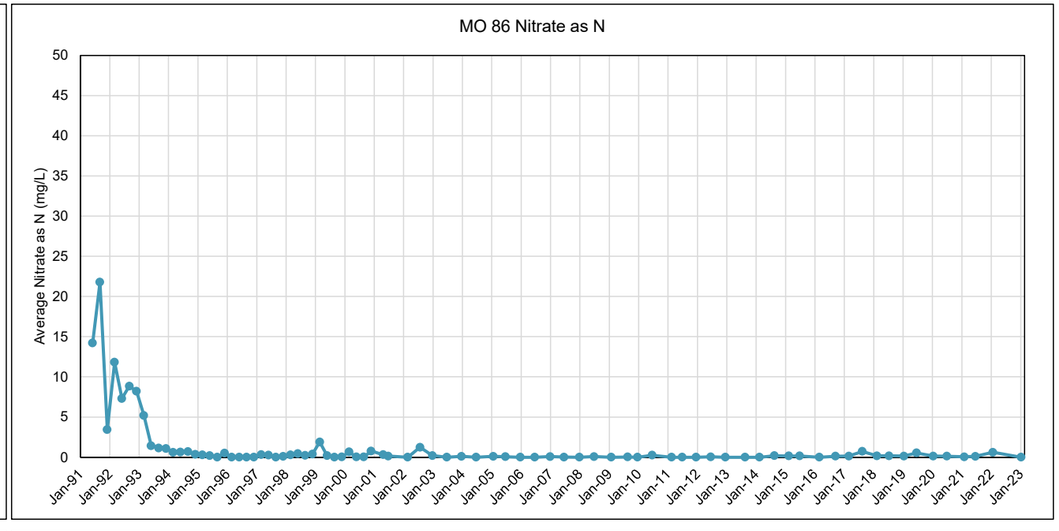
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Average Nitrate as N (mg/L)
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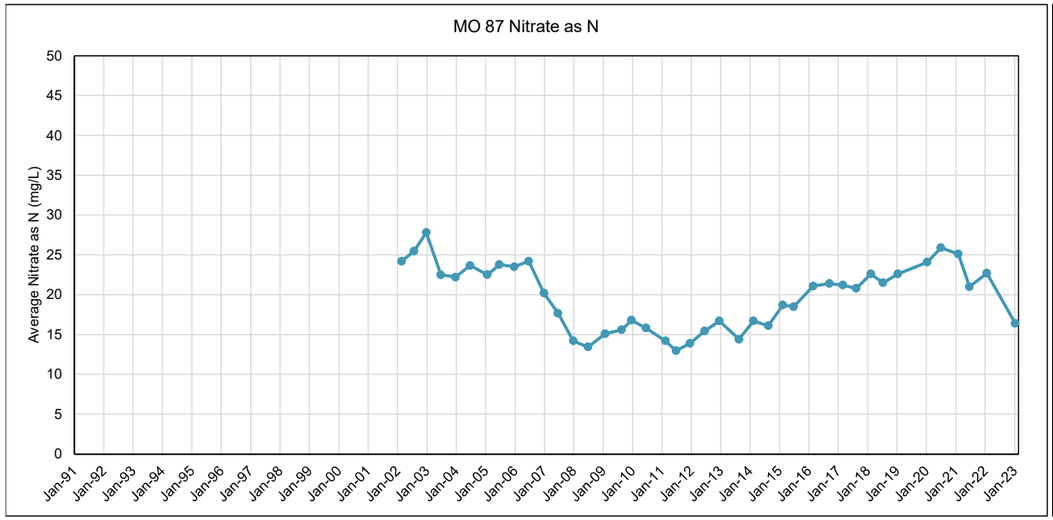
MO 87 Nitrate as N
Average Nitrate as N (mg/L)
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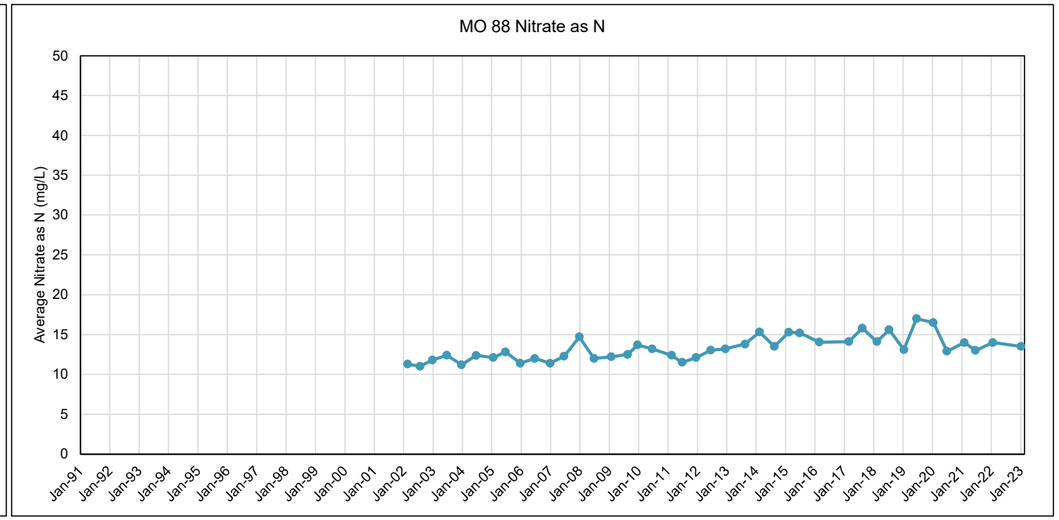
MO 88 Nitrate as N
Average Nitrate as N (mg/L)
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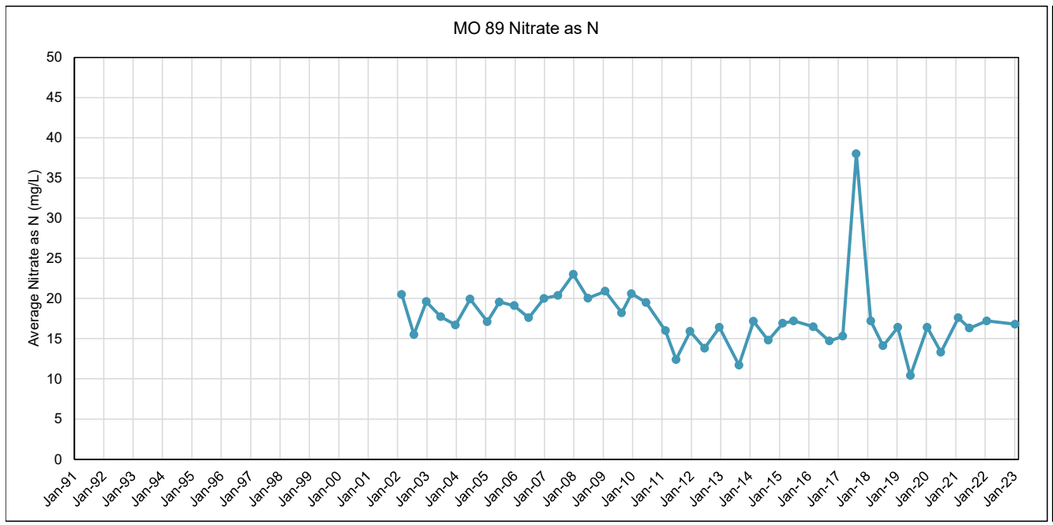
MO 89 Nitrate as N
Average Nitrate as N (mg/L)
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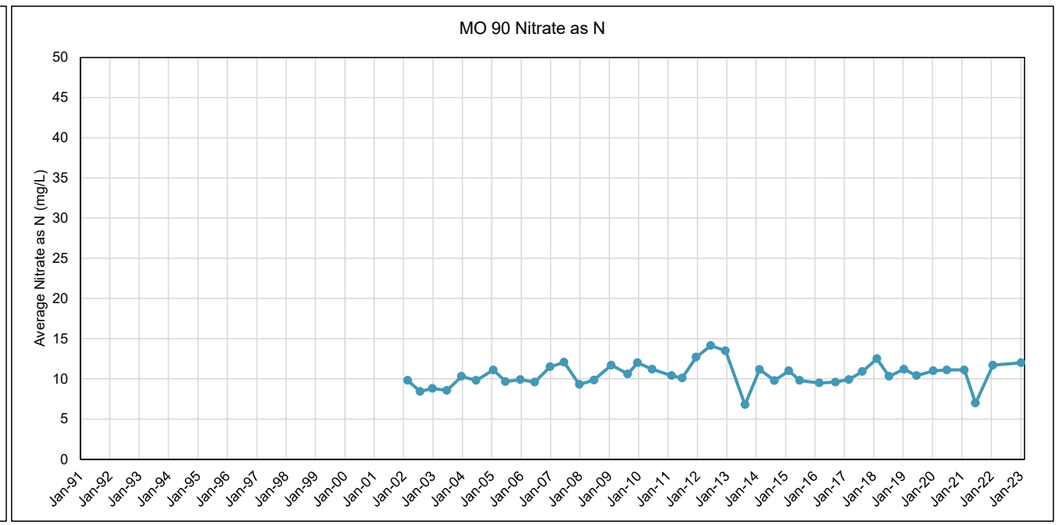
MO 90 Nitrate as N
Average Nitrate as N (mg/L)
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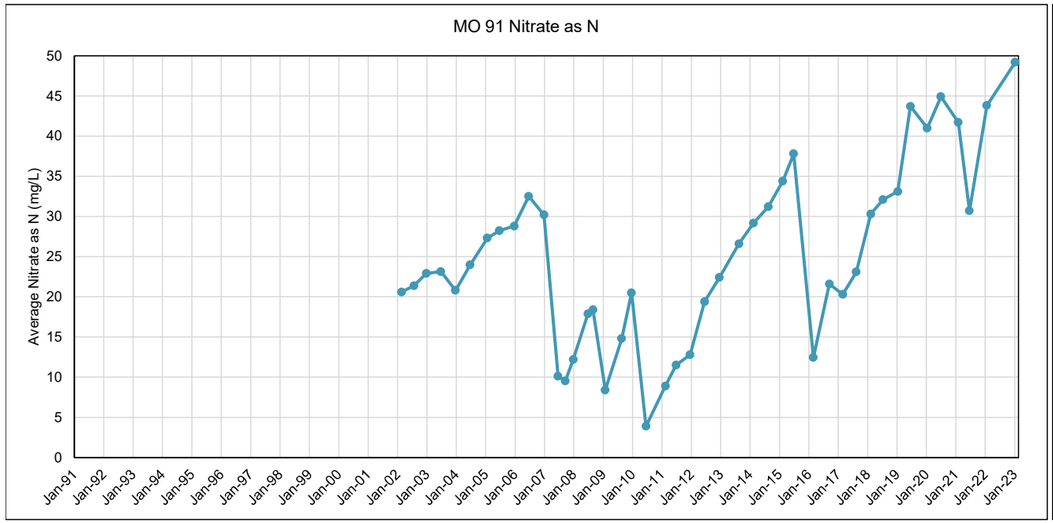
MO 91 Nitrate as N
Average Nitrate as N (mg/L)
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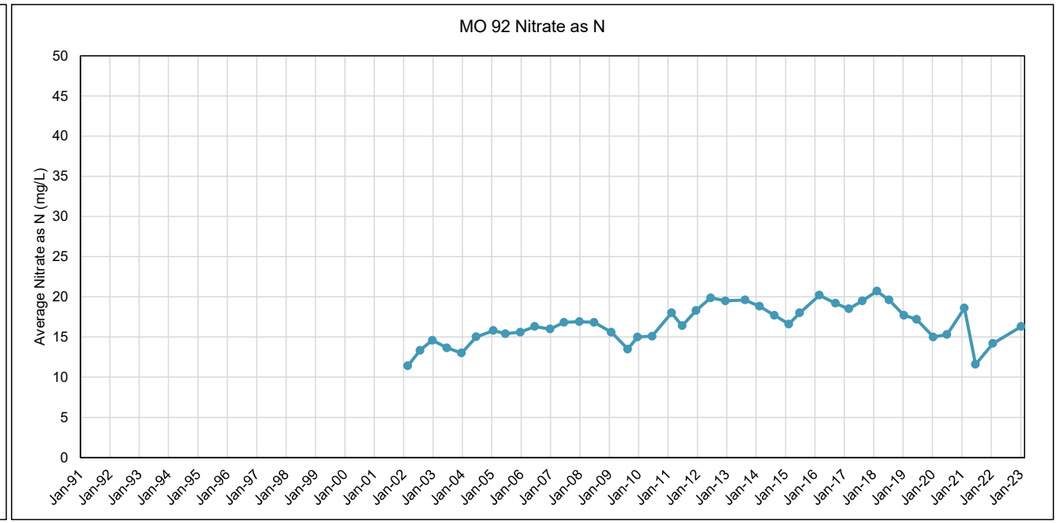
MO 92 Nitrate as N
Average Nitrate as N (mg/L)
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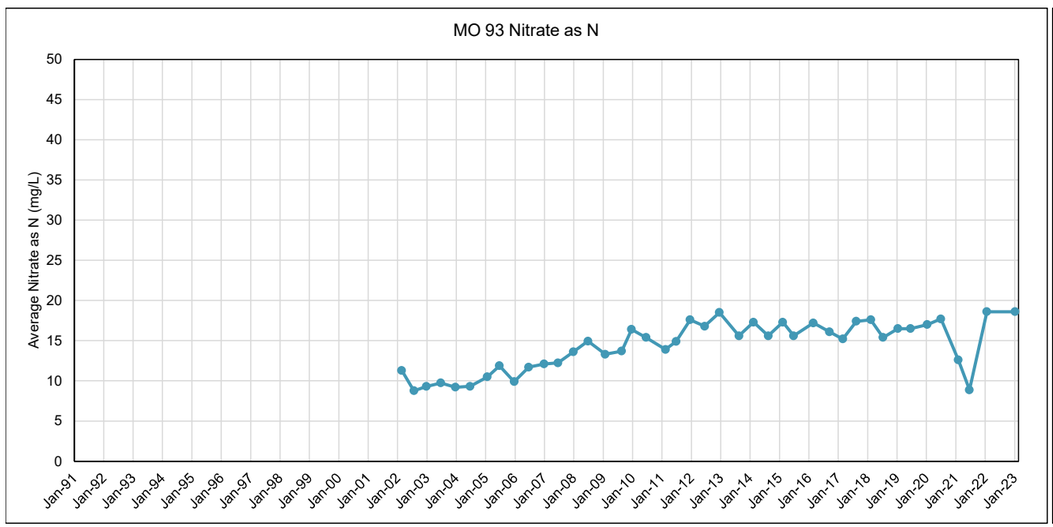
MO 93 Nitrate as N
Average Nitrate as N (mg/L)
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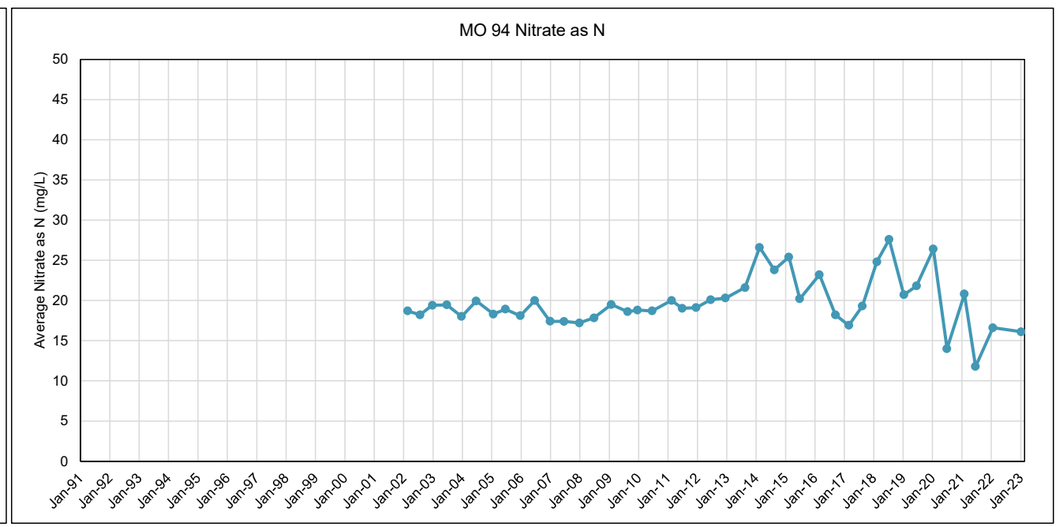
MO 94 Nitrate as N
Average Nitrate as N (mg/L)
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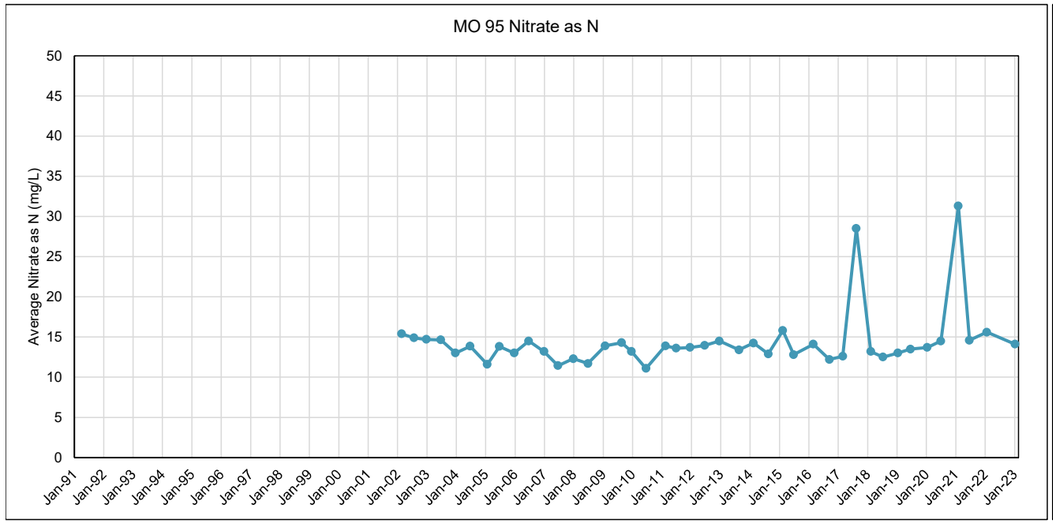
MO 95 Nitrate as N
Average Nitrate as N (mg/L)
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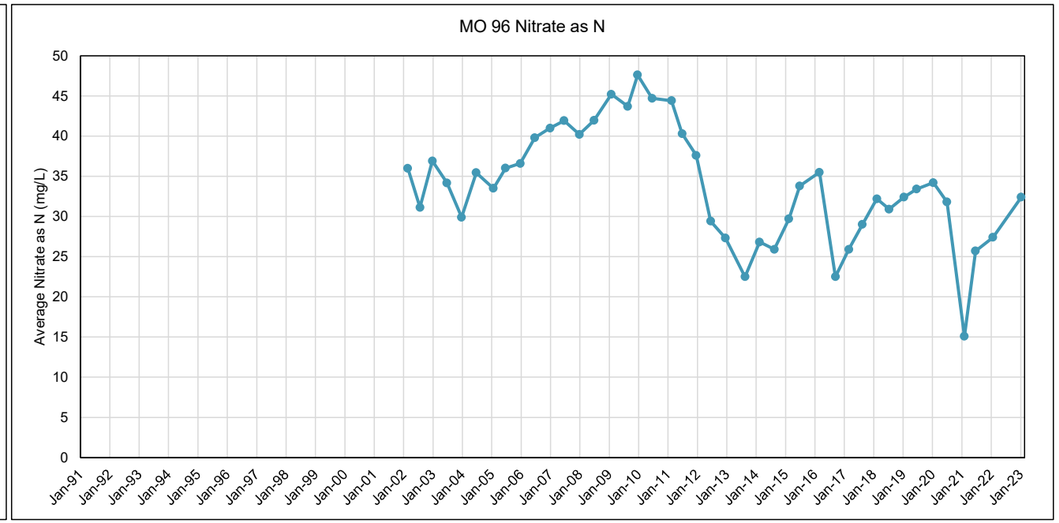
MO 96 Nitrate as N
Average Nitrate as N (mg/L)
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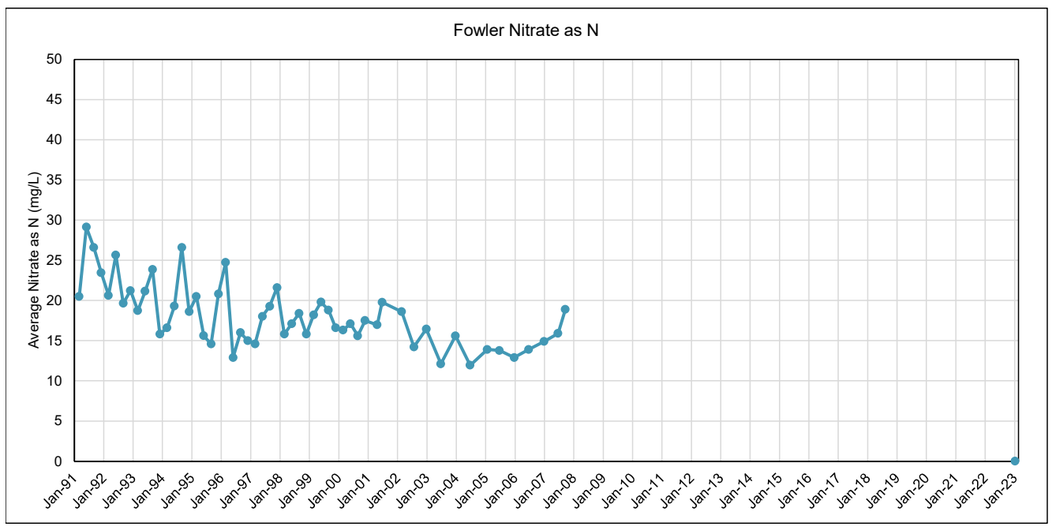
Fowler Nitrate as N
Average Nitrate as N (mg/L)
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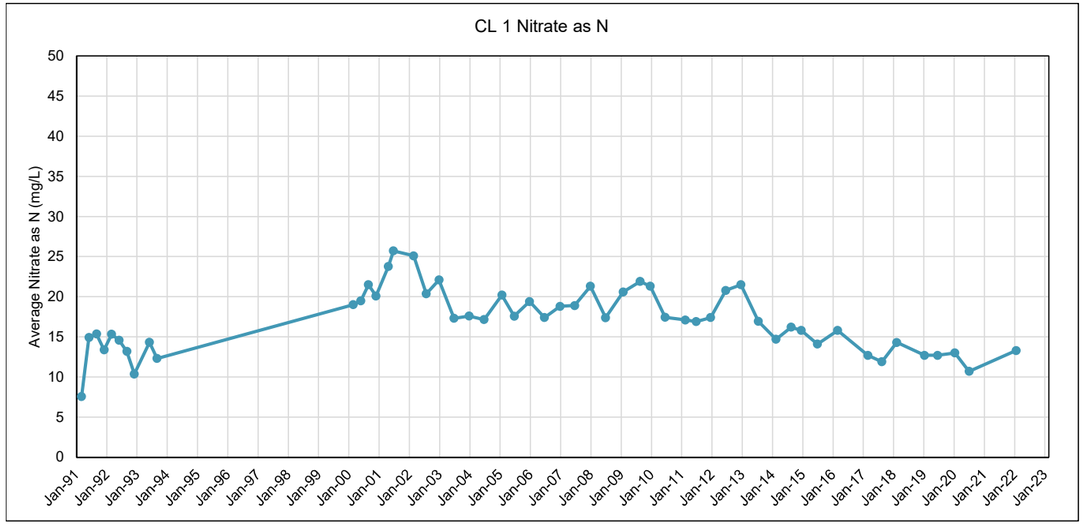
Time Series Figures of Nitrate-N Concentrations in CL Recovery Wells


CL 1 Nitrate as N
Average Nitrate as N (mg/L)
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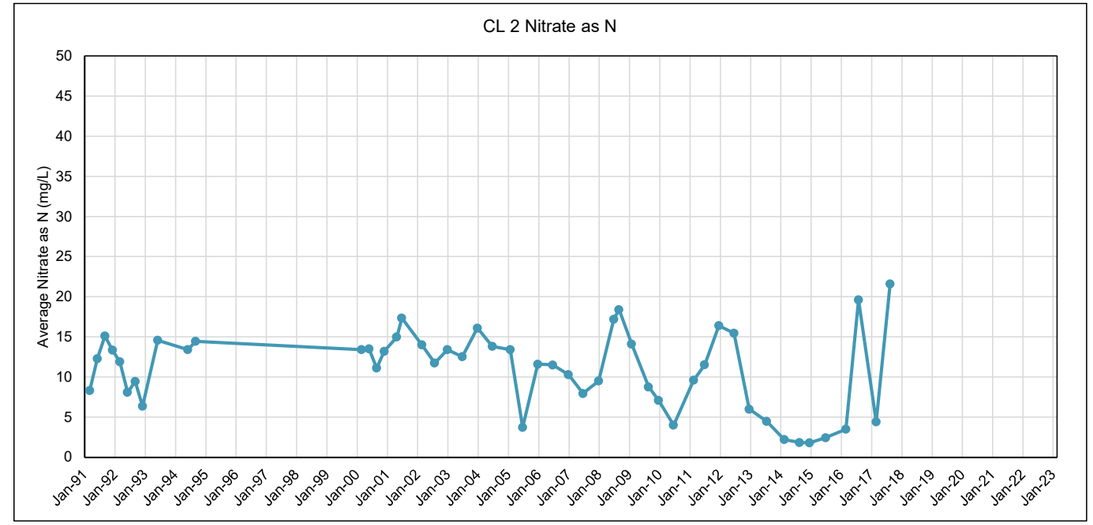
CL 2 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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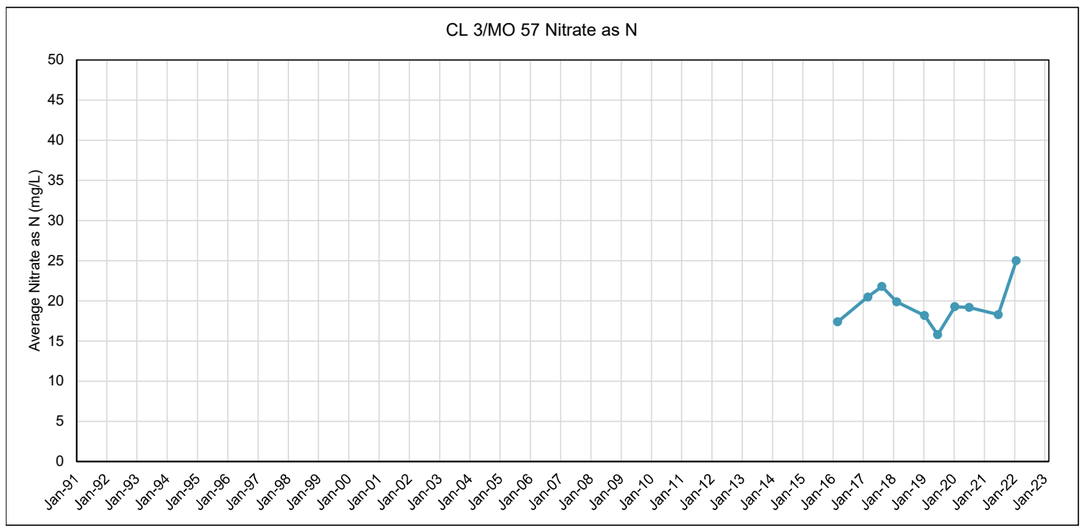
CL 3/MO 57 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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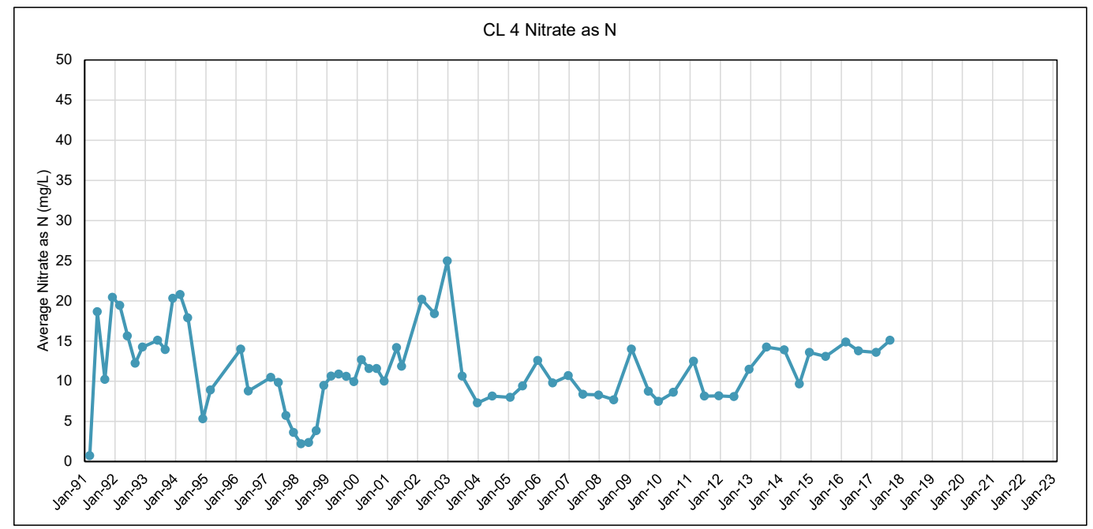
CL 4 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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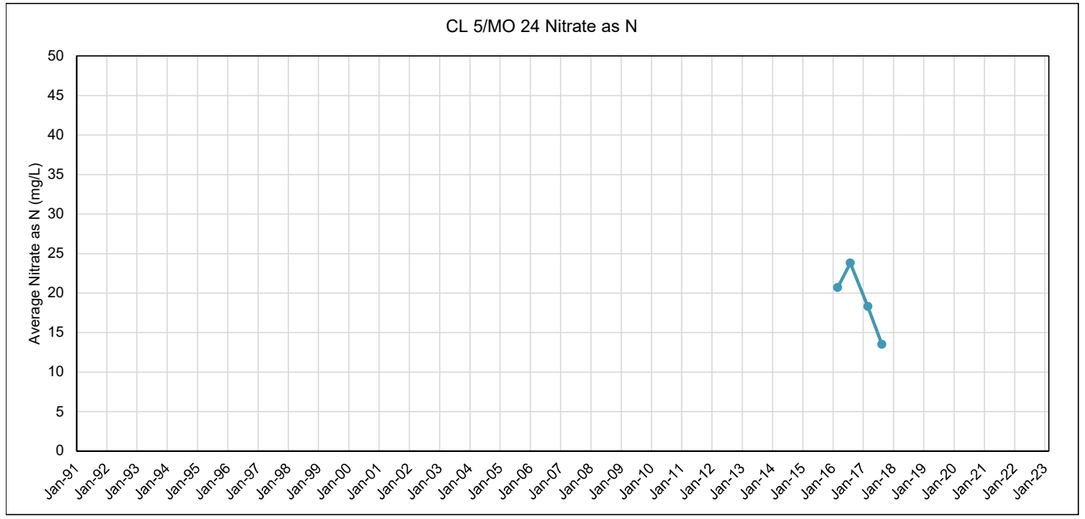
CL 5/MO 24 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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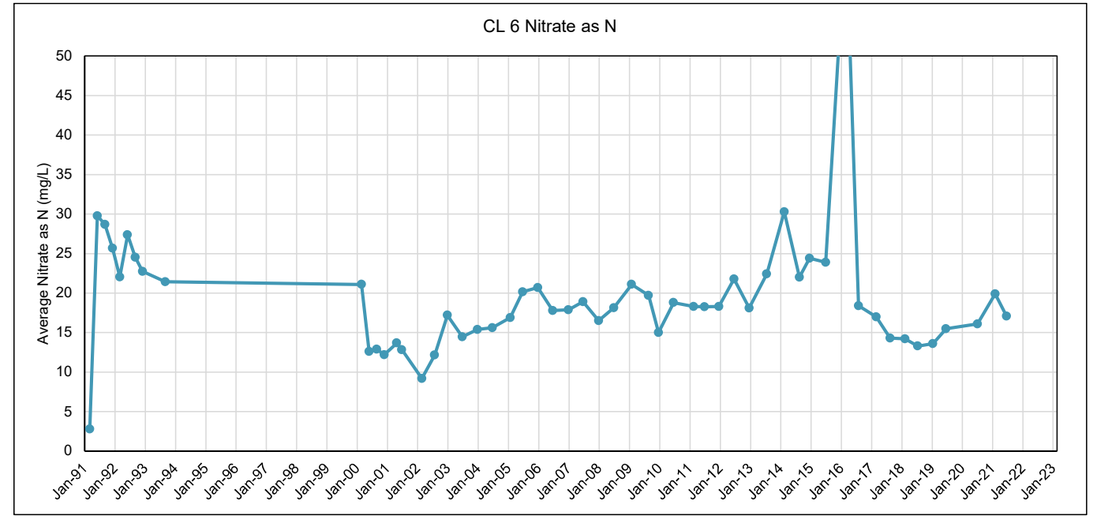
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Average Nitrate as N (mg/L)
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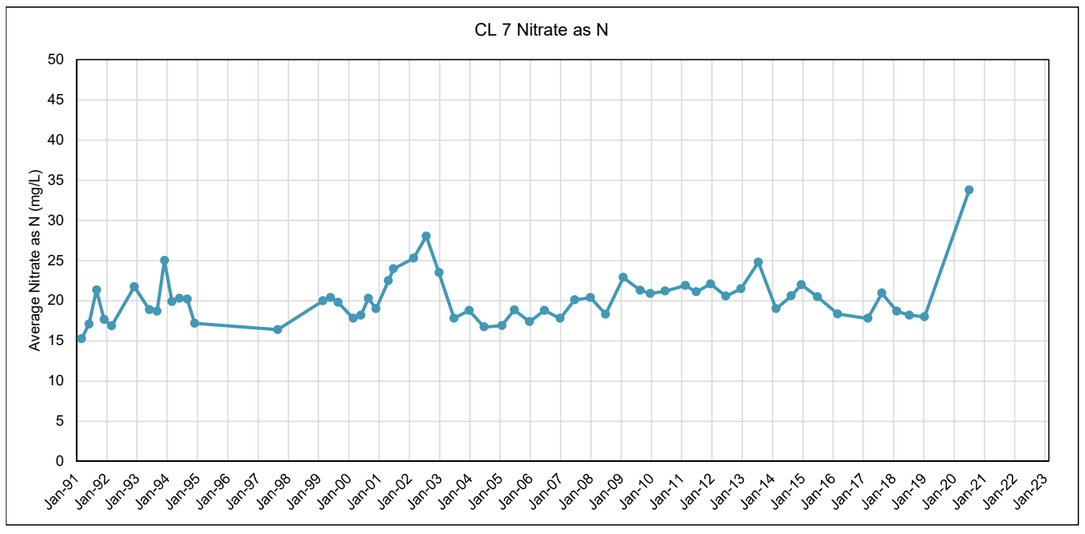
CL 7 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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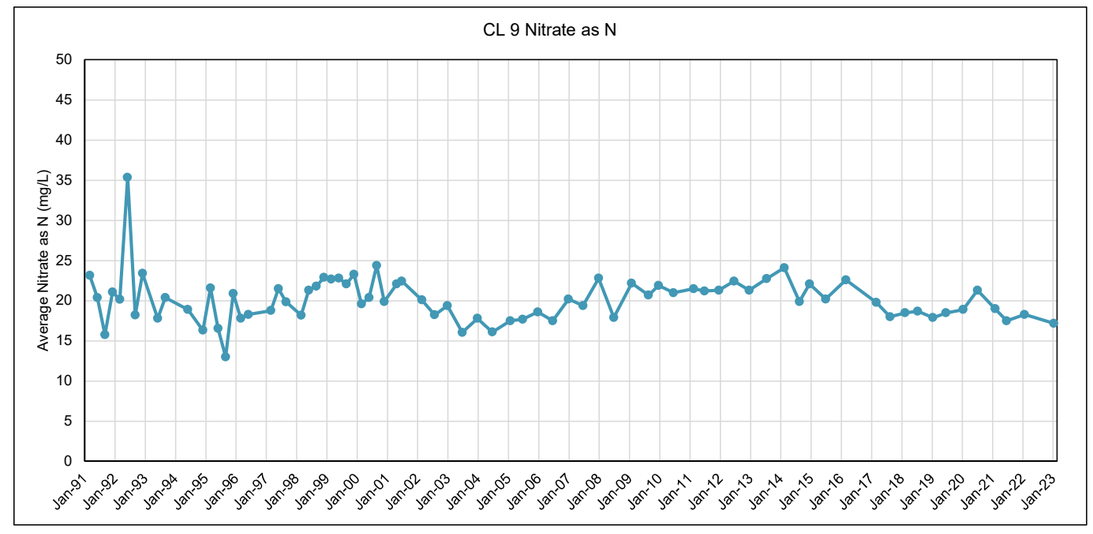
CL 9 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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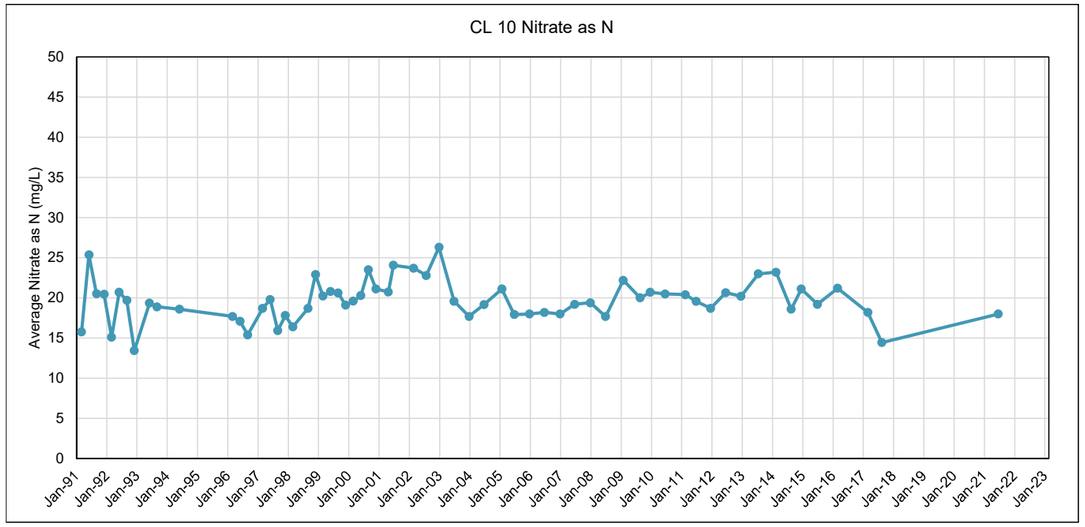
CL 10 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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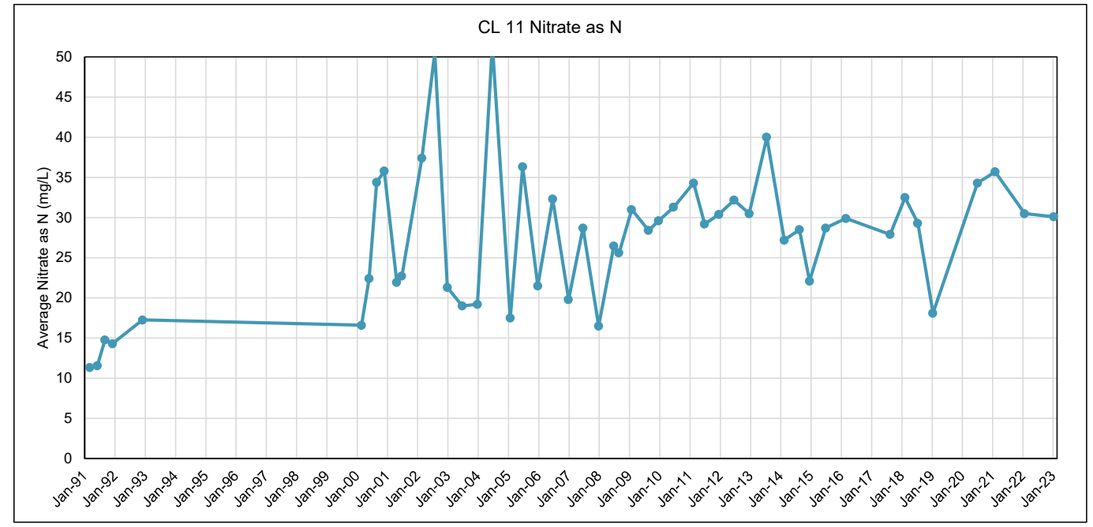
CL 11 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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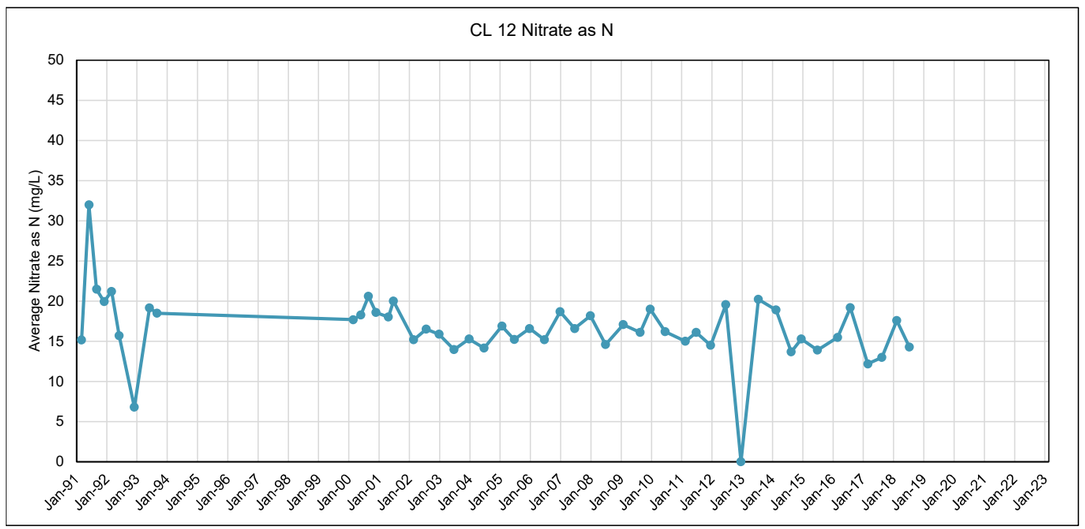
CL 12 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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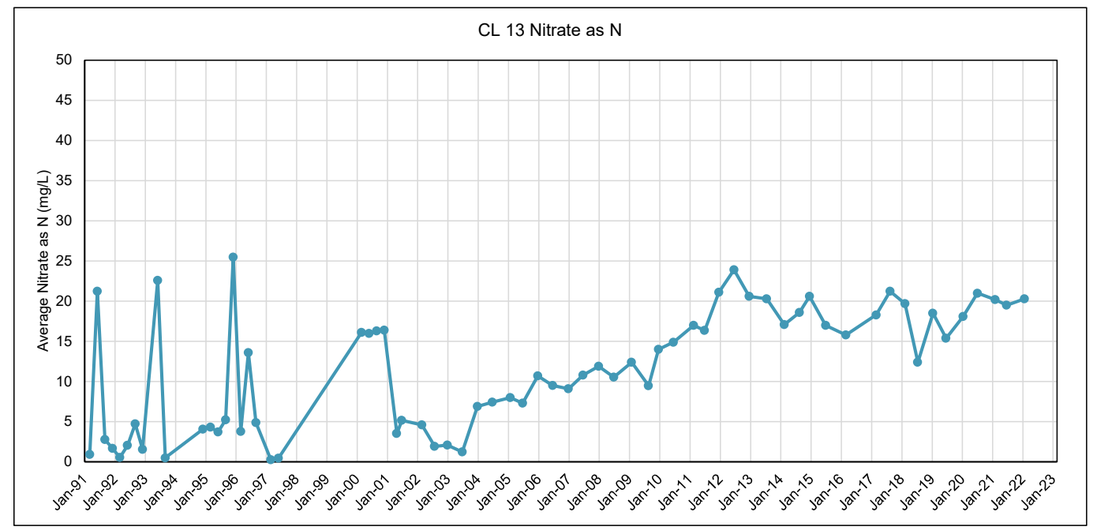
CL 13 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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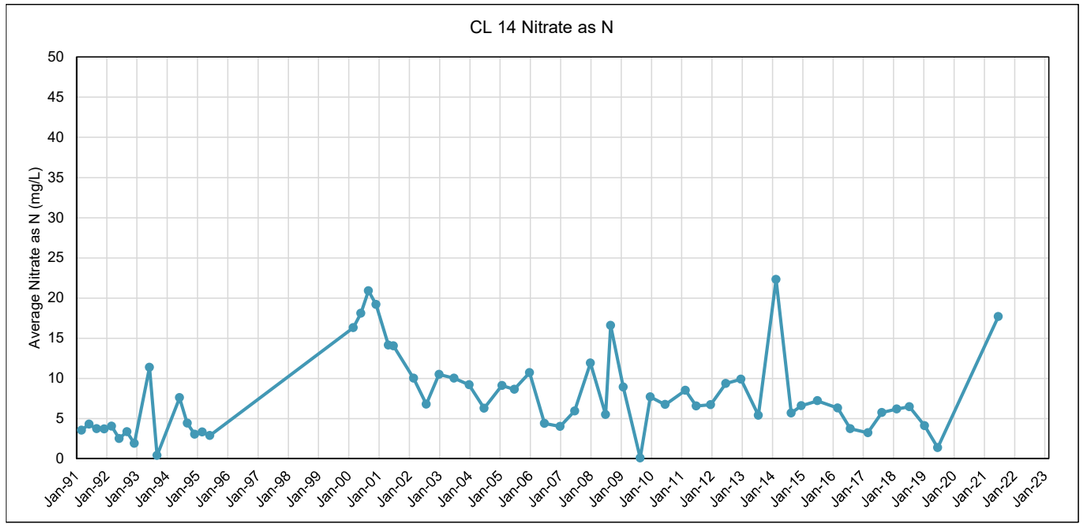
CL 14 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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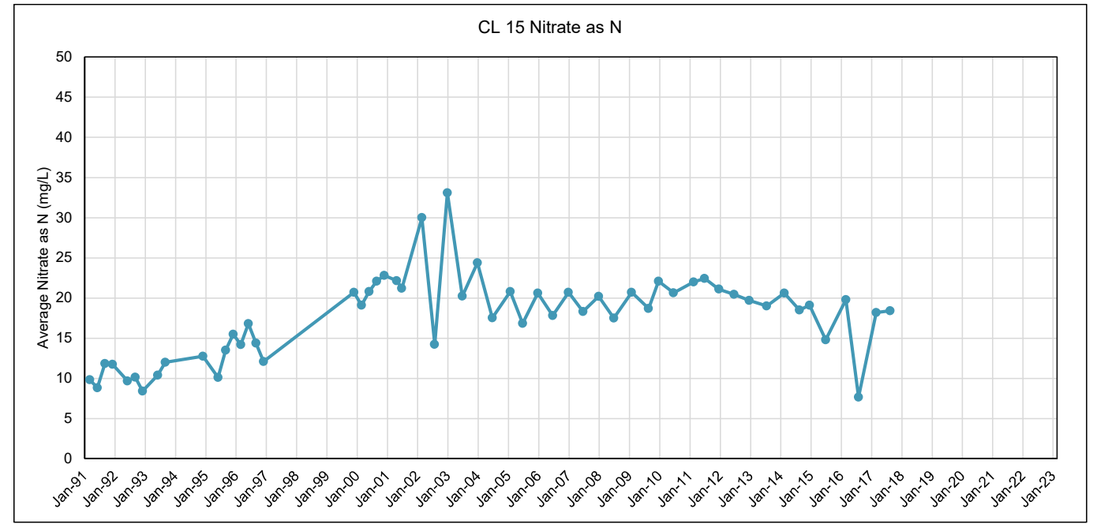
CL 15 Nitrate as N
Average Nitrate as N (mg/L)
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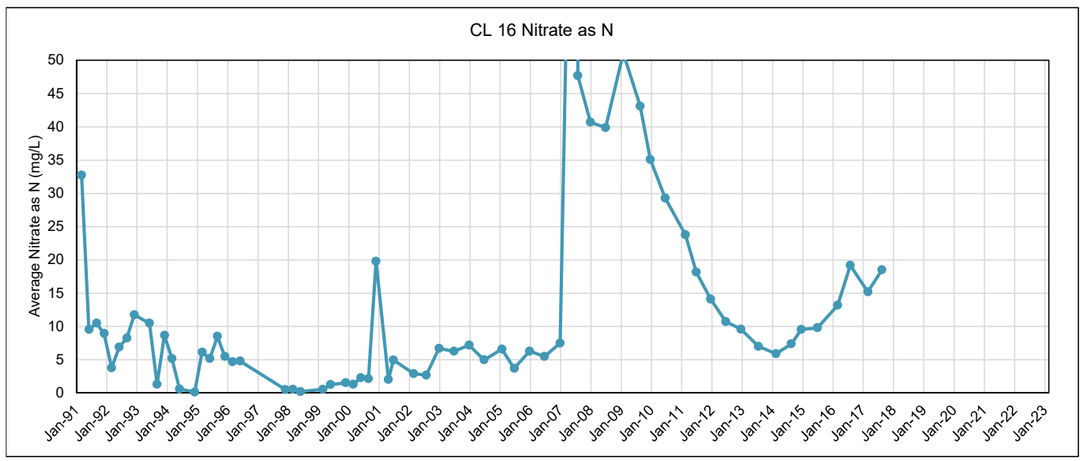
CL 16 Nitrate as N
Average Nitrate as N (mg/L)
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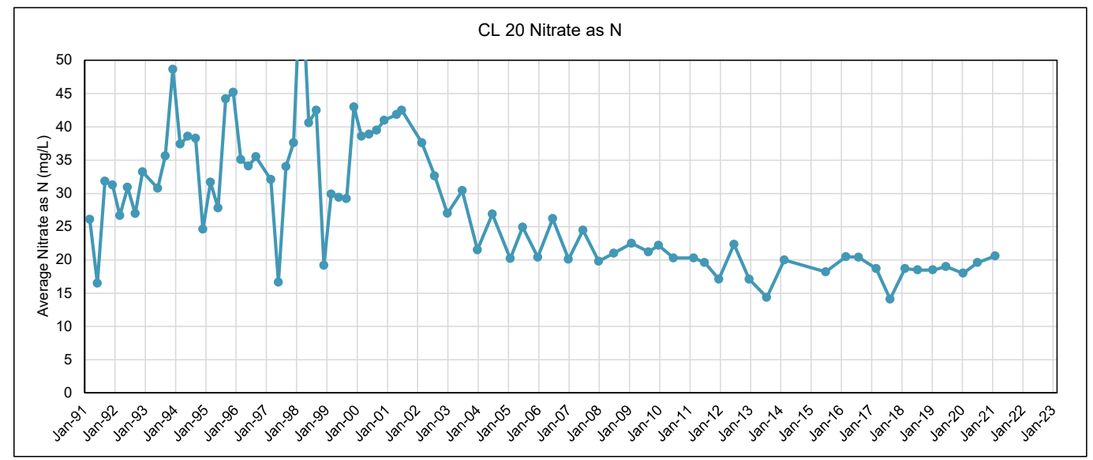
CL 20 Nitrate as N
Average Nitrate as N (mg/L)
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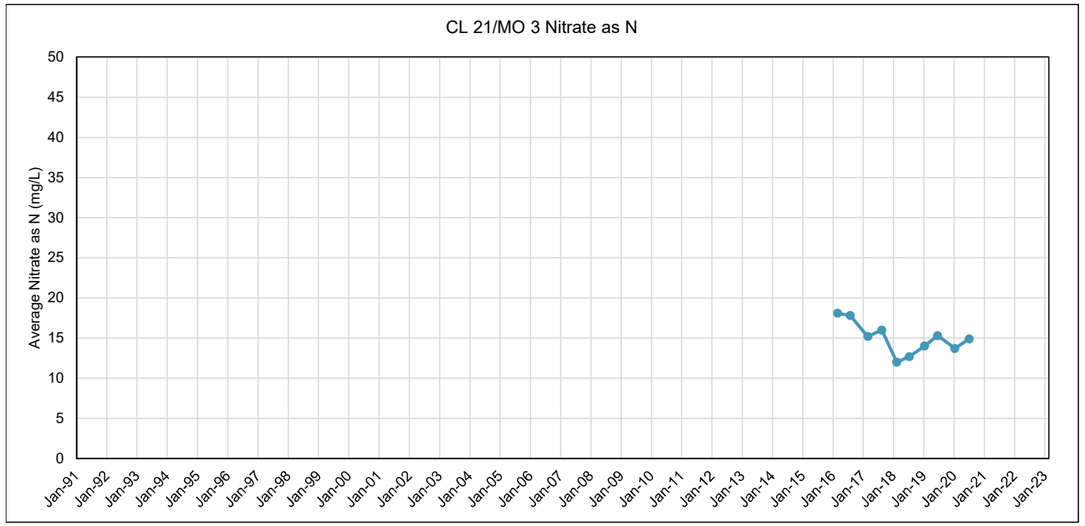
CL 21/MO 3 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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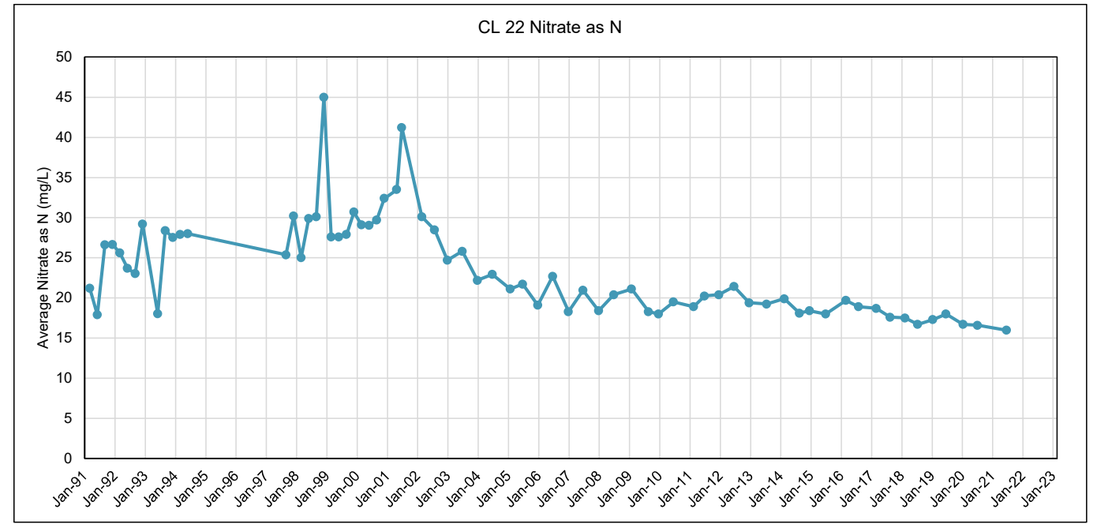
CL 22 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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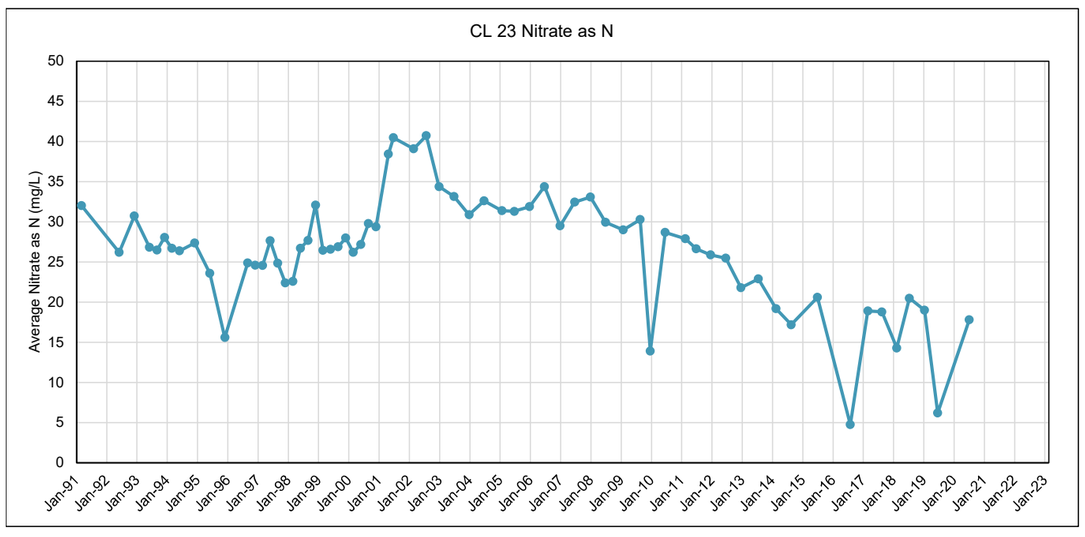
CL 23 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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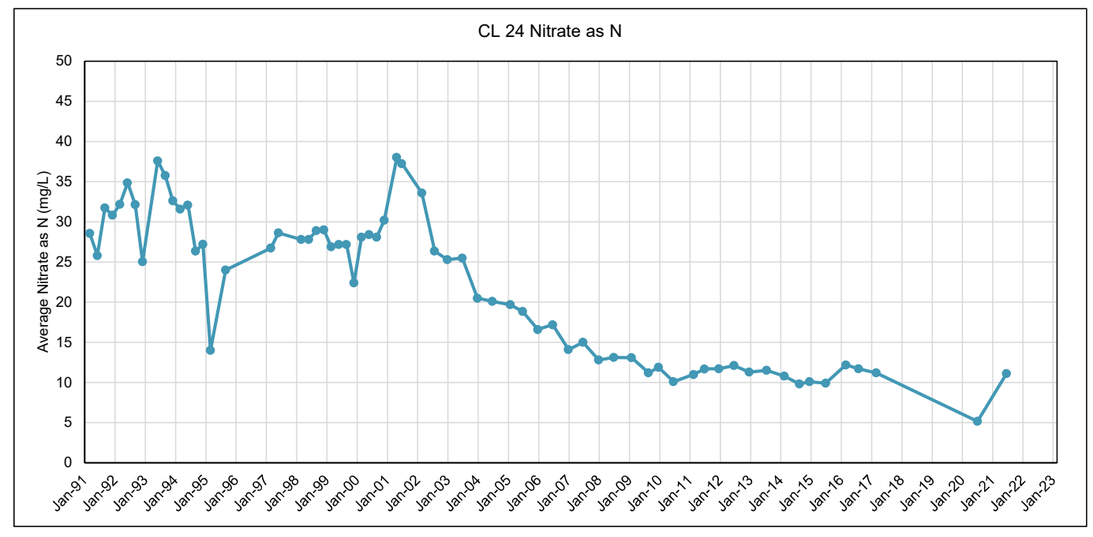
CL 24 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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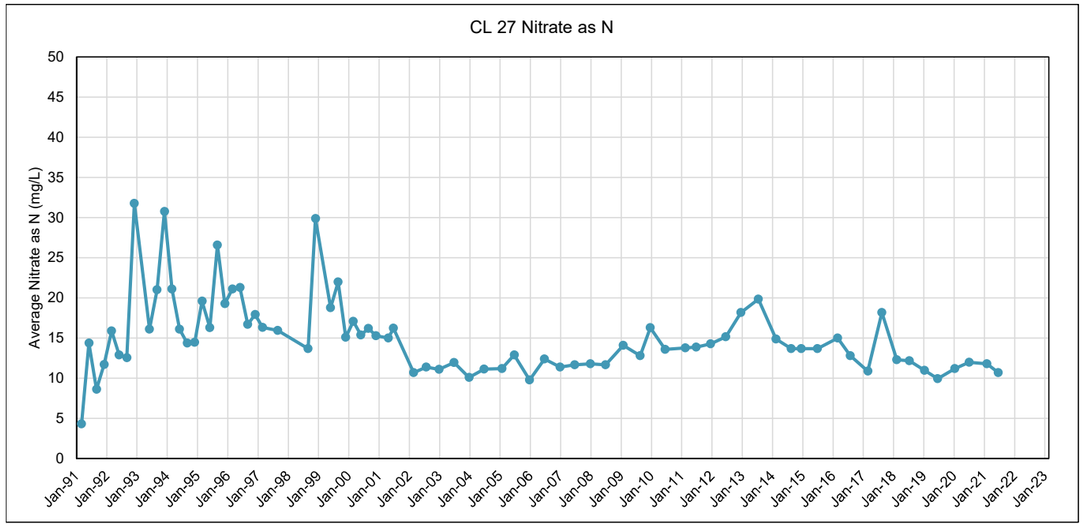
CL 27 Nitrate as N
Average Nitrate as N (mg/L)
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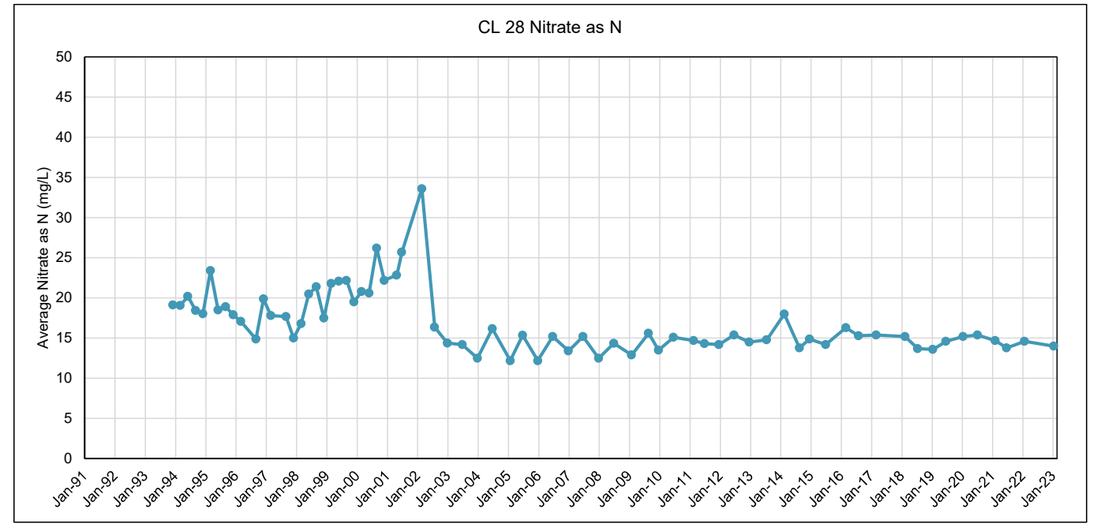
CL 28 Nitrate as N
Average Nitrate as N (mg/L)
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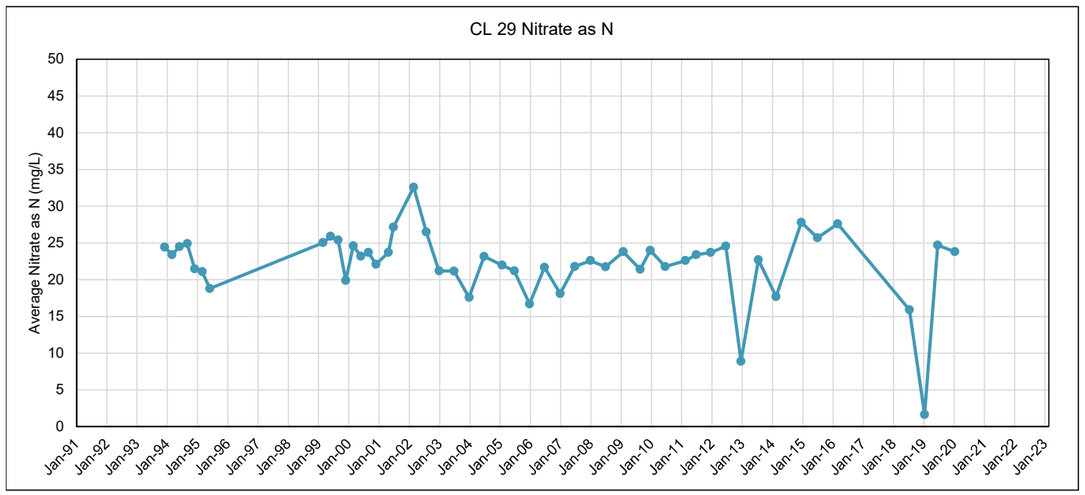
CL 29 Nitrate as N
Average Nitrate as N (mg/L)
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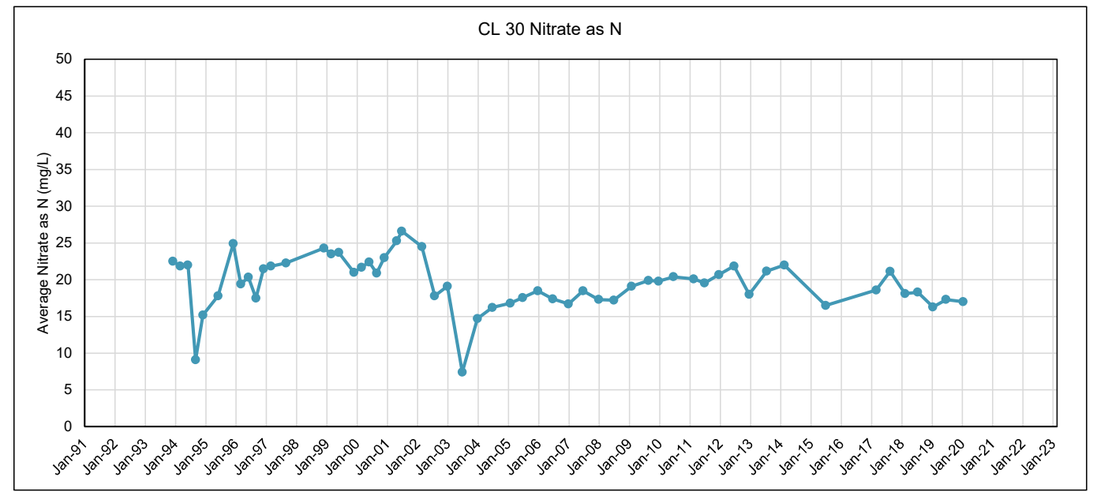
CL 30 Nitrate as N
Average Nitrate as N (mg/L)
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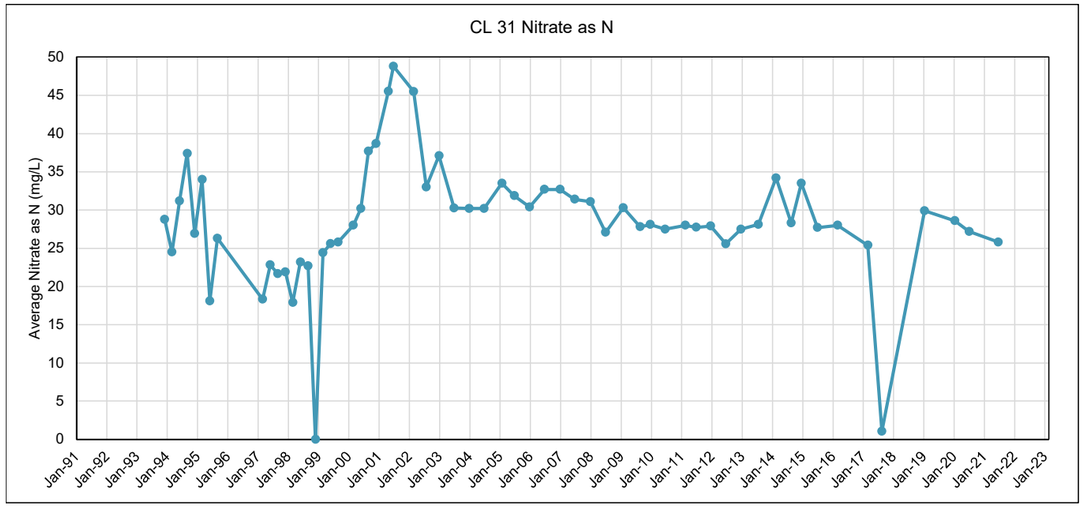
CL 31 Nitrate as N
Average Nitrate as N (mg/L)
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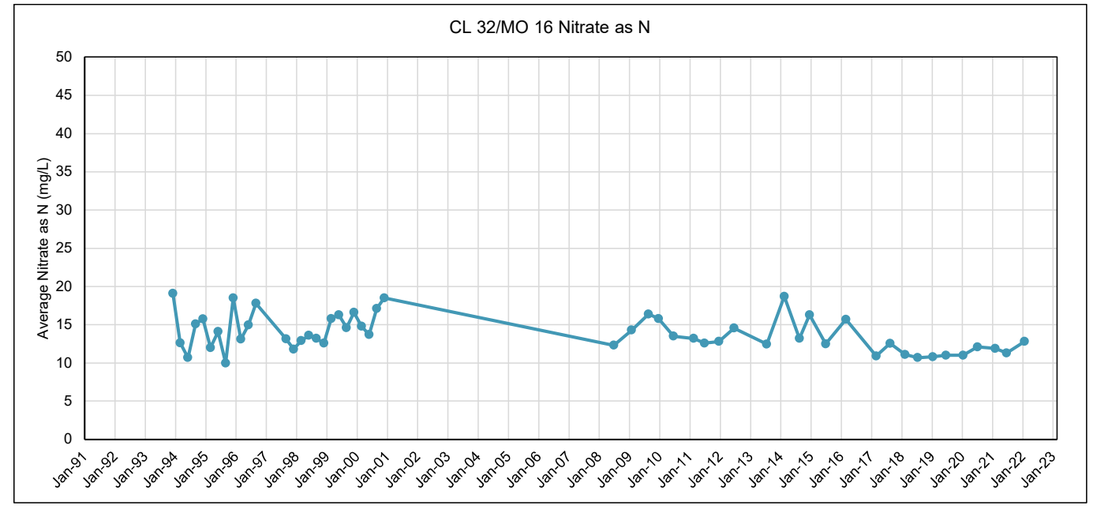
CL 32/MO 16 Nitrate as N
Average Nitrate as N (mg/L)
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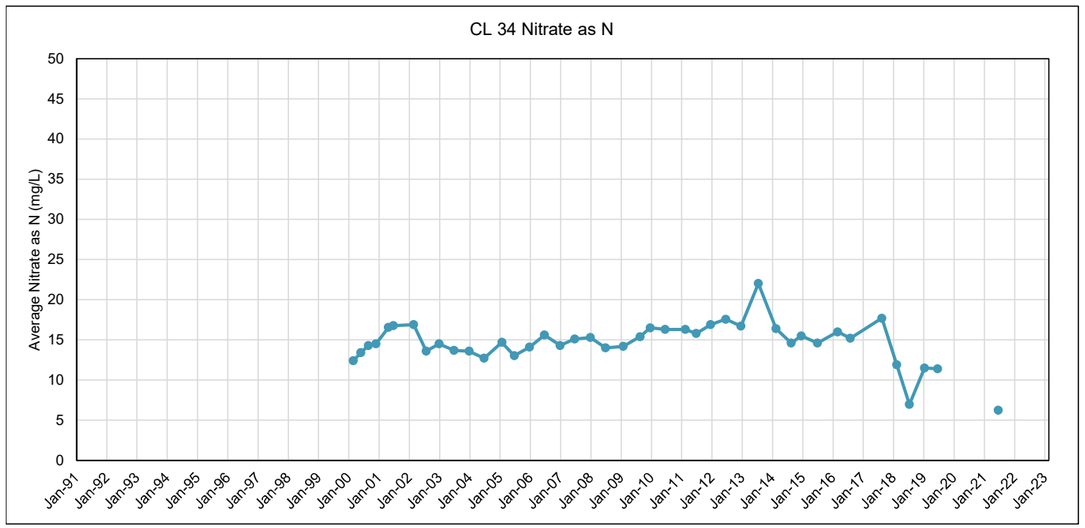
CL 34 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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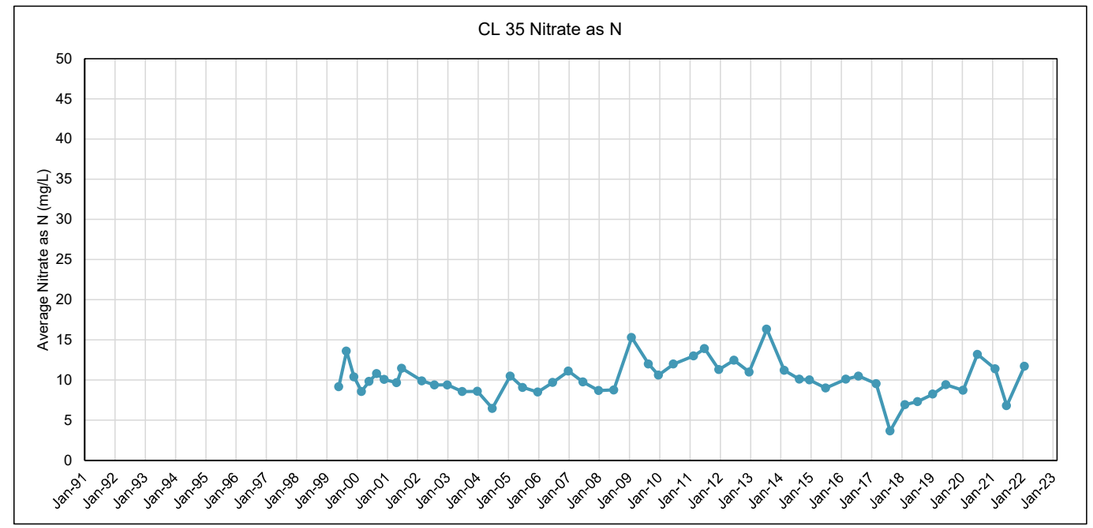
CL 35 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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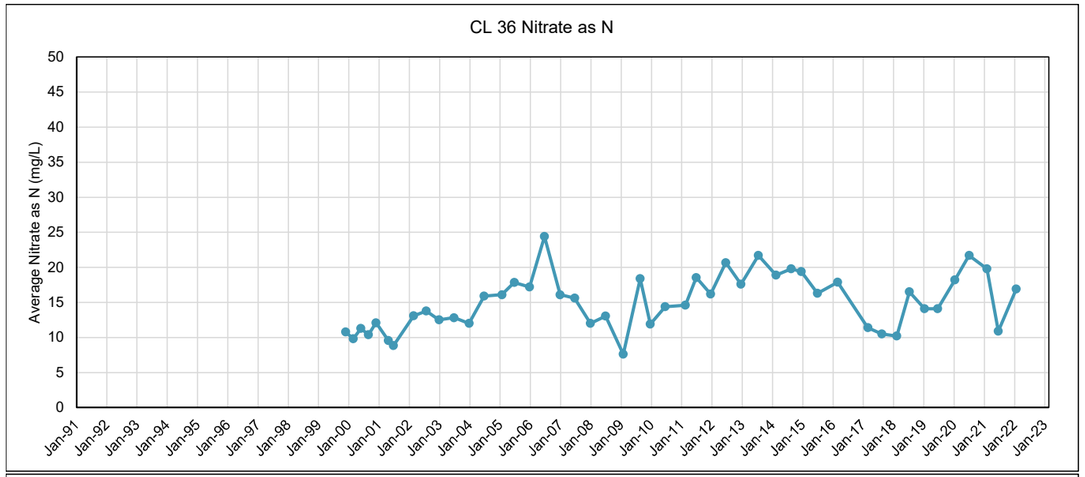
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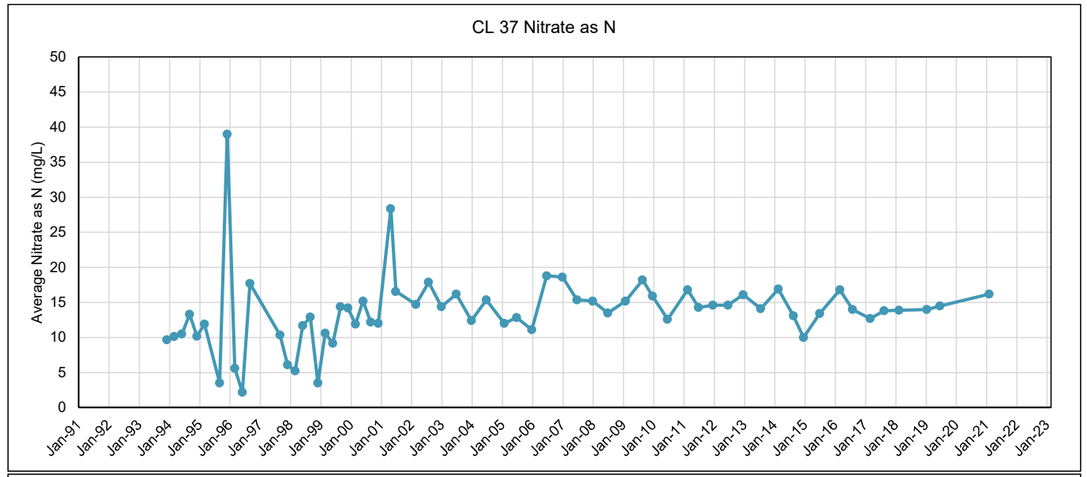
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Average Nitrate as N (mg/L)
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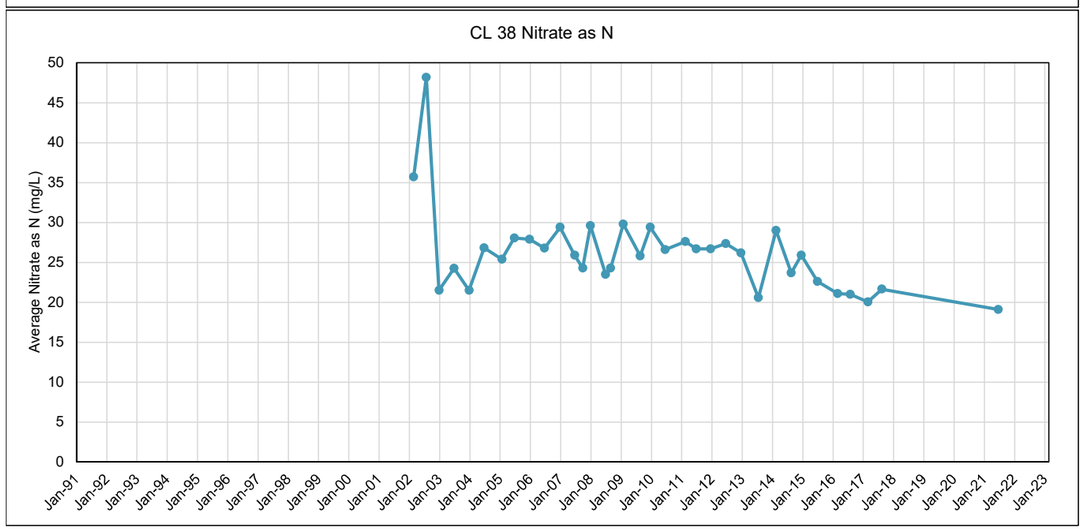
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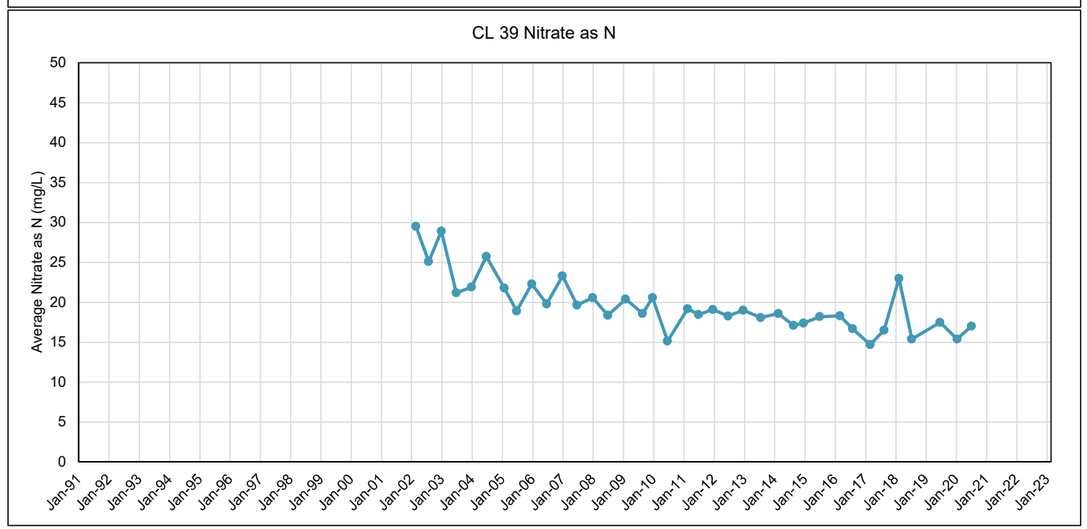
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Average Nitrate as N (mg/L)
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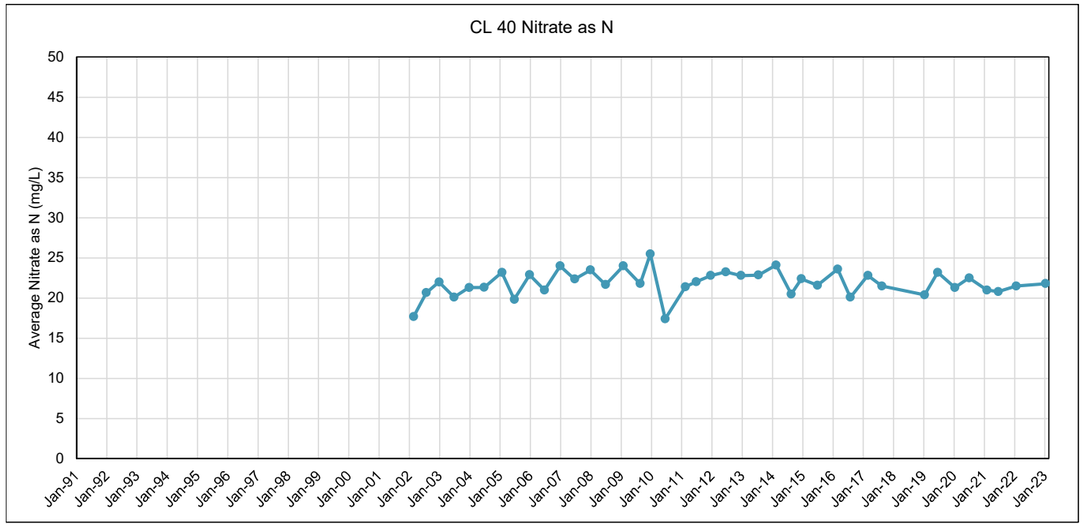
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Average Nitrate as N (mg/L)
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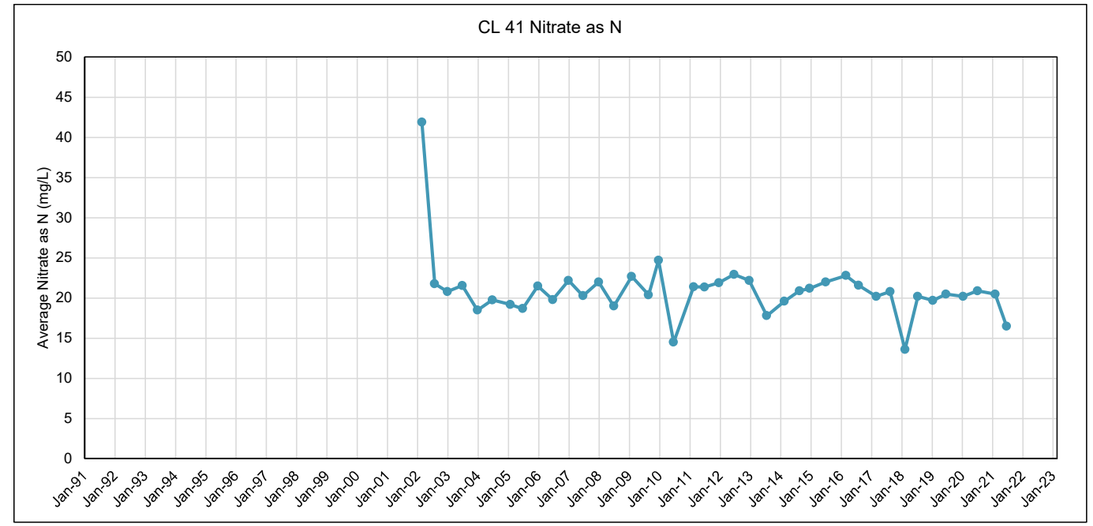
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Average Nitrate as N (mg/L)
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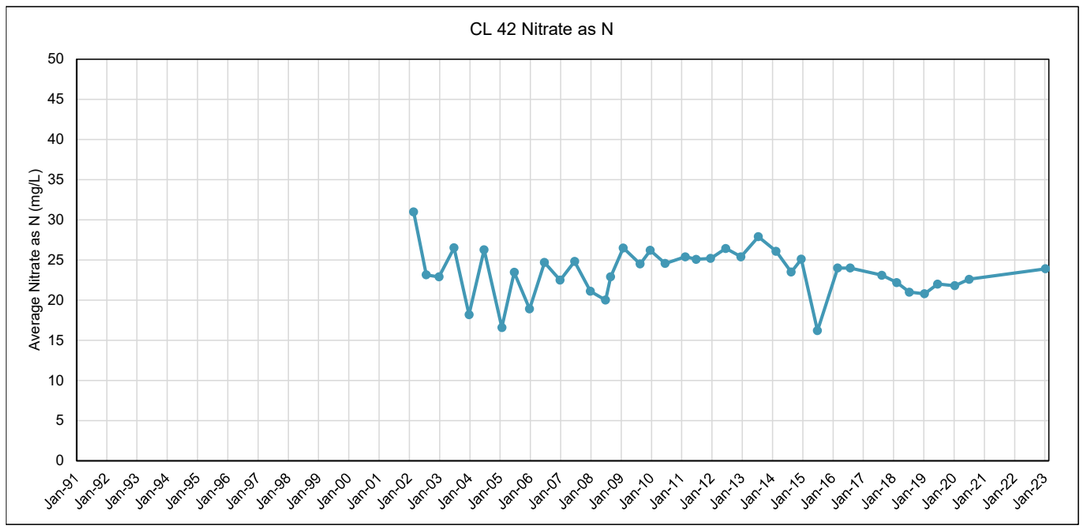
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Average Nitrate as N (mg/L)
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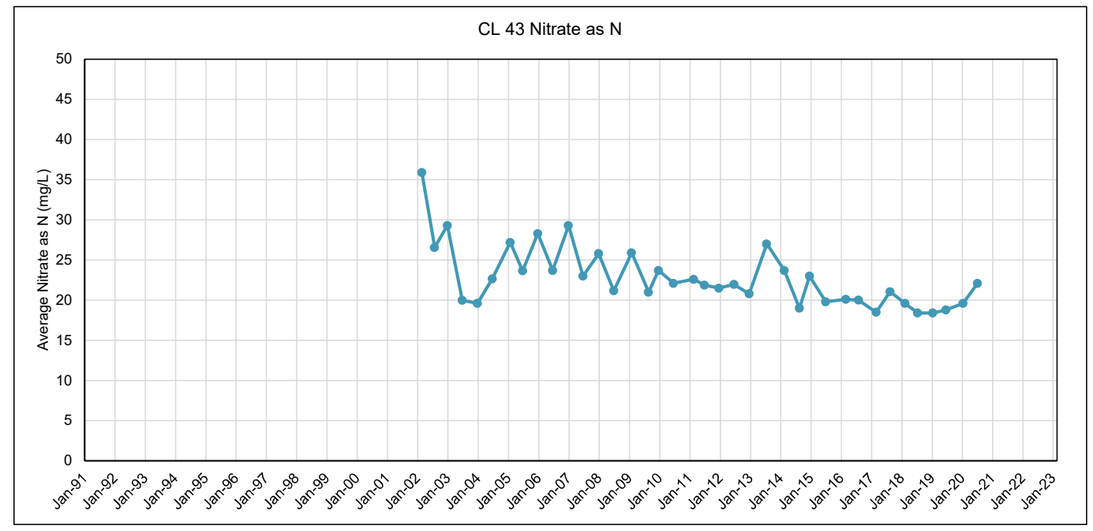
CL 43 Nitrate as N
Average Nitrate as N (mg/L)
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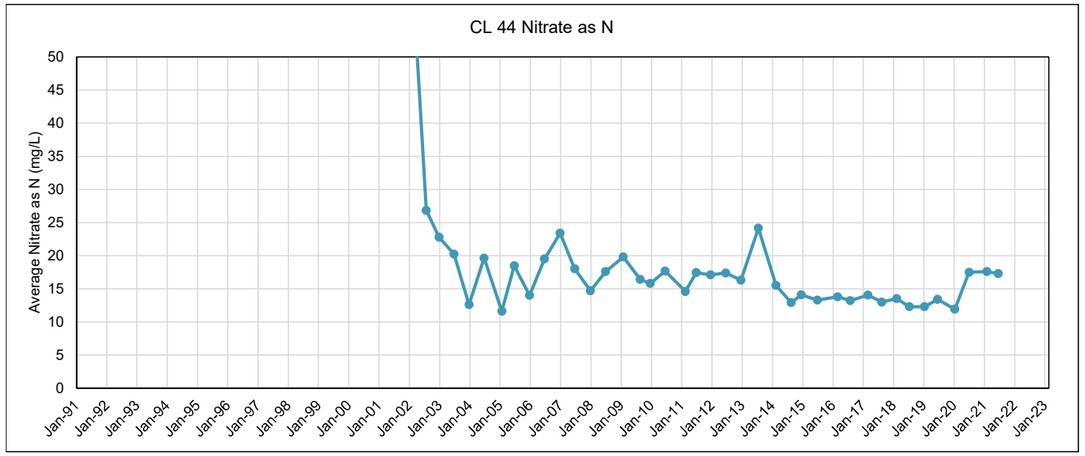
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Average Nitrate as N (mg/L)
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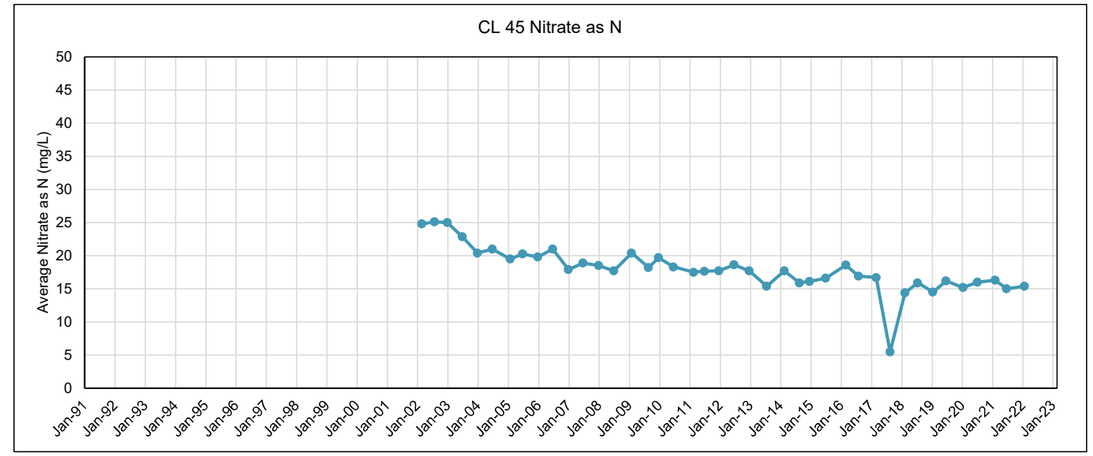
CL 45 Nitrate as N
Average Nitrate as N (mg/L)
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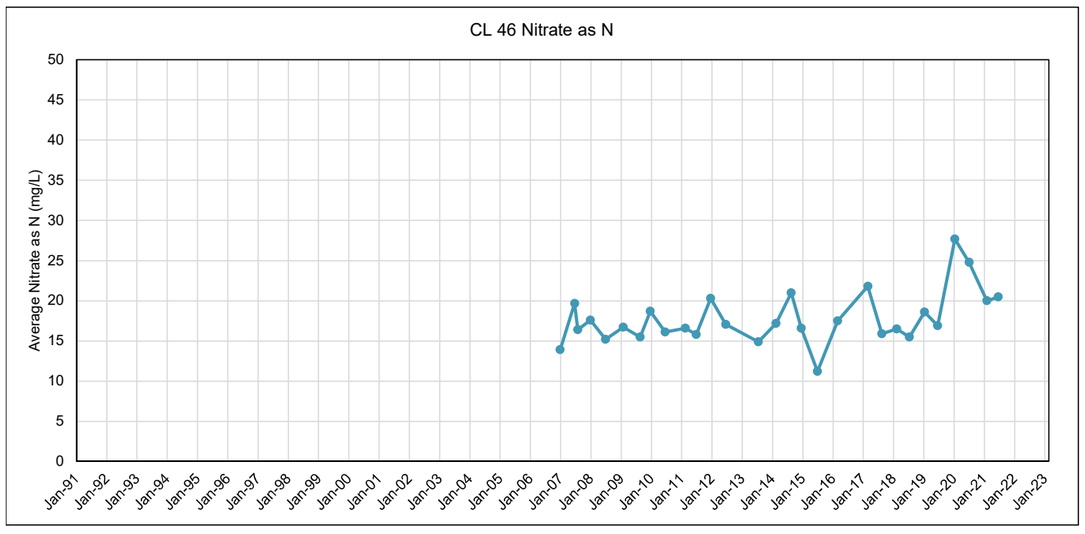
CL 46 Nitrate as N
Average Nitrate as N (mg/L)
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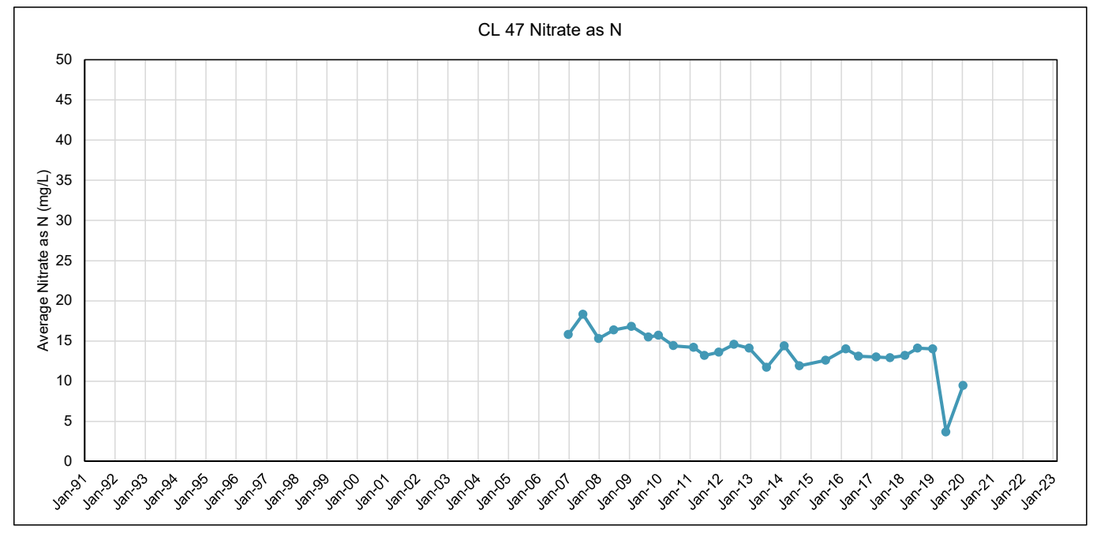
CL 47 Nitrate as N
Average Nitrate as N (mg/L)
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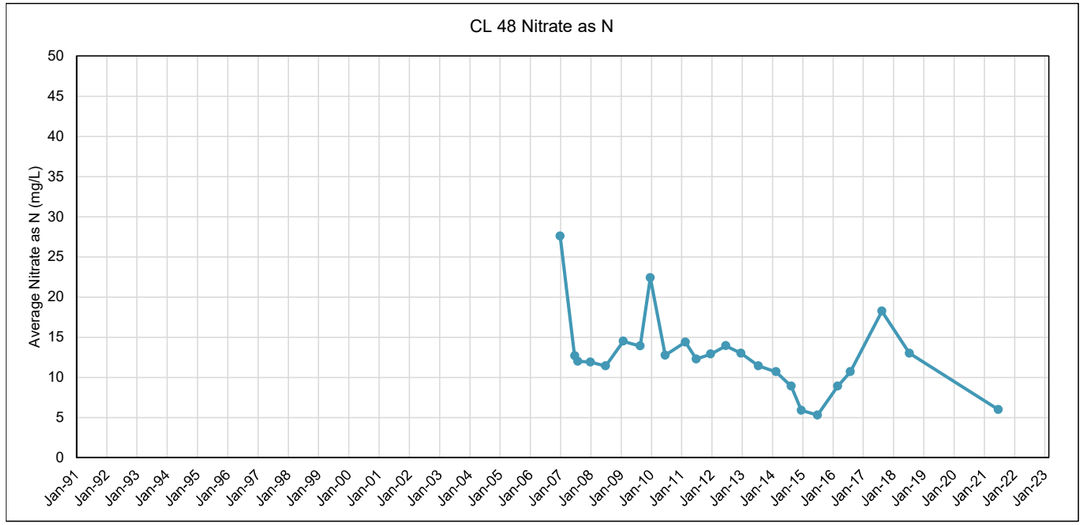
CL 48 Nitrate as N
Average Nitrate as N (mg/L)
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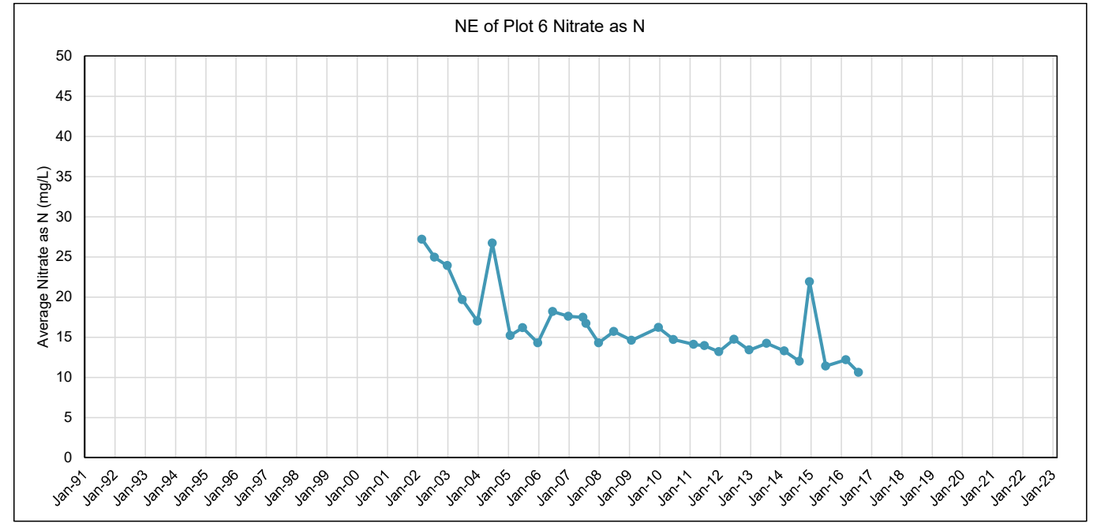
NE of Plot 6 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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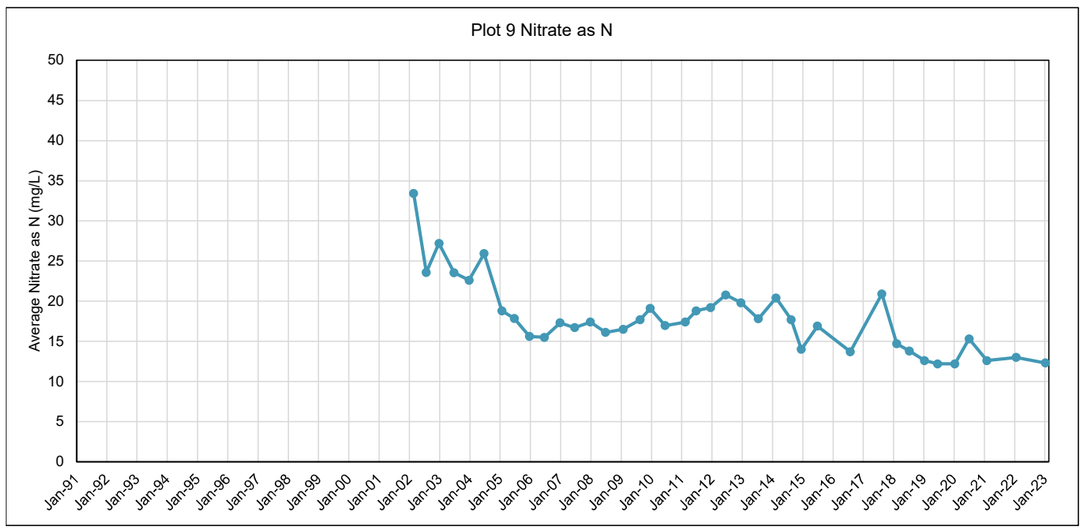
Plot 9 Nitrate as N
Average Nitrate as N (mg/L)
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Jan-91
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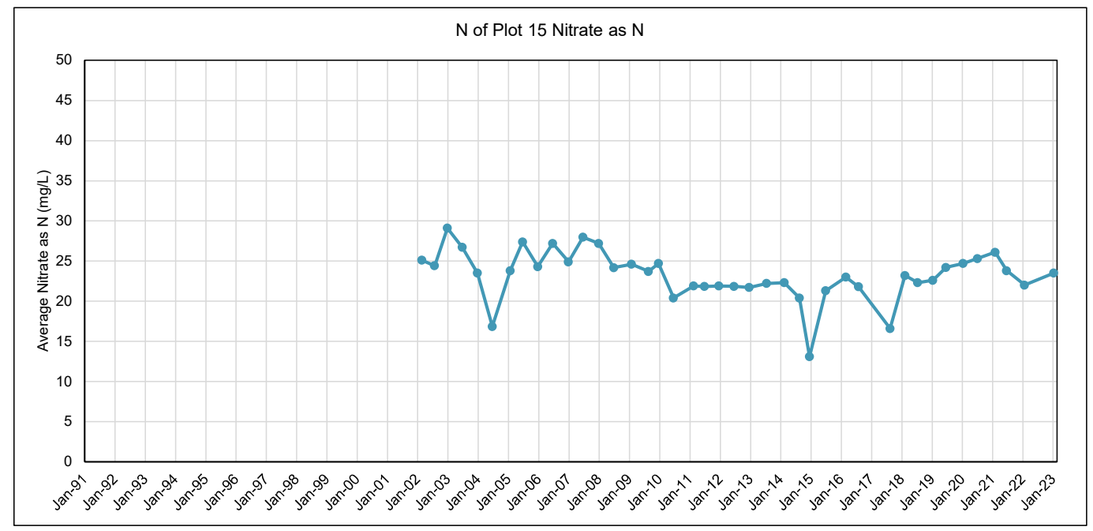
N of Plot 15 Nitrate as N
Average Nitrate as N (mg/L)
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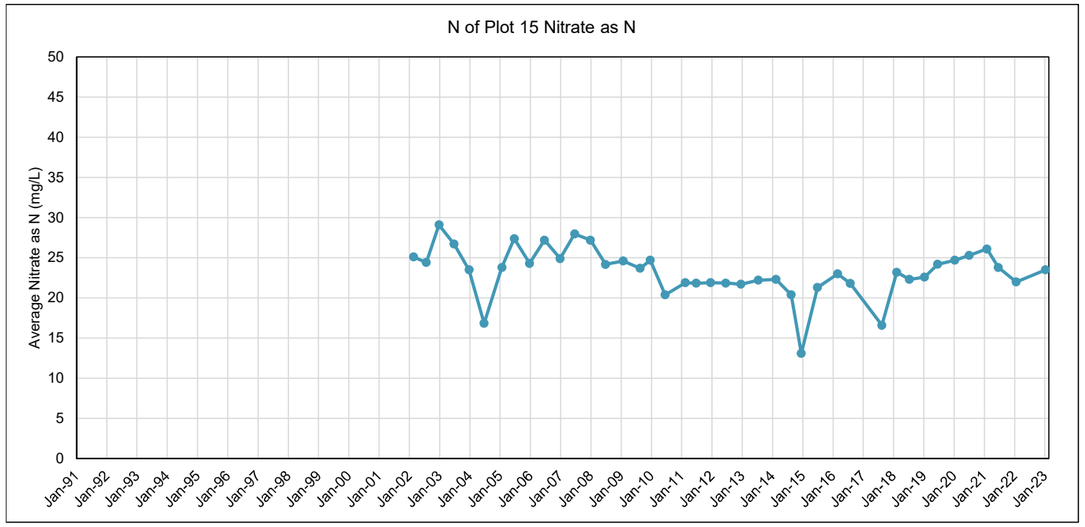
N of Plot 15 Nitrate as N
Average Nitrate as N (mg/L)
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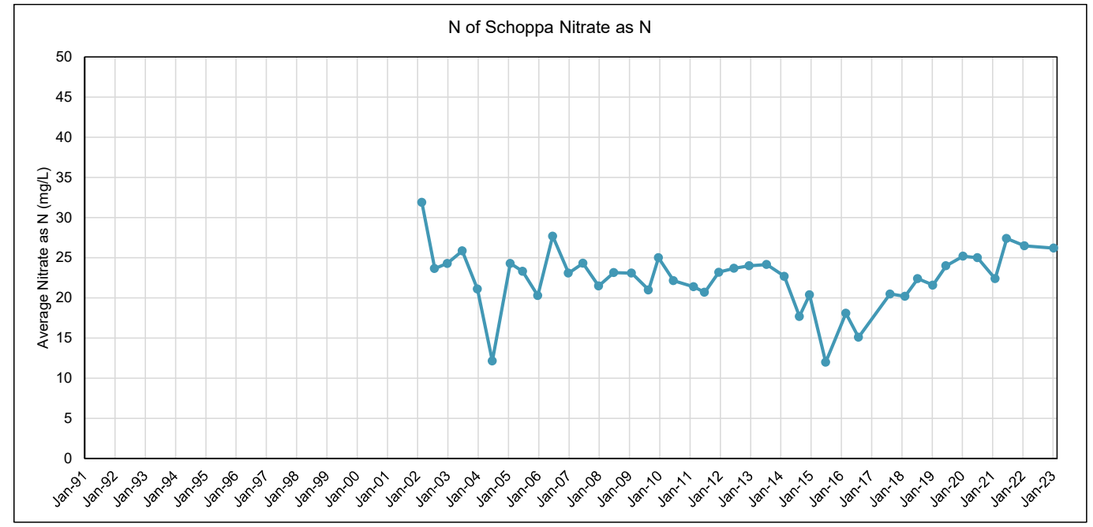
N of Schoppa Nitrate as N
Average Nitrate as N (mg/L)
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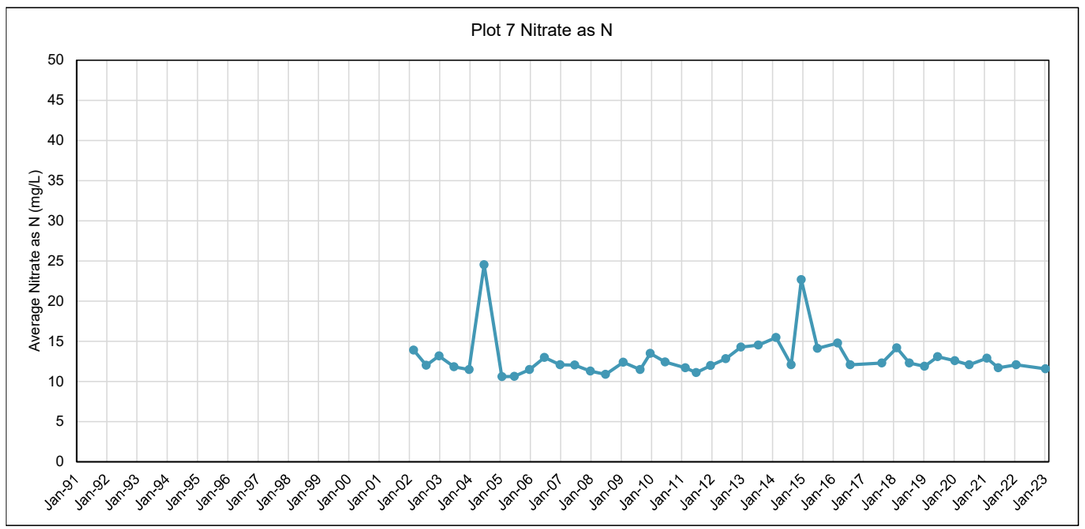
Plot 7 Nitrate as N
Average Nitrate as N (mg/L)
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Data Tables for Section 5 – Groundwater Volumes Routed to Other Locations

LLAS Groundwater Production to Booster Pump and Estimated Volume Discharged to Jim Bertram Lake System, Berl Huffman, and Cemetery

	Reported Canyon Lakes Groundwater Production to Booster Pump (Booster Pump Flow) (Million Gallons)	Estimated Discharge Volume to Jim Bertram Lake System (JBLS) (By Difference) (Million Gallons)	Reported Discharge Volume to Berl Huffman Athletic Complex (Million Gallons)	Reported Discharge Volume to Cemetery (Million Gallons)	Canyon Lakes Groundwater Production to Booster Pump (Booster Pump Flow) (Avg MGD)	Canyon Lakes Groundwater Production to Booster Pump (Booster Pump Flow) (Avg GPM)	Nitrate-N Concentration in Ground Storage Tank (mg/L)	Total Calculated Mass of Nitrate-N Recovered (lbs)
Jan-18	34.310	34.310	0.00	0.00	1.1068	769	15.1	4,321
Feb-18	40.339	40.339	0.00	0.00	1.4407	1,000	17.1	5,753
Mar-18	50.507	47.358	0.00	3.149	1.6293	1,131	17.1	7,203
Apr-18	55.091	51.103	0.00	3.988	1.8364	1,275	18.4	8,454
May-18	53.400	39.445	0.00	13.955	1.7226	1,196	18	8,016
Jun-18	60.591	45.447	0.00	15.144	2.0197	1,403	17.7	8,944
Jul-18	63.424	56.785	0.00	6.639	2.0459	1,421	16.2	8,569
Aug-18	43.167	33.522	0.00	9.645	1.3925	967	16.4	5,904
Sep-18	49.35 (Estimated)	44.128	0.00	5.222	1.645	1,142	17	6,997
Oct-18	27.26 (Estimated)	27.260	0.00	0.00	0.8794	611	17.9	4,070
Nov-18	19.191 (Inflow Meter)	19.191	0.00	0.00	0.6397	444	17.5	2,801
Dec-18	29.21 (Inflow Meter)	29.210	0.00	0.00	0.9423	654	17	4,141
2018 Totals	**400.8**	**468.1**	**0.00**	**57.7**	**1.44**	**1001**	**17.12**	**75,173**
Jan-19	27.569	27.600	0.00	0.00	0.89	618	17.5	4,031
Feb-19	24.448	24.5	0.00	0.00	0.84	586	17.3	3,537
Mar-19	27.405	27.4	0.00	0	0.88	614	15.8	3,613
Apr-19	19.666	9.8	0.00	9.83	0.66	455	15.7	2,572
May-19	16.581	11.1	0.00	8.29	0.53	371	17.6	2,848
Jun-19	29.967	15	0.00	14.98	1.00	694	16	4,003
Jul-19	36.795	18.4	0.00	14.16	1.05	729	17.1	4,646
Aug-19	45.331	22.7	0.00	15.33	1.23	851	16.8	5,332
Sep-19	17.858	17.9	0.00	14.13	1.07	741	17	4,544
Oct-19	30.365	30.400	0.00	0.00	0.98	680	17.2	4,363
Nov-19	28.299	26.3	0.00	0.00	0.88	609	17.5	3,841
Dec-19	18.449	18.400	0.00	0.00	0.6	413	18.1	2,779
2019 Totals	**322.7**	**249.5**	**0.00**	**76.7**	**0.884**	**613**	**16.97**	**46,108**
Jan-20	12.350	12.350	0.00	0.00	0.398	277	17	1,752
Feb-20	21.698	21.698	0.00	0.00	0.775	538	16.8	3,042
Mar-20	36.148	32.712	0.00	3.436	1.055	733	17	5,616
Apr-20	39.794	33.162	0.00	3.316	1.105	768	15.7	5,648
May-20	45.425	37.854	0.00	3.785	1.221	848	18.5	7,597
Jun-20	42.832	35.694	0.00	3.570	1.190	826	17.7	6,854
Jul-20	32.972	27.477	0.00	2.725	0.886	616	17.1	5,094

LLAS Groundwater Production to Booster Pump and Estimated Volume Discharged to Jim Bertram Lake System, Berl Huffman, and Cemetery

	Reported Canyon Lakes Groundwater Production to Booster Pump (Booster Pump Flow) (Million Gallons)	Estimated Discharge Volume to Jim Bertram Lake System (JBLS) (By Difference) (Million Gallons)	Reported Discharge Volume to Berl Huffman Athletic Complex (Million Gallons)	Reported Discharge Volume to Cemetery (Million Gallons)	Canyon Lakes Groundwater Production to Booster Pump (Booster Pump Flow) (Avg MGD)	Canyon Lakes Groundwater Production to Booster Pump (Booster Pump Flow) (Avg GPM)	Nitrate-N Concentration in Ground Storage Tank (mg/L)	Total Calculated Mass of Nitrate-N Recovered (lbs)
Aug-20	39.889	33.241	0.00	3.324	1.072	745	18.9	6,816
Sep-20	25.280	24.673	0.00	2.467	0.822	571	18.1	4,191
Oct-20	27.418	25.584	0.00	1.834	0.825	573	18.3	4,467
Nov-20	20.722	19.112	0.00	1.700	0.637	442	18.4	3,443
Dec-20	31.198	30.649	0.00	0.548	0.989	687	19.6	5,192
2020 Totals	**375.7**	**334.2**	**0.00**	**26.71**	**0.915**	**635**	**17.76**	**59,712**
Jan-21	21.153	20.466	0.00	0.00	0.682	474	20	3,530
Feb-21	17.828	11.343	0.00	0.00	0.637	442	**19.2**	2,856
Mar-21	22.788	22.283	0.00	0.00	0.735	510	17.7	3,366
Apr-21	26.916	26.198	0.00	0.495	0.897	623	16.7	3,820
May-21	21.984	19.786	0.00	0.879	0.709	492	18.1	3,453
Jun-21	22.457	18.992	0.00	0.948	0.749	520	21.1	4,121
Jul-21	31.111	30.366	0.00	0.263	1.004	697	16	4,189
Aug-21	19.866	17.125	0.00	1.068	0.641	445	13	2,271
Sep-21	23.628	23.628	0.00	0.000	0.788	547	19.6	3,865
Oct-21	25.880	25.846	0.00	0.000	0.835	580	15.9	3,434
Nov-21	26.386	26.438	0.00	0.000	0.880	611	19.9	4,382
Dec-21	23.145	23.145	0.00	0.000	0.747	519	18.6	3,593
2021 Totals	**283.1**	**265.6**	**0.00**	**3.7**	**0.775**	**538**	**18.0**	**42,880**
Jan-22	16.629	16.631	0.00	0.000	0.536	372	17.7	2,456
Feb-22	20.993	20.879	0.00	0.000	0.750	521	17.7	3,101
Mar-22	22.360	21.260	0.000	0.000	0.721	501	18.1	3,377
Apr-22	24.617	24.085	3.450	0.000	0.821	570	18.2	4,263
May-22	17.975	16.926	4.190	0.334	0.580	403	18.25	3,426
Jun-22	19.150	19.150	4.488	0.000	0.638	443	18.3	3,610
Jul-22	17.056	16.976	8.130	0.000	0.550	382	18.8	3,951
Aug-22	22.170	21.647	7.130	0.000	0.715	497	18.7	4,572
Sep-22	22.824	22.314	5.452	0.000	0.761	528	17.8	4,200
Oct-22	27.477	26.735	1.806	0.000	0.886	616	16.6	4,056
Nov-22	28.930	27.194	0.092	0.000	0.964	670	16.8	4,069
Dec-22	24.597	23.843	0.257	0.000	0.793	551	15.3	3,173
2022 Totals	**264.8**	**257.6**	**35.0**	**0.3**	**0.726**	**504**	**17.7**	**44,256**
Jan-23	19.613	18.810	0.592	0.000	0.633	439	18.1	3,052
Feb-23	19.985	18.909	1.299	0.000	0.666	463	18	3,197
Mar-23	23.201	21.463	4.777	0.000	0.748	520	20.8	4,856
Apr-23	14.966	13.968	4.220	0.153	0.499	346	17.5	2,824

E

Data Tables for Section 7 – Alterations to Plans based on Models

Plot	Acres	2000	2001	2002	2003	2004	2005	2006	2007	2008
L1	96	130,739,000	37,120,000	109,704,400	109,698,000	68,903,000	85,419,000	65,502,000	61,483,800	64,184,200
L2	114	180,064,100	133,080,100	125,022,000	132,244,600	100,356,700	84,703,700	87,595,200	96,809,200	84,380,300
L3	115	176,653,000	131,877,000	103,152,600	127,961,600	95,114,200	93,971,800	80,897,200	117,140,600	82,933,000
L4	116	180,529,000	169,282,000	112,797,300	129,489,400	90,145,500	95,123,700	84,729,900	95,353,700	96,154,500
L5	40	34,382,000	12,494,000	42,425,000	42,521,000	29,531,000	34,424,000	21,679,000	41,911,700	40,053,000
L6	111	164,648,000	159,775,000	102,664,000	120,392,000	98,767,000	93,042,900	105,061,700	80,139,800	85,664,300
L7	113	168,425,000	129,542,000	137,954,000	122,807,000	100,968,000	94,714,000	88,848,000	117,166,200	91,535,000
L8	94	154,009,600	138,688,500	86,458,300	92,985,400	83,797,800	79,579,000	68,567,000	87,778,000	83,469,000
L9	119	140,494,000	133,798,400	128,486,000	123,259,000	109,464,000	96,322,000	86,998,000	74,877,000	80,780,000
L10	40	30,825,000	51,732,600	40,695,700	41,063,300	29,314,800	37,129,300	30,763,300	32,743,900	28,987,900
L13	184	207,591,100	232,022,700	181,493,600	179,801,500	136,041,900	135,041,900	101,155,500	141,200,000	120,103,300
L15	152	81,812,000	77,663,700	71,020,800	91,486,700	75,709,700	105,224,600	132,608,700	134,373,400	144,281,900
L16	114	140,846,000	132,687,000	115,148,600	131,211,800	101,428,300	88,191,000	75,920,300	85,606,000	74,896,700
L17	107	131,325,000	141,212,000	120,087,000	122,670,000	102,065,600	97,001,000	85,981,400	65,908,200	78,976,800
L18	81	120,974,600	101,044,500	91,030,500	95,233,300	65,602,400	72,093,100	62,693,700	81,778,400	67,002,700
L19	179	216,275,500	226,969,000	186,388,300	209,679,800	136,577,500	156,811,000	132,902,400	121,699,500	115,997,000
L20	24	29,428,900	25,864,300	20,702,900	25,516,100	19,341,500	21,671,500	12,107,600	11,316,400	22,746,100
L21	39	45,187,400	49,559,400	36,251,500	44,458,900	33,573,200	33,213,500	20,175,800	21,673,900	34,340,000
L22	189	210,503,800	221,561,800	147,963,900	185,161,400	90,036,400	78,787,000	82,281,500	99,580,200	152,597,000
L23	77	116,485,000	85,389,000	84,766,700	91,216,700	69,386,000	58,978,000	49,618,000	38,148,000	80,231,000
L24	139	206,726,500	141,674,100	127,697,300	125,981,700	63,777,000	63,646,700	82,839,400	75,755,000	112,569,500
L25	105	165,947,100	32,447,600	94,494,700	7,833,500	0	0	0	53,249,600	95,660,800
L26	89	140,447,300	125,766,800	80,350,000	102,854,000	85,477,300	85,590,000	56,284,100	45,537,200	65,241,000
L27	71	126,324,000	32,911,300	72,366,600	5,049,500	0	0	0	35,092,500	61,103,000
L28	43	--	--	--	--	--	--	--	--	--
L34A	41	28,409,500	51,417,600	18,254,100	32,991,100	17,314,400	23,259,200	9,680,200	32,349,600	34,729,100
L34B	45	24,910,900	46,507,200	26,660,700	37,328,500	21,729,200	30,241,500	17,389,700	25,113,900	43,062,500
L34C	21	24,020,725	20,503,200	21,565,300	20,326,000	14,267,100	15,537,400	11,925,900	16,328,800	15,204,300
L35	44	37,692,300	49,777,900	43,288,800	48,376,800	35,040,900	39,756,100	26,778,800	44,198,600	43,771,900
L47	16	30,902,200	10,093,600	10,109,100	0	0	0	0	0	0
LLAS Total	2,659	3,446,578,525	2,902,462,300	2,538,999,700	2,599,598,600	1,873,730,400	1,899,472,900	1,680,984,300	1,934,313,100	2,100,655,800
~Gallons effluent applied per acre:										
Contract Plots										
Plot	Acres	2000	2001	2002	2003	2004	2005	2006	2007	2008
A	116	--	--	44,420,200	86,232,600	34,631,500	33,114,000	82,383,500	40,064,900	71,994,900
B	87	--	--	25,383,600	56,620,300	26,819,300	30,980,400	64,957,500	32,775,900	57,304,600
C	50	--	--	20,864,200	27,314,800	14,359,200	16,851,400	23,067,400	5,047,900	16,244,583
D	75	--	--	15,332,800	19,499,000	9,098,000	11,534,900	37,142,900	9,775,000	20,768,500
E	113	--	--	43,732,500	49,353,100	27,272,600	30,030,600	67,258,000	15,188,800	38,398,700
F	150	--	--	20,954,700	34,562,800	23,239,700	26,301,001	39,629,800	25,890,600	62,995,500
G	325	--	--	61,458,200	74,911,600	8,591,300	19,018,700	70,010,342	35,501,046	25,432,300
Contract Total	916	--	--	232,148,202	348,496,203	144,013,604	167,833,006	384,451,448	164,246,153	293,141,091
~Gallons effluent applied per acre:										
Total		2000	2001	2002	2003	2004	2005	2006	2007	2008
LLAS	(L1-L47)	3,446,578,525	2,902,462,300	2,538,999,700	2,599,598,600	1,873,730,400	1,899,472,900	1,680,984,300	1,934,313,100	2,100,655,800
Contract		--	--	232,148,202	348,496,203	144,013,604	167,833,006	384,451,448	164,246,153	293,141,091
TOTAL		--	--	2,771,147,902	2,948,094,803	2,017,744,004	2,067,305,906	2,065,435,748	2,098,559,253	2,393,796,891

* Effluent Applied through May 2023

Plot	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
L1	61,981,000	101,580,300	76,702,500	62,751,500	70,601,200	62,463,800	78,140,600	75,394,700	67,055,800	54,767,400
L2	91,201,000	110,446,000	74,524,000	45,370,000	71,193,000	79,688,800	90,652,800	67,405,000	75,291,900	59,797,200
L3	92,336,000	116,455,000	96,355,000	93,256,000	88,890,000	85,137,000	86,173,600	76,776,500	79,212,700	67,281,700
L4	94,144,900	99,999,700	80,896,500	93,768,600	73,363,400	69,513,800	92,436,900	90,940,200	66,385,300	70,053,500
L5	32,772,000	32,875,000	13,666,000	14,638,200	30,724,900	31,256,100	33,133,800	34,071,900	22,573,600	22,989,400
L6	90,619,300	93,232,700	73,295,100	89,756,500	40,531,700	73,424,100	92,419,800	64,777,400	73,991,200	54,971,300
L7	84,630,000	97,540,000	77,794,000	73,939,000	82,814,000	96,833,000	98,093,000	57,085,000	66,547,000	21,280,000
L8	75,825,000	90,300,000	77,193,000	72,613,000	45,682,000	59,109,100	85,220,800	59,259,300	63,970,400	58,514,800
L9	87,378,000	67,936,000	66,645,000	54,209,500	72,492,200	40,644,700	89,839,600	59,070,400	77,990,300	60,739,300
L10	30,025,600	41,639,700	24,061,300	13,936,600	25,675,200	22,858,900	17,361,800	4,851,300	4,338,800	7,162,200
L13	133,490,500	149,325,300	102,185,600	80,932,513	118,659,260	124,455,999	119,851,885	115,597,860	57,750,028	38,438,000
L15	126,007,100	142,738,200	95,095,300	79,509,700	38,224,500	115,215,553	115,329,154	82,175,413	118,570,500	92,941,900
L16	64,699,400	99,081,500	74,204,900	93,839,000	62,672,500	72,413,900	77,713,100	59,981,800	69,102,500	49,417,200
L17	62,825,000	86,169,200	58,942,600	84,556,900	57,921,500	62,226,800	63,678,630	40,518,180	53,977,700	45,966,500
L18	63,304,500	66,102,100	79,809,000	75,054,800	77,828,800	74,568,500	81,995,100	62,312,900	52,148,700	49,184,600
L19	118,791,000	141,188,000	119,924,100	97,367,400	95,484,400	63,020,640	79,922,500	70,556,800	61,811,000	49,459,800
L20	21,346,200	26,729,600	14,710,300	6,404,800	21,961,800	14,415,500	31,690,400	22,611,600	13,057,000	8,659,700
L21	32,294,400	44,862,200	22,657,900	1,350,900	10,587,000	20,692,800	36,807,800	37,021,400	16,400,800	9,950,100
L22	113,000,000	129,425,000	126,641,000	97,637,000	169,808,000	123,163,000	134,070,400	77,866,200	90,528,000	53,621,600
L23	63,925,000	59,662,000	41,160,000	53,811,000	62,707,600	73,151,000	71,257,600	53,898,700	41,245,500	15,619,000
L24	68,560,300	111,088,250	76,774,350	45,446,700	69,122,400	34,808,000	104,181,550	98,559,300	57,240,400	33,491,700
L25	83,893,200	59,905,700	87,792,600	82,026,300	89,727,000	82,152,000	93,864,000	51,305,000	43,259,900	46,798,000
L26	66,571,200	70,096,000	67,099,800	62,002,500	65,049,200	64,359,300	79,384,600	50,860,500	36,078,100	28,668,300
L27	53,137,300	41,851,800	63,039,000	58,158,500	60,298,500	66,082,700	62,255,800	36,208,500	32,132,600	32,328,800
L28	--	--	15,791,100	--	--	--	14,259,500	2,587,900	--	--
L34A	30,692,000	20,071,000	14,756,900	4,801,000	31,015,800	17,034,000	27,629,000	38,624,000	14,985,000	24,199,000
L34B	30,789,500	43,200,700	27,155,700	21,874,700	31,850,200	43,404,300	29,102,200	37,557,800	9,479,400	20,295,400
L34C	9,345,300	15,470,900	13,876,000	5,778,200	16,437,500	21,004,000	14,207,600	20,179,600	8,666,700	4,455,500
L35	30,947,500	40,507,300	14,693,900	16,499,900	36,260,910	44,987,400	39,594,600	33,178,700	23,653,500	24,783,000
L47	0	0	0	0	0	0	--	--	--	--
LLAS Total	1,914,532,200	2,199,479,150	1,777,442,450	1,581,290,713	1,717,584,470	1,738,084,692	2,040,268,119	1,581,233,853	1,397,444,328	1,105,834,900
~Gallons effluent applied per acre:				594,694	645,951	653,661	767,307	594,672	525,553	415,884
Contract Plots										
Plot	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
A	78,672,000	48,027,800	74,590,942	65,757,300	67,896,500	60,931,600	42,748,900	61,996,000	22,725,200	65,296,200
B	74,380,800	40,862,900	94,584,390	31,539,000	50,816,300	28,837,900	29,932,979	34,358,200	14,427,000	40,606,300
C	18,371,600	16,156,500	28,898,542	24,710,900	25,840,100	29,457,100	4,038,721	20,777,600	3,704,900	21,298,000
D	28,258,500	21,700,000	47,066,303	37,834,400	31,712,400	34,578,900	12,750,500	27,625,300	8,353,000	29,523,900
E	47,431,500	38,666,400	73,773,955	67,057,600	51,531,400	51,142,100	21,692,200	34,285,400	21,803,700	46,051,900
F	56,935,800	24,135,500	25,351,839	28,368,400	23,751,700	17,229,500	1,922,300	20,481,200	8,508,000	21,203,900
G	58,081,600	52,196,200	159,228,364	85,165,089	62,693,780	74,284,800	33,280,700	2,119,900	77,697,100	34,065,100
Contract Total	362,133,809	241,747,310	503,496,346	340,434,701	314,244,193	296,463,914	146,368,315	201,645,616	157,220,917	258,045,300
~Gallons effluent applied per acre:				371,654	343,061	323,651	159,791	220,137	171,639	281,709
Total	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
LLAS	1,914,532,200	2,199,479,150	1,777,442,450	1,581,290,713	1,717,584,470	1,738,084,692	2,040,268,119	1,581,233,853	1,397,444,328	1,105,834,900
Contract	362,133,809	241,747,310	503,496,346	340,434,701	314,244,193	296,463,914	146,368,315	201,645,616	157,220,917	258,045,300
TOTAL	2,276,666,009	2,441,226,460	2,280,938,796	1,921,725,414	2,031,828,663	2,034,548,606	2,186,636,434	1,782,879,469	1,554,665,245	1,363,880,200

* Effluent Applied through May 2023

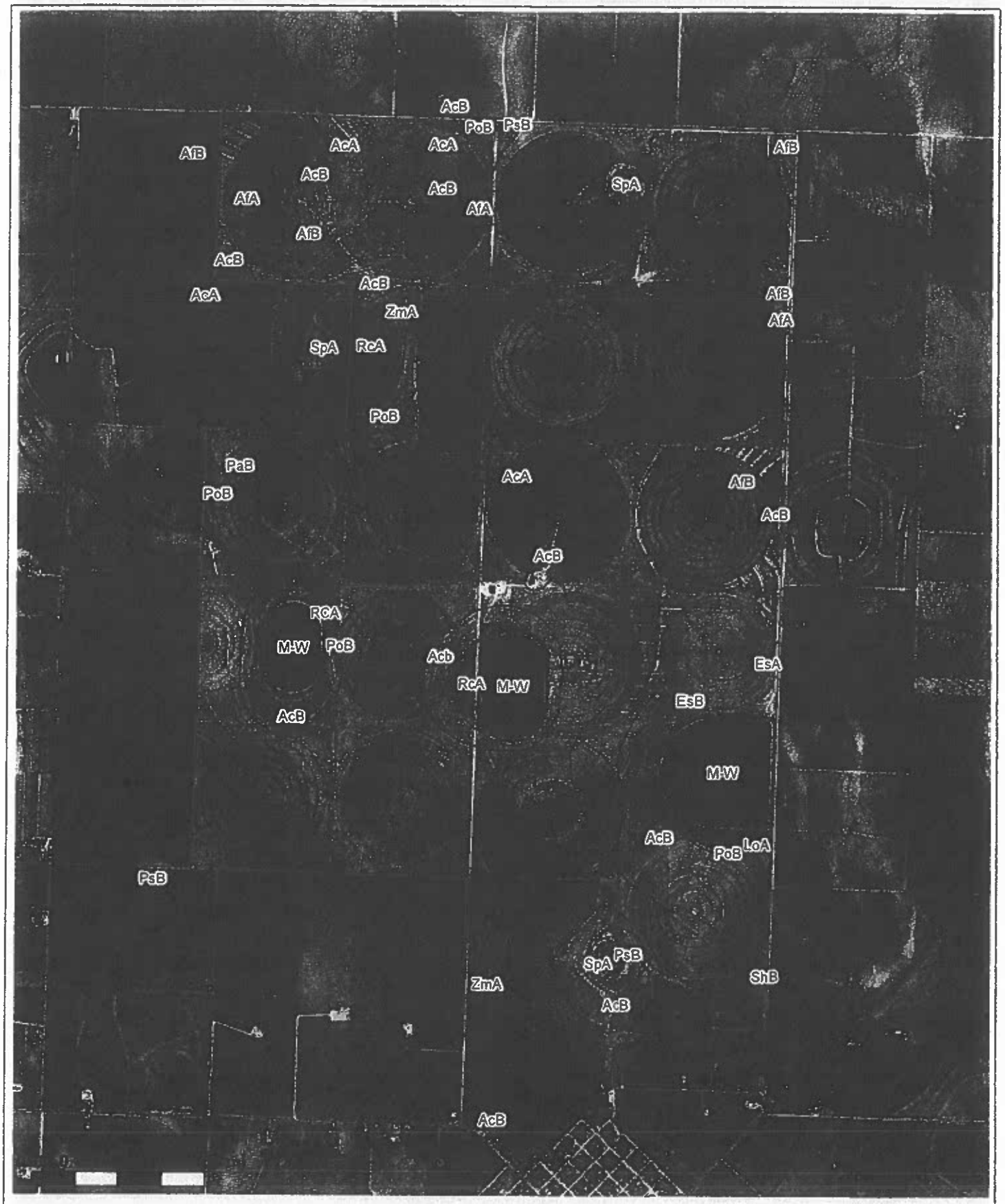
Plot	2019	2020	2021	2022	2023*	Plot	Min	Max
L1	47,907,100	61,417,600	70,479,900	82,522,500	38,225,500	L1	37,120,000	130,739,000
L2	73,672,800	55,339,600	70,992,700	57,445,900	42,680,600	L2	45,370,000	180,064,100
L3	67,664,300	58,630,200	75,918,600	58,451,200	49,534,600	L3	58,630,200	176,653,000
L4	26,812,500	--				L4	26,812,500	180,529,000
L5	30,935,700	19,048,100	13,990,200	20,350,200	0	L5	12,494,000	42,521,000
L6	56,742,600	67,392,100	57,174,000	35,169,500	29,265,400	L6	40,531,700	164,648,000
L7	69,595,000	59,299,000	54,936,000	49,262,630	44,654,000	L7	21,280,000	168,425,000
L8	19,895,200	45,727,300	34,908,800	52,913,500	0	L8	19,895,200	154,009,600
L9	68,565,500	53,622,600	63,126,100	54,183,600	23,969,700	L9	40,644,700	140,494,000
L10	560,200	--	0	4,233,800	0	L10	560,200	51,732,600
L13	111,802,200	71,771,300	120,107,300	61,041,100	0	L13	38,438,000	232,022,700
L15	98,998,800	64,863,300	100,816,600	98,861,100	54,411,500	L15	38,224,500	144,281,900
L16	53,027,900	52,752,200	54,542,600	62,260,000	28,772,000	L16	49,417,200	140,846,000
L17	45,016,400	54,369,300	62,538,900	54,715,071	20,065,300	L17	40,518,180	141,212,000
L18	32,813,400	--			0	L18	32,813,400	120,974,600
L19	29,271,900	71,393,200	46,579,700	49,067,500		L19	29,271,900	226,969,000
L20	6,600,400	14,096,400	7,692,100	10,544,400	5,446,700	L20	6,404,800	31,690,400
L21	11,356,500	6,989,300	12,142,200	22,853,900	12,081,800	L21	1,350,900	49,559,400
L22	40,153,500	53,653,000	47,939,700	68,542,200	68,498,100	L22	40,153,500	221,561,800
L23	24,777,000	39,360,000	18,171,000	29,126,000	0	L23	15,619,000	116,485,000
L24	26,651,800	64,662,100	43,434,900	45,201,400	0	L24	26,651,800	206,726,500
L25	38,808,000	38,140,000	76,914,200	75,525,900	39,567,800	L25	--	165,947,100
L26	29,253,100	33,608,800	44,149,000	68,402,000	27,792,000	L26	28,668,300	140,447,300
L27	27,642,400	40,061,200	46,961,400	40,425,100	33,080,500	L27	--	126,324,000
L28	--	1,867,700	0	0	0	L28	1,867,700	15,791,100
L34A	26,469,000	18,522,000	8,979,800	15,429,100	1,528,200	L34A	4,801,000	51,417,600
L34B	27,355,100	20,538,500	13,172,100	17,245,600	1,396,200	L34B	9,479,400	46,507,200
L34C	3,486,900	1,390,600	0	0	0	L34C	1,390,600	24,020,725
L35	27,769,100	--	17,625,400	19,298,100	0	L35	14,693,900	49,777,900
L47	--	--	0	0	0	L47	--	30,902,200
LLAS Total	1,123,604,300	1,068,515,400	1,163,293,200	1,153,071,301	520,969,900	LLAS Total	1,068,515,400	3,446,578,525
~Gallons effluent **	422,566	401,849	437,493	433,648	195,927			
Contract Plots								
Plot	2019	2020	2021	2022	2023	Plot		
A	157,241,200	58,740,480	45,409,200	64,315,100	0	A	22,725,200	157,241,200
B	155,423,700	52,876,634	39,029,900	62,058,800	0	B	14,427,000	155,423,700
C	13,925,800	31,457,200	18,758,800	17,597,900	0	C	3,704,900	31,457,200
D	22,132,000	36,898,900	22,358,400	24,755,600	0	D	8,353,000	47,066,303
E	37,330,900	48,541,400	27,139,100	28,486,400	0	E	15,188,800	73,773,955
F	--	23,987,600	27,710,700	18,580,500	0	F	1,922,300	62,995,500
G	82,668,500	98,291,400	13,517,400	47,219,100	0	G	2,119,900	159,228,364
Contract Total	468,722,100	350,793,614	193,923,500	263,013,400	0	Contract Total	144,013,604	503,496,346
~Gallons effluent **	511,705	382,962	211,707	287,133	0			
Total	2019	2020	2021	2022	2023	TOTALS		
LLAS	1,123,604,300	1,068,515,400	1,163,293,200	1,153,071,301	520,969,900	LLAS	1,068,515,400	3,446,578,525
Contract	468,722,100	350,793,614	193,923,500	263,013,400	0	Contract	144,013,604	503,496,346
TOTAL	1,592,326,400	1,419,309,014	1,357,216,700	1,416,084,701	520,969,900	TOTALS	1,363,880,200	2,948,094,803

* Effluent Applied through May 2023

**~Gallons effluent applied per acre

ATTACHMENT TR-14

Soil Sample Map



city of lubbock TEXAS

ATTACHMENT
CITY OF LUBBOCK
SOUTHEAST WATER RECLAMATION PLANT
TPDES PERMIT APPLICATION
HLAS-SOILS MAP

LEGEND

EFFLUENT LAND DISPOSAL SITE

SOIL TYPE SEE TABLE O-2

TABLE O-2

CITY OF LUBBOCK
SOUTHEAST WATER RECLAMATION PLANT
TPDES PERMIT APPLICATION

LYNN COUNTY
USDA DESIGNATED SOIL SERIES

Soil Series #	Soil Series Name	Depth from Surface (inches)	Permeability	Available Water Capacity
AcA	Acuff loam, 0–1% slopes	80	Moderate	High
AcB	Acuff loam, 1-3% slopes	80	Moderate	High
AfA	Amarillo fine sandy loam, 0-3% slopes	80	Moderate	High
AfB	Amarillo fine sandy loam, 1-3% slopes	80	Moderate	High
EsA	Estacado clay loam, 0-1% slopes	66	Moderate	High
EsB	Estacado clay loam, 1-3% slopes	80	Moderate	High
LoA	Lofton clay loam, 0-1%	72	Very Slow	High
MdA	Midessa fine sandy loam, 0-1% slopes	80	Moderate	Medium
PoB	Portales loam, 1-3% slopes	80	Moderate	High
PsB	Posey fine sandy loam, 1-3% slopes	62	Moderate	Medium
RcA	Randall clay 0-1% slopes, freq. flooded	62	Very slow	Medium
ShB	Sharvana fine sandy loam, 0-3% slopes	80	Moderate	Medium
SpA	Sparenberg clay, 0-1% slopes, occ. Flooded	80	Moderate	Medium
ZmA	Zita loam, 0-1% slopes	66	Moderate	Medium

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:
American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
AcA—Acuff loam, 0 to 1 percent slopes												
Acuff	0-12	*Loam	CL, SC-SM	A-6	0	0	100	100	92-100	57-71	25-41	8-19
	12-20	*Sandy clay loam, Loam, clay loam	CL, SC-SM	A-7-6, A-6	0	0	100	100	89-100	51-66	30-45	13-25
	20-28	*Sandy clay loam, Loam, clay loam	CL, SC-SM	A-7-6, A-6	0	0	100	100	88-100	53-68	30-45	13-25
	28-38	*Sandy clay loam, Loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	91-100	51-66	29-44	13-25
	38-58	*Sandy clay loam, Clay loam	CL, SC-SM	A-6, A-7-6	0	0	93-99	87-98	76-98	44-64	29-44	13-25
	58-80	*Sandy clay loam, Clay loam	CL, SC-SM	A-6, A-7-6	0	0	93-99	87-98	77-98	46-67	29-44	13-25

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
AcB—Acuff loam, 1 to 3 percent slopes												
Acuff	0-10	*Loam	CL, SC-SM	A-6	0	0	100	100	92-100	57-71	25-41	8-19
	10-18	*Sandy clay loam, Loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	89-100	51-66	30-45	13-25
	18-26	*Sandy clay loam, Loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	88-100	53-68	30-45	13-25
	26-36	*Sandy clay loam, Loam, clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	91-100	51-66	29-44	13-25
	36-56	*Sandy clay loam, Clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	87-100	50-65	29-44	13-25
	56-80	*Sandy clay loam, Clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	89-100	54-69	29-44	13-25
AfA—Amarillo fine sandy loam, 0 to 1 percent slopes												
Amarillo	0-11	*Fine sandy loam	SC-SM, SC	A-4	0	0	100	100	94-100	44-52	21-31	6-12
	11-27	*Sandy clay loam, Clay loam	SC, SC-SM, CL	A-6, A-7-6	0	0	100	100	93-100	49-64	29-44	13-25
	27-39	*Sandy clay loam, Clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	95-100	51-66	29-44	13-25
	39-56	*Sandy clay loam, Clay loam	SC, SC-SM, CL	A-6, A-4, A-7-6	0	0	93-98	87-97	83-97	44-63	29-44	10-25
	56-80	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-6, A-7-6	0	0	93-100	87-100	80-100	49-71	29-44	11-25

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
AfB—Amarillo fine sandy loam, 1 to 3 percent slopes												
Amarillo	0-10	*Fine sandy loam	SC, SC-SM	A-4	0	0	100	100	94-100	44-52	21-31	6-12
	10-26	*Sandy clay loam, Clay loam	SC, SC-SM, CL	A-6, A-7-6	0	0	100	100	93-100	49-64	29-44	13-25
	26-39	*Sandy clay loam, Clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	95-100	51-66	29-44	13-25
	39-55	*Sandy clay loam, Clay loam	SC, SC-SM, CL	A-6, A-4, A-7-6	0	0	93-98	87-97	83-97	44-63	29-44	10-25
	55-80	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-6, A-7-6	0	0	93-100	87-100	80-100	49-71	29-44	11-25
ArA—Arch loam, 0 to 1 percent slopes												
Arch	0-5	*Loam	CL, SC-SM	A-4	0	0	97-100	94-100	82-97	58-71	25-39	9-17
	5-16	*Sandy clay loam, Fine sandy loam, clay loam, loam	SC, CL	A-6, A-4	0	0	95-99	90-98	68-98	31-58	20-47	6-25
	16-37	*Sandy clay loam, Fine sandy loam, clay loam, loam	SC, CL	A-4, A-6	0	0	89-96	77-92	54-87	29-58	20-47	6-25
	37-80	*Sandy clay loam, Clay loam, loam, fine sandy loam	SC, CL	A-4, A-6	0	0	89-96	77-92	55-89	30-58	20-47	6-25

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
EsA—Estacado loam, 0 to 1 percent slopes												
Estacado	0-6	*Loam	CL, SC-SM	A-6, A-4	0	0	100	100	84-98	59-73	25-45	8-19
	6-19	*Clay loam, Sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	76-96	58-78	30-51	13-29
	19-38	*Clay loam, Sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	77-97	57-77	29-50	13-29
	38-50	*Clay loam, Sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	90-100	87-100	66-97	50-77	29-50	13-29
	50-80	*Clay loam, Sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	90-99	87-98	67-96	50-77	29-50	13-29
EsB—Estacado loam, 1 to 3 percent slopes												
Estacado	0-4	*Loam	CL, SC-SM	A-6, A-4	0	0	100	100	84-98	59-73	25-45	8-19
	4-17	*Clay loam, Sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	76-96	58-78	30-51	13-29
	17-36	*Clay loam, Sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	100	100	77-97	57-77	29-50	13-29
	36-48	*Clay loam, Sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	90-100	87-100	66-97	50-77	29-50	13-29
	48-80	*Clay loam, Sandy clay loam	CL, SC-SM	A-6, A-7-6	0	0	90-99	87-98	67-96	50-77	29-50	13-29

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
LMA—Lamesa soils, 0 to 1 percent slopes, frequently ponded												
Lamesa	0-4	*Sandy clay, Fine sandy loam, sandy clay loam	SC, SC-SM, CL	A-7-6, A-6, A-4	0	0	100	100	86-100	42-65	24-55	6-27
	4-11	*Sandy clay loam, Sandy clay, fine sandy loam	CL, SC, CL-ML, SC-SM	A-4, A-6, A-7-6	0	0	100	100	86-100	40-62	22-51	6-27
	11-31	*Sandy clay loam, Fine sandy loam	SC, SC-SM, CL	A-4, A-6	0	0	100	100	88-100	43-62	27-43	10-22
	31-48	*Very fine sandy loam, Fine sandy loam	SC-SM, SC	A-4	0	0	100	100	88-100	31-48	20-32	4-13
	48-58	*Fine sandy loam, Sandy clay loam	SC-SM, SC	A-6, A-4	0	0	100	100	89-100	40-61	26-44	10-24
	58-80	*Sandy clay loam, Clay loam, clay	CH, SC, CL	A-6, A-7-6	0	0	100	100	89-100	45-67	31-59	13-34
LoA—Lofton clay loam, 0 to 1 percent slopes												
Lofton	0-9	*Clay loam	CL	A-7-6	0	0	100	100	95-100	72-82	41-55	21-28
	9-24	*Clay, Silty clay	CH	A-7-6	0	0	100	100	95-100	77-87	50-60	29-34
	24-38	*Clay, Silty clay	CH	A-7-6	0	0	100	100	95-100	77-87	50-60	29-34
	38-52	*Clay, Silty clay, clay loam	CH, CL	A-6, A-7-6	0	0	100	91-100	86-100	68-88	39-55	20-30
	52-80	*Silty clay, Clay, clay loam	CH, CL	A-6, A-7-6	0	0	93-100	91-100	79-100	70-97	38-55	19-29
M-W—Miscellaneous water												
Water, miscellaneous	—	—	—	—	—	—	—	—	—	—	—	—

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity Index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
MdA—Midessa fine sandy loam, 0 to 1 percent slopes												
Midessa	0-10	*Fine sandy loam	SC, SC-SM	A-4	0	0	100	100	88-98	39-49	20-32	6-12
	10-30	*Sandy clay loam	CL, SC, SC-SM	A-6	0	0	100	100	79-94	44-59	29-43	13-22
	30-60	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-6, A-7-6	0	0	85-97	80-96	64-91	35-57	28-41	11-18
	60-80	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-7-6, A-6	0	0	87-97	83-96	66-91	36-57	28-41	11-18
MdB—Midessa fine sandy loam, 1 to 3 percent slopes												
Midessa	0-8	*Fine sandy loam	SC, SC-SM	A-4	0	0	100	100	88-98	39-49	20-32	6-12
	8-28	*Sandy clay loam	CL, SC, SC-SM	A-6	0	0	100	100	79-94	44-59	29-43	13-22
	28-58	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-6, A-7-6	0	0	85-97	80-96	64-91	35-57	28-41	11-18
	58-80	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-6, A-7-6	0	0	87-97	83-96	66-91	36-57	28-41	11-18

Engineering Properties--Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity Index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
PoA—Portales loam, 0 to 1 percent slopes												
Portales	0-15	*Loam	CL, SC-SM	A-4	0	0	100	100	84-94	60-70	27-41	9-17
	15-35	*Clay loam, Loam	SC-SM, CL	A-7-6, A-6	0	0	100	100	81-98	62-79	29-49	12-25
	35-43	*Loam, Clay loam	CL, SC-SM	A-6, A-7-6, A-4	0	0	87-97	83-96	70-96	51-76	27-46	8-25
	43-60	*Clay loam, Loam	CL, SC-SM	A-4, A-7-6, A-6	0	0	85-96	80-95	65-93	49-74	27-46	10-25
	60-80	*Clay loam, Loam	CL, SC-SM	A-7-6, A-6	0	0	87-97	83-96	68-95	51-76	27-46	13-25
PoB—Portales loam, 1 to 3 percent slopes												
Portales	0-13	*Loam	CL, SC-SM	A-4	0	0	100	100	84-94	60-70	27-41	9-17
	13-33	*Clay loam, Loam	SC-SM, CL	A-6, A-7-6	0	0	100	100	81-98	62-79	29-49	12-25
	33-41	*Loam, Clay loam	CL, SC-SM	A-6, A-4, A-7-6	0	0	87-97	83-96	70-96	51-76	27-46	8-25
	41-58	*Clay loam, Loam	CL, SC-SM	A-4, A-6, A-7-6	0	0	85-96	80-95	65-93	49-74	27-46	10-25
	58-80	*Clay loam, Loam	CL, SC-SM	A-6, A-7-6	0	0	87-97	83-96	68-95	51-76	27-46	13-25

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
PsA—Posey fine sandy loam, 0 to 1 percent slopes												
Posey	0-10	*Fine sandy loam	SC-SM, CL	A-4	0	0	99-100	98-100	81-95	40-54	17-31	2-12
	10-18	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-6, A-7-6	0	0	94-100	91-100	66-87	36-55	29-44	13-25
	18-39	*Sandy clay loam, Clay loam	SC-SM, SC, CL	A-6, A-7-6	0	0	82-94	76-91	56-81	33-53	29-44	13-25
	39-80	*Sandy clay loam, Clay loam	SC-SM, SC, CL	A-6, A-7-6	0	0	88-97	84-97	62-86	37-57	29-44	13-25
PsB—Posey fine sandy loam, 1 to 3 percent slopes												
Posey	0-9	*Fine sandy loam	SC-SM, CL	A-4	0	0	99-100	98-100	81-95	40-54	17-31	2-12
	9-15	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-6, A-7-6	0	0	94-100	91-100	66-87	36-55	29-44	13-25
	15-37	*Sandy clay loam, Clay loam	SC-SM, SC, CL	A-6, A-7-6	0	0	82-94	76-91	56-81	33-53	29-44	13-25
	37-80	*Sandy clay loam, Clay loam	SC-SM, SC, CL	A-6, A-7-6	0	0	88-97	84-97	62-86	37-57	29-44	13-25

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
RcA—Ranco clay, 0 to 1 percent slopes, frequently ponded												
Ranco	0-2	*Clay	CH	A-7-6, A-8	0	0	100	100	85-100	71-91	53-77	29-43
	2-9	*Clay	CH	A-7-6, A-8	0	0	100	100	91-100	73-83	51-66	29-35
	9-25	*Clay	CH	A-7-6, A-8	0	0	100	100	91-100	70-80	51-64	29-34
	25-35	*Clay	CH	A-7-6, A-8	0	0	100	100	93-100	70-80	51-63	29-34
	35-61	*Clay	CH	A-7-6, A-8	0	0	100	100	92-100	70-80	51-63	29-34
	61-80	*Clay	CH	A-7-6, A-8	0	0	100	100	88-100	69-84	51-67	29-36
SgA—Seagraves fine sandy loam, 0 to 1 percent slopes												
Seagraves	0-25	*Fine sandy loam, Loamy fine sand	SC-SM, SC	A-2-4, A-4	0	0	100	100	80-97	20-37	16-34	1-14
	25-39	*Loamy fine sand, Fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0	100	100	89-100	25-42	0-32	NP-13
	39-47	*Sandy clay loam, Clay loam, clay	CH, CL, SC	A-6, A-7-6	0	0	100	100	79-100	41-66	31-54	13-32
	47-57	*Sandy clay loam, Clay loam, clay	CH, CL, SC	A-6, A-7-6	0	0	100	100	78-100	40-65	31-55	13-32
	57-67	*Sandy clay loam, Clay, clay loam	CH, CL, SC	A-6, A-7-6	0	0	93-100	91-100	71-98	42-66	35-53	17-30
	67-80	*Clay, Sandy clay loam, clay loam	CH, CL	A-6, A-7-6	0	0	93-100	91-100	68-100	45-75	35-57	17-32

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
ShB—Sharvana fine sandy loam, 0 to 3 percent slopes												
Sharvana	0-6	*Fine sandy loam	SC-SM, SC	A-6	0	0	91-100	90-100	76-99	24-41	18-33	3-13
	6-16	*Sandy clay loam	SC-SM, SC	A-6	0	0	91-100	90-100	78-100	34-54	28-45	12-24
	16-36	*Cemented material	—	—	—	—	—	—	—	—	—	—
	36-80	*Extremely gravelly sandy loam, Loam, extremely gravelly loam, sandy loam	GP-GM, GC-GM, SC-SM	A-1-a	0	0	10-90	10-90	7-83	3-44	19-31	2-8
SL—Water, intermittent, salt lake												
Water, intermittent, salt lake	0-80	*Variable	—	—	—	—	—	—	—	—	—	—
SpA—Sparenberg clay, 0 to 1 percent slopes, occasionally ponded												
Sparenberg	0-4	*Clay	CH	A-7-6, A-8	0	0	100	100	89-100	78-93	52-74	29-41
	4-10	*Clay	CH	A-8, A-7-6	0	0	100	100	90-100	76-91	52-72	29-41
	10-17	*Clay	CH	A-8, A-7-6	0	0	100	100	89-100	75-90	52-71	29-41
	17-47	*Clay	CH	A-8, A-7-6	0	0	100	100	91-100	78-93	52-71	29-41
	47-61	*Clay	CH	A-8, A-7-6	0	0	100	100	90-100	77-92	51-70	29-41
	61-80	*Clay	CH	A-8, A-7-6	0	0	100	100	90-100	79-94	51-68	29-40

Engineering Properties–Lynn County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
ZmA—Zita loam, 0 to 1 percent slopes												
Zita	0-7	*Loam	CL, SC-SM	A-6	0	0	100	100	88-100	63-78	31-47	13-24
	7-18	*Loam	CL, CL-ML, SC-SM	A-4, A-6	0	0	100	100	75-100	53-78	21-47	6-24
	18-23	*Clay loam, Loam, silty clay loam	SC-SM, CL	A-6, A-7-6	0	0	100	100	81-100	62-82	28-48	12-25
	23-34	*Clay loam, Loam, silty clay loam	CL, SC-SM	A-6, A-4	0	0	89-96	79-91	64-91	49-75	27-45	10-20
	34-80	*Clay loam, Loam, silty clay loam	CL, SC-SM	A-4, A-6	0	0	88-95	76-90	62-90	47-74	27-45	10-20

Data Source Information

Soil Survey Area: Lynn County, Texas
Survey Area Data: Version 8, Sep 21, 2012

ATTACHMENT
CITY OF LUBBOCK
SOUTHEAST WATER RECLAMATION PLANT
TPDES PERMIT APPLICATION
LLAS-SOILS MAP

LEGEND

EFFLUENT LAND DISPOSAL SITE

SOIL TYPE SEE TABLE O-1

TABLE O-1

CITY OF LUBBOCK
SOUTHEAST WATER RECLAMATION PLANT
TPDES PERMIT APPLICATION

LUBBOCK COUNTY
USDA DESIGNATED SOIL SERIES

Soil Series #	Soil Series Name	Depth from Surface (inches)	Permeability	Available Water Capacity
1	Acuff loam, 0–1% slopes	80	Moderate	High
5	Amarillo fine sandy loam, 0–1% slopes	80	Moderate	High
6	Amarillo fine sandy loam, 1–3% slopes	80	Moderate	High
9	Arents and Pits	80	Moderate	High
13	Bippus fine sandy loam, frequently flooded	64	Moderate	High
18	Estacado clay loam, 0–1% slopes	66	Moderate	High
19	Estacado clay loam, 1–3% slopes	80	Moderate	High
21	Friona loam, 0–1% slopes	60	Moderate	High
22	Kimbrough loam, 0–3% slopes	34	Moderate	Very Low
23	Lofton clay loam, 0–1% slopes	72	Very Slow	High
24	Mansker clay loam, 1–3% slopes	60	Moderate	Medium
26	Midessa fine sandy loam, 1–3% slopes	66	Moderate	Medium
28	Mobeetie fine sandy loam, 3–5% slopes	72	Moderate	Medium
30	Olton clay loam, 0–1% slopes	80	Moderately Slow	High
33	Portales loam, 0–1% slopes	80	Moderate	High
35	Posey fine sandy loam, 1–3% slopes	62	Moderate	Medium
38	Potter loam, 2–12% slopes	30	Moderate	Very Low
39	Potter-Berda association, steep	60	Moderate	Medium
42	Randall clay	62	Very Slow	Medium
46	Zita loam, 0–1% slopes	66	Moderate	Medium

Engineering Properties

This table gives the engineering classifications and the range of engineering properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is 15 percent or more, an appropriate modifier is added, for example, "gravelly."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, CL-ML.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of particle-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

References:
American Association of State Highway and Transportation Officials (AASHTO). 2004. Standard specifications for transportation materials and methods of sampling and testing. 24th edition.
American Society for Testing and Materials (ASTM). 2005. Standard classification of soils for engineering purposes. ASTM Standard D2487-00.

Report—Engineering Properties

Absence of an entry indicates that the data were not estimated. The asterisk '*' denotes the representative texture; other possible textures follow the dash.

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1—Acuff loam, 0 to 1 percent slopes												
Acuff	0-12	*Loam	CL	A-4, A-6	0	0	100	95-100	95-100	51-70	24-32	8-16
	12-38	*Sandy clay loam, Clay loam, loam	CL	A-6	0	0	100	95-100	95-100	50-75	28-40	12-22
	38-80	*Sandy clay loam, Clay loam, loam	CL	A-6	0	0	95-100	90-100	90-100	60-75	25-40	12-22
2—Acuff loam, 1 to 3 percent slopes												
Acuff	0-12	*Loam	CL	A-4, A-6	0	0	100	95-100	95-100	51-70	24-32	8-16
	12-38	*Sandy clay loam, Clay loam, loam	CL	A-6	0	0	100	95-100	95-100	50-75	28-40	12-22
	38-80	*Sandy clay loam, Clay loam, loam	CL	A-6	0	0	95-100	90-100	90-100	60-75	25-40	12-22
3—Acuff-Urban land complex, 0 to 2 percent slopes												
Acuff	0-12	*Loam	CL	A-4, A-6	0	0	100	95-100	95-100	51-70	24-32	8-16
	12-38	*Sandy clay loam, Clay loam, loam	CL	A-6	0	0	100	95-100	95-100	50-75	28-40	12-22
	38-80	*Sandy clay loam, Clay loam, loam	CL	A-6	0	0	95-100	90-100	90-100	60-75	25-40	12-22
Urban land	0-40	*Variable	—	—	—	—	—	—	—	—	—	—

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
4—Amarillo loamy fine sand, 0 to 3 percent slopes												
Amarillo	0-14	*Loamy fine sand	SC-SM, SM	A-2-4	0	0	100	100	95-100	15-35	0-22	NP-4
	14-46	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-4, A-6	0	0	100	100	95-100	35-65	20-40	7-20
	46-80	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-4, A-6	0	0	90-100	90-100	65-98	35-70	20-35	7-17
5—Amarillo fine sandy loam, 0 to 1 percent slopes												
Amarillo	0-14	*Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2-4, A-4	0	0	100	100	95-100	30-55	17-25	3-7
	14-46	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-4, A-6	0	0	100	100	95-100	35-65	20-40	7-20
	46-80	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-4, A-6	0	0	90-100	90-100	65-98	35-70	20-35	7-17

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
6—Amarillo fine sandy loam, 1 to 3 percent slopes												
Amarillo	0-14	*Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2-4, A-4	0	0	100	100	95-100	30-55	17-25	3-7
	14-46	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-4, A-6	0	0	100	100	95-100	35-65	20-40	7-20
	46-80	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-4, A-6	0	0	90-100	90-100	65-98	35-70	20-35	7-17
7—Amarillo-Urban land complex, 0 to 2 percent slopes												
Amarillo	0-14	*Fine sandy loam	CL-ML, ML, SC-SM, SM	A-2-4, A-4	0	0	100	100	95-100	30-55	17-25	3-7
	14-46	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-4, A-6	0	0	100	100	95-100	35-65	20-40	7-20
	46-80	*Sandy clay loam, Clay loam	CL, SC, SC-SM	A-4, A-6	0	0	90-100	90-100	65-98	35-70	20-35	7-17
Urban land	0-40	*Variable	—	—	—	—	—	—	—	—	—	—
8—Arch loam, 0 to 3 percent slopes												
Arch	0-9	*Loam	CL-ML	A-4	0	0	80-95	75-90	65-75	55-65	25-30	5-10
	9-17	*Sandy clay loam, Loam, clay loam	CL, SC	A-6	0	0	80-95	75-90	60-75	45-60	25-40	10-20
	17-62	*Clay loam, Sandy loam, loam	CL, SC	A-6	0	0	80-95	75-90	55-70	40-55	30-40	10-20

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
9—Arents and Pits												
Arents	0-80	*Variable	—	—	—	—	—	—	—	—	—	—
Pits	0-80	*Variable	—	—	—	—	—	—	—	—	0-14	—
10—Berda loam, 1 to 3 percent slopes												
Berda	0-8	*Loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0-3	85-100	84-98	75-95	36-65	20-35	7-20
	8-60	*Loam, Clay loam, sandy clay loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	85-100	84-98	75-95	36-65	20-35	7-20
11—Berda loam, 3 to 5 percent slopes												
Berda	0-8	*Loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0-3	85-100	84-98	75-95	36-65	20-35	7-20
	8-60	*Loam, Clay loam, sandy clay loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	85-100	84-98	75-95	36-65	20-35	7-20

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
12—Berda-Potter association, hilly												
Berda	0-8	*Loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0-3	85-100	84-98	75-95	36-65	20-35	7-20
	8-60	*Loam, Clay loam, sandy clay loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0	85-100	84-98	75-95	36-65	20-35	7-20
Potter	0-12	*Gravelly loam	CL, CL-ML	A-4, A-6	0	0-5	70-95	70-85	60-80	51-70	20-40	5-20
	12-30	*Very cobbly loam, Extremely gravelly loam, extremely cobbly loam	GC, GC-GM, SC, SC-SM	A-2-4, A-2-6, A-4, A-6	0-10	5-50	30-80	25-75	20-60	13-50	20-40	5-20
13—Bippus fine sandy loam, frequently flooded												
Bippus	0-8	*Fine sandy loam	CL, CL-ML, SC, SC-SM	A-2-4, A-4	0	0	100	95-100	80-98	30-60	18-25	4-10
	8-72	*Clay loam, Loam, sandy clay loam	CL, SC, SC-SM	A-4, A-6	0	0	100	95-100	85-98	36-75	22-40	7-20
14—Bippus clay loam, occasionally flooded												
Bippus	0-8	*Clay loam	CL	A-4, A-6	0	0	100	95-100	85-98	50-80	22-40	7-20
	8-72	*Clay loam, Loam, sandy clay loam	CL, SC, SC-SM	A-4, A-6	0	0	100	95-100	85-98	36-75	22-40	7-20

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
15—Bippus clay loam, frequently flooded												
Bippus	0-8	*Clay loam	CL	A-4, A-6	0	0	100	95-100	85-98	50-80	22-40	7-20
	8-72	*Clay loam, Loam, sandy clay loam	CL, SC, SC-SM	A-4, A-6	0	0	100	95-100	85-98	36-75	22-40	7-20
16—Drake clay loam, 1 to 3 percent slopes												
Drake	0-28	*Clay loam	CL	A-6, A-7-6	0	0	100	100	85-98	60-85	35-45	15-23
	28-60	*Clay loam, Loam, sandy clay loam	CL, SC	A-4, A-6, A-7-6	0	0	100	100	70-98	45-75	25-45	8-25
17—Drake clay loam, 3 to 5 percent slopes												
Drake	0-28	*Clay loam	CL	A-6, A-7-6	0	0	100	100	85-98	60-85	35-45	15-23
	28-60	*Clay loam, Loam, sandy clay loam	CL, SC	A-6, A-7-6, A-4	0	0	100	100	70-98	45-75	25-45	8-25
18—Estacado clay loam, 0 to 1 percent slopes												
Estacado	0-16	*Clay loam	CL	A-6, A-7-6	0	0	98-100	96-100	90-100	65-90	25-45	12-27
	16-28	*Clay loam, Sandy clay loam	CL	A-6, A-7-6	0	0	98-100	96-100	85-100	60-90	30-45	15-27
	28-66	*Clay loam, Sandy clay loam	CL	A-7-6, A-6	0	0	98-100	96-100	85-100	60-90	30-45	15-27
	66-80	*Clay loam, Sandy clay loam	CL	A-7-6, A-6	0	0	93-100	90-100	85-100	60-90	30-45	15-27

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
19—Estacado clay loam, 1 to 3 percent slopes												
Estacado	0-16	*Clay loam	CL	A-7-6, A-6	0	0	98-100	96-100	90-100	65-90	25-45	12-27
	16-28	*Clay loam, Sandy clay loam	CL	A-7-6, A-6	0	0	98-100	96-100	85-100	60-90	30-45	15-27
	28-66	*Clay loam, Sandy clay loam	CL	A-7-6, A-6	0	0	98-100	96-100	85-100	60-90	30-45	15-27
	66-80	*Clay loam, Sandy clay loam	CL	A-7-6, A-6	0	0	93-100	90-100	85-100	60-90	30-45	15-27
20—Estacado-Urban land complex, 0 to 2 percent slopes												
Estacado	0-16	*Clay loam	CL	A-7-6, A-6	0	0	98-100	96-100	90-100	65-90	25-45	12-27
	16-28	*Clay loam, Sandy clay loam	CL	A-7-6, A-6	0	0	98-100	96-100	85-100	60-90	30-45	15-27
	28-66	*Clay loam, Sandy clay loam	CL	A-7-6, A-6	0	0	98-100	96-100	85-100	60-90	30-45	15-27
	66-80	*Clay loam, Sandy clay loam	CL	A-7-6, A-6	0	0	93-100	90-100	85-100	60-90	30-45	15-27
Urban land	0-40	*Variable	—	—	—	—	—	—	—	—	—	—

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
21—Friona loam, 0 to 1 percent slopes												
Friona	0-8	*Loam	CL, CL-ML	A-6, A-4	0	0	100	100	90-100	51-70	24-35	7-15
	8-26	*Clay loam, Sandy clay loam, loam	CL	A-7-6, A-6	0	0	100	100	90-100	60-75	30-45	12-25
	26-32	*Cemented material	—	—	—	—	—	—	—	—	—	—
	32-60	*Sandy clay loam, Loam, clay loam	CL	A-7-6, A-6	0	0	95-100	95-100	90-100	60-75	30-45	12-25
22—Kimbrough loam, 0 to 3 percent slopes												
Kimbrough	0-11	*Loam	CL-ML	A-4	0	0	80-90	75-85	66-75	55-65	25-30	5-10
	11-14	*Loam, Gravelly fine sandy loam, gravelly loam	GC-GM, SC-SM, CL-ML	A-4, A-2	—	0-15	65-90	60-85	40-60	30-55	25-30	5-10
	14-30	*Cemented material	—	—	—	—	—	—	—	—	—	—
23—Lofton clay loam, 0 to 1 percent slopes												
Lofton	0-10	*Clay loam	CL	A-7, A-6	0	0	100	100	98-100	70-90	35-45	15-25
	10-50	*Clay, Silty clay	CL	A-7, A-6	0	0	100	100	95-100	70-90	38-50	20-30
	50-72	*Clay, Silty clay, silty clay loam	CL	A-7, A-6	0	0	100	95-100	90-100	60-80	30-45	15-25

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
24—Mansker clay loam, 1 to 3 percent slopes												
Mansker	0-8	*Clay loam	SC-SM, SC, CL-ML, CL	A-6, A-4	0	0	95-100	95-100	80-98	40-75	20-37	5-20
	8-32	*Clay loam, Loam, sandy clay loam	SC, CL	A-6, A-4	0	0	90-100	90-100	85-98	40-80	22-40	7-22
	32-60	*Clay loam, Sandy clay loam	SC, CL	A-6, A-4	0	0	98-100	95-100	85-100	45-85	22-40	7-22
25—Mansker clay loam, 3 to 5 percent slopes												
Mansker	0-8	*Clay loam	SC-SM, SC, CL-ML, CL	A-6, A-4	0	0	95-100	95-100	80-98	40-75	20-37	5-20
	8-32	*Clay loam, Loam, sandy clay loam	SC, CL	A-6, A-4	0	0	90-100	90-100	85-98	40-80	22-40	7-22
	32-60	*Clay loam, Sandy clay loam	SC, CL	A-6, A-4	0	0	98-100	95-100	85-100	45-85	22-40	7-22

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
26—Midessa fine sandy loam, 1 to 3 percent slopes												
Midessa	0-6	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0	95-100	95-100	85-100	30-55	17-27	4-9
	6-23	*Sandy clay loam	SC-SM, SC, CL-ML, CL	A-6, A-4	0	0	95-100	95-100	90-100	36-80	22-35	7-17
	23-66	*Sandy clay loam, Clay loam	SC-SM, SC, CL-ML, CL	A-6, A-4	0	0	90-100	85-100	80-100	40-80	22-35	7-17
27—Mobeetie fine sandy loam, 1 to 3 percent slopes												
Mobeetie	0-26	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	95-100	90-100	75-95	25-55	20-27	4-10
	26-42	*Fine sandy loam, Loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	95-100	90-100	75-95	25-55	20-27	4-10
	42-72	*Fine sandy loam, Loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	90-100	85-100	70-95	25-55	20-27	4-10

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
28—Mobeetie fine sandy loam, 3 to 5 percent slopes												
Mobeetie	0-26	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	95-100	90-100	75-95	25-55	20-27	4-10
	26-42	*Fine sandy loam, Loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	95-100	90-100	75-95	25-55	20-27	4-10
	42-72	*Fine sandy loam, Loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	90-100	85-100	70-95	25-55	20-27	4-10
29—Mobeetie fine sandy loam, 5 to 8 percent slopes												
Mobeetie	0-26	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	95-100	90-100	75-95	25-55	20-27	4-10
	26-42	*Fine sandy loam, Loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	95-100	90-100	75-95	25-55	20-27	4-10
	42-72	*Fine sandy loam, Loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0-5	90-100	85-100	70-95	25-55	20-27	4-10

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
30—Olton clay loam, 0 to 1 percent slopes												
Olton	0-10	*Clay loam	CL	A-6, A-4	0	0	100	95-100	85-100	55-85	25-40	8-22
	10-42	*Clay loam, Silty clay loam, clay	CL	A-7-6, A-6	0	0	95-100	90-100	90-100	65-95	35-50	18-32
	42-80	*Clay loam, Sandy clay loam, loam	CL	A-7-6, A-6, A-4	0	0	90-100	85-100	80-100	60-90	20-43	8-27
31—Olton clay loam, 1 to 3 percent slopes												
Olton	0-10	*Clay loam	CL	A-6, A-4	0	0	100	95-100	85-100	55-85	25-40	8-22
	10-42	*Clay loam, Silty clay loam, clay	CL	A-7-6, A-6	0	0	95-100	90-100	90-100	65-95	35-50	18-32
	42-80	*Clay loam, Sandy clay loam, loam	CL	A-7-6, A-6, A-4	0	0	90-100	85-100	80-100	60-90	20-43	8-27
32—Olton-Urban land complex, 0 to 2 percent slopes												
Olton	0-10	*Clay loam	CL	A-6, A-4	0	0	100	95-100	85-100	55-85	25-40	8-22
	10-42	*Clay loam, Silty clay loam, clay	CL	A-7-6, A-6	0	0	95-100	90-100	90-100	65-95	35-50	18-32
	42-80	*Clay loam, Sandy clay loam, loam	CL	A-7-6, A-6, A-4	0	0	90-100	85-100	80-100	60-90	20-43	8-27
Urban land	0-40	*Variable	—	—	—	—	—	—	—	—	—	—

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
33—Portales loam, 0 to 1 percent slopes												
Portales	0-14	*Loam	CL-ML	A-4	0	0	100	95-100	90-100	60-70	25-30	5-10
	14-60	*Clay loam, Loam	CL	A-6	0	0	100	95-100	90-100	60-80	30-40	10-20
	60-80	*Clay loam, Loam	CL	A-6	0	0	100	95-100	90-100	60-80	30-40	10-20
34—Posey fine sandy loam, 0 to 1 percent slopes												
Posey	0-10	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0	98-100	95-100	65-85	30-55	17-25	4-10
	10-39	*Sandy clay loam, Clay loam	CL	A-6	0	0	95-100	90-100	88-100	60-90	30-40	16-25
	39-80	*Sandy clay loam, Clay loam	CL	A-6	0	0	90-100	85-100	85-100	60-90	30-40	16-25
35—Posey fine sandy loam, 1 to 3 percent slopes												
Posey	0-10	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0	98-100	95-100	65-85	30-55	17-25	4-10
	10-39	*Sandy clay loam, Clay loam	CL	A-6	0	0	95-100	90-100	88-100	60-90	30-40	16-25
	39-80	*Sandy clay loam, Clay loam	CL	A-6	0	0	90-100	85-100	85-100	60-90	30-40	16-25

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
36—Posey fine sandy loam, 3 to 5 percent slopes												
Posey	0-10	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0	98-100	95-100	65-85	30-55	17-25	4-10
	10-39	*Sandy clay loam, Clay loam	CL	A-6	0	0	95-100	90-100	88-100	60-90	30-40	16-25
	39-80	*Sandy clay loam, Clay loam	CL	A-6	0	0	90-100	85-100	85-100	60-90	30-40	16-25
37—Posey fine sandy loam, 5 to 8 percent slopes												
Posey	0-10	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0	98-100	95-100	65-85	30-55	17-25	4-10
	10-39	*Sandy clay loam, Clay loam	CL	A-6	0	0	95-100	90-100	88-100	60-90	30-40	16-25
	39-80	*Sandy clay loam, Clay loam	CL	A-6	0	0	90-100	85-100	85-100	60-90	30-40	16-25
38—Potter loam, 2 to 12 percent slopes												
Potter	0-12	*Loam	CL-ML, CL	A-6, A-4	0	0-2	95-100	85-100	75-95	50-75	20-40	5-20
	12-30	*Very cobbly loam, Extremely gravelly loam, extremely cobbly loam	SC-SM, SC, GC-GM, GC	A-6, A-4, A-2-6, A-2-4	0-10	5-50	30-80	25-75	20-60	13-50	20-40	5-20

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity Index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
39—Potter-Berda association, steep												
Potter	0-12	*Loam	CL-ML, CL	A-6, A-4	0	0-2	95-100	85-100	75-95	50-75	20-40	5-20
	12-30	*Extremely cobbly loam, Very cobbly loam, extremely gravelly loam	SC-SM, SC, GC-GM, GC	A-6, A-4, A-2-6, A-2-4	0-10	5-50	30-80	25-75	20-60	13-50	20-40	5-20
Berda	0-8	*Loam	SC-SM, SC, CL-ML, CL	A-6, A-4	0	0-3	85-100	84-98	75-95	36-65	20-35	7-20
	8-60	*Loam, Clay loam, sandy clay loam	SC-SM, SC, CL-ML, CL	A-6, A-4	0	0	85-100	84-98	75-95	36-65	20-35	7-20

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
40—Potter-Kimbrough-Urban land complex, 1 to 5 percent slo pes												
Potter	0-12	*Loam	CL-ML, CL	A-6, A-4	0	0-2	95-100	85-100	75-95	50-75	20-40	5-20
	12-30	*Extremely cobbly loam, Very cobbly loam, extremely gravelly loam	SC-SM, SC, GC-GM, GC	A-6, A-4, A-2-6, A-2-4	0-10	5-50	30-80	25-75	20-60	13-50	20-40	5-20
Urban land	0-40	*Variable	—	—	—	—	—	—	—	—	—	—
Kimbrough	0-11	*Loam	CL-ML	A-4	0	0	80-90	75-85	66-75	55-65	25-30	5-10
	11-14	*Loam, Gravelly fine sandy loam, gravelly loam	SC-SM, GC-GM, CL-ML	A-4, A-2	—	0-15	65-90	60-85	40-60	30-55	25-30	5-10
	14-30	*Cemented material	—	—	—	—	—	—	—	—	—	—
41—Pullman clay loam, 0 to 1 percent slopes												
Pullman	0-12	*Clay loam	CL	A-7-6, A-6	0	0	100	100	95-100	70-95	30-50	15-30
	12-46	*Clay, Silty clay	CL, CH	A-7-6	0	0	100	100	95-100	85-98	41-55	22-35
	46-66	*Clay loam, Silty clay loam	CL	A-7-6, A-6	0	0	100	100	95-100	75-98	35-50	18-30
	66-80	*Clay, Silty clay, clay loam	CL	A-7-6, A-6	0	0	95-100	90-100	80-100	75-95	30-50	15-30
42—Randall clay												
Randall	0-6	*Clay	CH	A-7-6	0	0	100	100	95-100	85-98	61-82	37-46
	6-32	*Clay, Silty clay	CH	A-7-6	0	0	100	100	95-100	85-98	60-80	37-46
	32-80	*Clay, Silty clay	CH	A-7-6	0	0	100	98-100	90-100	80-95	60-79	37-46

Engineering Properties–Lubbock County, Texas												
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
43—Randall variant fine sandy loam												
Randall	0-12	*Fine sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0	98-100	95-100	75-95	31-60	23-35	7-13
	12-24	*Clay, Silty clay	CL, CH	A-7-6	0	0	100	100	95-100	75-98	50-70	29-44
	24-80	*Clay, Silty clay, clay loam	CL, CH	A-7-6, A-6	0	0	100	95-100	85-100	70-98	46-70	25-44
44—Urban land												
Urban land	0-40	*Variable	—	—	—	—	—	—	—	—	—	—
45—Zita fine sandy loam, 0 to 1 percent slopes												
Zita	0-12	*Fine sandy loam	SM, SC-SM	A-4	0	0	100	100	88-100	35-50	18-25	2-7
	12-36	*Clay loam, Loam	CL	A-7-6, A-6	0	0	98-100	98-100	95-100	60-75	35-48	18-28
	36-66	*Clay loam, Loam	CL	A-6	0	0	90-100	80-99	80-98	50-75	28-40	12-22
46—Zita loam, 0 to 1 percent slopes												
Zita	0-12	*Loam	SC, CL-ML, CL	A-6, A-4	0	0	100	100	98-100	45-70	22-32	7-15
	12-36	*Clay loam, Loam	CL	A-7-6, A-6	0	0	98-100	98-100	95-100	60-75	35-48	18-28
	36-66	*Clay loam, Loam	CL	A-6	0	0	90-100	80-99	80-98	50-75	28-40	12-22
M-W—Miscellaneous water												
Water, miscellaneous	—	—	—	—	—	—	—	—	—	—	—	—

Engineering Properties–Lubbock County, Texas													
Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				*Pct*	*Pct*					*Pct*	
W—Water												
Water	—	—	—	—	—	—	—	—	—	—	—	—

Data Source Information

Soil Survey Area: Lubbock County, Texas
Survey Area Data: Version 8, Sep 21, 2012

ATTACHMENT TR-15

Soil Analysis

City of
Lubbock
TEXAS

Hancock Land Application Site
T.P.D.E.S. WQ0010353002
Annual Soil Report
2023

COPY

City of Lubbock
Hancock Land Application Site
TPDES Permit Number WQ0010353002

Annual Soil Sampling Analysis
2023

City of Lubbock
Hancock Land Application Site
TPDES Permit Number WQ0010353002

Annual Soil Sampling Analysis 2023

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Soil Sample Analysis Results 2022/2023 presenting the soil sample analysis results

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Section D.

Soil Sample Collection and Processing Procedures

Section E.

Soil Sample Chains of Custody

Section F.

Laboratory Procedures provided by Midwest Laboratories

City of Lubbock TEXAS

September 21, 2023

April Hoh
TCEQ Water Quality Assessment Team
P.O. Box 13087
Austin, TX 78711-3087

Re: **Permit WQ0010353002, City of Lubbock Hancock Land Application Site Annual Soil Analysis, 2023**

Attached is the 2023 Annual Soil Analysis Report for soil samples taken on the Hancock Land Application Site. This report contains six (6) sections, Sections A through F. As required by TPDES Permit WQ0010353002, OTHER REQUIREMENTS #14, the report presents, for each soil sample:

1). The soil sample analysis results, date and time analysis was performed (Section A)
2). The date and time of sampling (Section B)
3). The location of samples on each irrigation plot (Section C)
4). How each sample was obtained (Section D)
5). The means of conveyance for samples to the laboratory (Section E)
6). A detailed account of the procedures for each analysis (Section F)

The City of Lubbock continues to operate its land application operations with an absolute commitment to meet or exceed all conditions of its permit(s). If you have any questions regarding the contents of this report, please do not hesitate to contact me at (806) 775-2585.

Sincerely,

Aubrey Spear

Aubrey A. Spear, P.E.
Director of Water Utilities
cc: Christopher Mayben, P.G. TCEQ Regional Director, Region 2
Jennifer Talley, TCEQ, Compliance Monitoring Section, Enforcement Division (MC 224)

Section A

Soil Sample

Analysis Results

2022/2023

HLAS 2023

Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
39625022	4/14/22	H21-11B-A DUP	A	0-6"	4/14/22	14:49	4/28/22	8.6	0.8	6	2	990	618	42	790	4399	822	256	15	37	9.0
39625023	4/14/22	H21-11B-A	A	0-6"	4/14/22	14:49	4/28/22	8.6	0.8	6	2	1040	599	42	771	4348	794	273	14	36	9.7
39625024	4/14/22	H21-11B-B	B	6-18"	4/14/22	14:49	4/28/22	8.7	1.7	2	1	660	431	11	703	6026	1761	925	34	72	22.4
39625025	4/14/22	H21-11B-C	C	18-30"	4/14/22	14:49	4/28/22	8.5	3.2	2	1	480	192	7	488	16940	2255	2175	89	321	27.6
39625026	4/19/22	H21-19A-A	A	0-6"	4/21/22	9:56	4/28/22	8.6	0.6	2	1	840	535	71	604	1750	615	265	15	34	9.5
39625027	4/19/22	H21-19A-B	B	6-18"	4/21/22	9:56	4/28/22	8.5	1.2	2	1	540	450	14	650	1530	1270	322	12	33	12.3
39625028	4/19/22	H21-19A-C	C	18-30"	4/21/22	9:30	4/28/22	8.5	2	1	1	390	274	6	532	4368	1970	1321	50	172	22.7
39625029	4/19/22	H21-19B-A	A	0-6"	4/21/22	9:30	4/28/22	8.5	0.6	2	1	880	567	48	653	2285	666	292	18	40	9.6
39625030	4/19/22	H21-19B-B	B	6-18"	4/21/22	9:30	4/28/22	8.7	1	1	1	530	474	12	680	2632	1160	305	8.8	24	13.4
39625031	4/19/22	H21-19B-C	C	18-30"	4/21/22	9:56	4/28/22	8.7	1.4	1	1	410	268	5	531	4310	1628	766	20	61	21.7
39625032	4/18/22	H21-16A-A	A	0-6"	4/21/22	10:30	4/28/22	8.6	0.5	3	2	970	651	56	716	3159	605	230	14	32	8.5
39625033	4/18/22	H21-16A-B	B	6-18"	4/21/22	10:30	4/28/22	8.7	1.3	1	1	600	566	11	806	4157	1426	449	15	38	15.5
39625034	4/18/22	H21-16A-C	C	18-30"	4/21/22	10:30	4/28/22	8.7	1.7	2	1	420	312	7	582	5245	1599	770	25	68	20.3
39625035	4/18/22	H21-16A D-A	A	0-6"	4/21/22	10:10	4/28/22	8.7	0.5	2	2	990	648	54	698	3483	605	187	9.9	24	8.1
39625036	4/18/22	H21-16A D-B	B	6-18"	4/21/22	10:10	4/28/22	8.9	1.3	1	1	620	559	12	805	4126	1457	505	20	38	16.5
39625037	4/18/22	H21-16A D-C	C	18-30"	4/21/22	10:10	4/28/22	8.7	1.8	2	1	1230	295	7	616	5766	1748	707	20	49	21.3
39625041	4/11/22	H21-01A D-A DUP	A	0-6"	4/13/22	15:25	4/28/22	8.3	0.5	3	2	880	500	83	577	2159	475	257	22	47	7.7
39625042	4/11/22	H21-01A D-A	A	0-6"	4/13/22	15:25	4/28/22	8.4	0.5	3	2	800	495	72	573	2278	486	258	22	46	7.8
39625043	4/11/22	H21-01A D-B	B	6-18"	4/13/22	15:25	4/28/22	8.7	0.8	2	1	360	472	17	682	4054	866	404	21	39	12.9
39625044	4/11/22	H21-01A D-C	C	18-30"	4/13/22	15:25	4/28/22	8.6	1.4	1	1	1130	305	8	616	5689	1216	785	43	89	17.0
39625045	4/14/22	H21-08A-A	A	0-6"	4/14/22	13:35	4/28/22	8.6	0.8	4	2	620	608	51	738	2665	835	331	18	39	10.9
39625046	4/14/22	H21-08A-B	B	6-18"	4/14/22	13:35	4/28/22	8.8	1.5	1	1	530	529	10	727	4011	1622	1289	58	109	24.7
39625047	4/14/22	H21-08A-C	C	18-30"	4/14/22	13:35	4/28/22	8.8	2.5	1	1	1350	266	9	494	6212	2325	1686	50	156	30.0
39625048	4/14/22	H21-10A-A	A	0-6"	4/14/22	13:49	4/28/22	8.4	0.7	6	1	1000	537	74	599	2052	639	290	19	41	9.4
39625049	4/14/22	H21-10A-B	B	6-18"	4/14/22	13:49	4/28/22	8.7	0.8	2	1	690	482	19	665	1623	963	336	13	31	12.7
39625050	4/14/22	H21-10A-C	C	18-30"	4/14/22	13:49	4/28/22	8.4	1.4	1	1	460	284	6	585	2145	1408	604	21	57	17.3
39625051	4/14/22	H21-10B-A	A	0-6"	4/14/22	14:09	4/28/22	8.3	0.6	10	3	1220	570	63	629	2134	740	264	17	38	8.9
39625052	4/14/22	H21-10B-B	B	6-18"	4/14/22	14:09	4/28/22	8.5	1.1	5	2	630	445	15	690	1992	1163	378	15	32	13.7
39625053	4/14/22	H21-10B-C	C	18-30"	4/14/22	14:09	4/28/22	8.5	1.9	2	1	460	281	5	555	4468	1723	967	39	121	19.5

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Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
39625054	4/14/22	H21-11A-A	A	0-6"	4/14/22	14:32	4/28/22	8.6	0.7	5	2	870	551	59	690	2153	686	256	14	30	9.6
39625055	4/14/22	H21-11A-B	B	6-18"	4/14/22	14:32	4/28/22	8.7	1.2	2	1	550	494	8	724	4169	1371	557	21	42	17.5
39625056	4/14/22	H21-11A-C	C	18-30"	4/14/22	14:32	4/28/22	8.6	2.1	1	1	390	261	5	498	5289	2045	1316	43	146	24.5
39625059	4/11/22	H21-01A-A D	A	0-6"	4/13/22	15:25	4/28/22	8.5	0.5	3	1	950	501	55	567	3296	410	201	20	46	6.2
39625060	4/11/22	H21-01A-A	A	0-6"	4/13/22	15:10	4/28/22	8.4	0.5	3	1	970	535	64	594	2683	432	204	21	46	6.3
39625061	4/11/22	H21-01A-B	B	6-18"	4/13/22	15:10	4/28/22	9	0.7	2	1	550	474	13	666	4167	821	443	21	44	13.7
39625062	4/11/22	H21-01A-C	C	18-30"	4/13/22	15:10	4/28/22	8.9	1.6	2	1	400	280	6	620	5425	1480	1096	14	107	26.5
39625063	4/11/22	H21-03A-A	A	0-6"	4/13/22	14:56	4/28/22	8.7	0.9	10	2	1180	559	56	698	4979	741	356	28	60	9.5
39625064	4/11/22	H21-03A-B	B	6-18"	4/13/22	14:56	4/28/22	8.8	1.6	2	1	560	341	18	628	11160	1206	944	22	123	20.5
39625065	4/11/22	H21-03A-C	C	18-30"	4/13/22	14:56	4/28/22	8.9	2	2	1	380	211	2	613	25240	1312	1528	22	233	25.6
39625066	4/11/22	H21-03B-A	A	0-6"	4/13/22	14:30	4/28/22	8.7	0.7	9	1	1200	563	61	683	4238	635	306	27	52	8.5
39625067	4/11/22	H21-03B-B	B	6-18"	4/13/22	14:30	4/28/22	8.9	1.2	2	1	670	408	19	660	5150	1117	407	13	36	14.7
39625068	4/11/22	H21-03B-C	C	18-30"	4/13/22	14:30	4/28/22	8.8	2.1	2	1	430	230	9	548	13500	1563	1463	14	198	27.1
39625069	4/11/22	H21-04A-A	A	0-6"	4/13/22	13:39	4/28/22	8.5	0.9	22	2	1390	656	68	687	3303	744	411	46	69	9.4
39625070	4/11/22	H21-04A-B	B	6-18"	4/13/22	13:39	4/28/22	8.9	1.2	3	1	610	521	14	748	4070	1198	331	14	28	12.7
39625071	4/11/22	H21-04A-C	C	18-30"	4/13/22	13:39	4/28/22	8.9	1.7	3	1	420	306	9	638	6043	1692	611	8.5	51	20.8
39625072	4/11/22	H21-04B-A	A	0-6"	4/13/22	13:15	4/28/22	8.4	0.9	14	7	1220	678	45	716	2843	645	230	29	45	6.5
39625073	4/11/22	H21-04B-B	B	6-18"	4/13/22	13:15	4/28/22	9	1	4	2	660	450	9	804	4447	1209	348	10	29	14.1
39625074	4/11/22	H21-04B-C	C	18-30"	4/13/22	13:15	4/28/22	9	2.1	5	1	450	209	8	556	8735	2168	911	6.1	79	26.6
39734052	5/2/22	H21-05A-A	A	0-6"	5/4/22	13:44	5/20/22	8.6	0.9	11	2	1360	539	44	731	3669	846	418	24	51	12.1
39734053	5/2/22	H21-05A-A	A	0-6"	5/4/22	13:44	5/20/22	8.6	0.9	9	3	1310	529	45	724	3634	823	829	36	60	20.8
39734054	5/2/22	H21-05A-B	B	6-18"	5/4/22	13:44	5/20/22	8.8	1.4	4	1	670	376	11	718	4951	1372	740	30	53	20.1
39734055	5/2/22	H21-05A-C	C	18-30"	5/4/22	13:44	5/20/22	8.7	2.2	2	2	540	232	7	630	7338	1923	957	36	86	21.8
39734056	5/2/22	H21-05B-A	A	0-6"	5/4/22	13:26	5/20/22	8.6	1.1	8	3	1270	574	60	766	2811	1052	496	23	48	14.8
39734057	5/2/22	H21-05B-B	B	6-18"	5/4/22	13:26	5/20/22	8.6	2.1	2	3	670	400	10	796	4264	1747	147	7.2	20	7.1
39734058	5/2/22	H21-05B-C	C	18-30"	5/4/22	13:26	5/20/22	8.6	2.8	1	2	500	235	8	618	6209	2251	1556	72	200	23.9
39734059	5/5/22	H21-20A-A	A	0-6"	5/10/22	8:35	5/20/22	8.6	0.5	4	3	800	556	63	610	1698	636	119	7	18	6.0
39734060	5/5/22	H21-20A-B	B	6-18"	5/10/22	8:35	5/20/22	8.4	2.2	1	1	460	276	6	511	3100	1647	987	37	131	19.5
39734061	5/5/22	H21-20A-C	C	18-30"	5/10/22	8:35	5/20/22	8.4	1.2	1	1	540	431	19	606	1606	1093	480	16	37	16.5

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Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
39734064	5/5/22	H21-20B-A DUP	A	0-6"	5/10/22	8:10	5/20/22	8.6	0.5	4	3	810	466	49	614	1871	589	195	8.2	22	9.0
39734065	5/5/22	H21-20B-A	A	0-6"	5/10/22	8:10	5/20/22	8.6	0.6	4	3	710	469	46	621	1728	616	231	10	25	9.8
39734066	5/5/22	H21-20B-B	B	6-18"	5/10/22	8:10	5/20/22	8.6	0.9	2	2	520	387	13	649	2191	1108	306	10	28	12.6
39734067	5/5/22	H21-20B-C	C	18-30"	5/10/22	8:10	5/20/22	8.5	1.7	1	2	410	237	6	534	4148	1708	500	11	38	18.4
39734068	5/5/22	H21-18A-A	A	0-6"	5/4/22	9:25	5/20/22	8.8	0.6	3	3	810	547	67	680	2503	641	268	13	30	10.3
39734069	5/5/22	H21-18A-B	B	6-18"	5/4/22	9:25	5/20/22	8.7	1.2	2	1	540	421	11	692	3114	1153	370	12	31	14.4
39734070	5/5/22	H21-18A-C	C	18-30"	5/4/22	9:25	5/20/22	8.7	1.5	1	1	400	288	5	553	5406	1601	438	9.5	34	17.0
39734071	5/5/22	H21-18B-A	A	0-6"	5/10/22	9:05	5/20/22	8.2	0.7	3	3	920	558	79	713	1865	652	287	20	39	9.3
39734072	5/5/22	H21-18B-B	B	6-18"	5/10/22	9:05	5/20/22	8.4	0.9	2	1	540	526	18	785	1782	1034	391	17	35	13.5
39734073	5/5/22	H21-18B-C	C	18-30"	5/10/22	9:05	5/20/22	8.6	1.4	1	1	420	384	8	776	4961	1491	578	17	40	19.2
39734076	4/28/22	H21-14B-A D	A	0-6"	5/10/22	10:39	5/20/22	8.4	0.8	5	4	1160	571	70	756	2238	715	257	14	32	9.5
39734077	4/28/22	H21-14B-A	A	0-6"	5/10/22	10:39	5/20/22	8.3	0.8	5	4	1180	592	66	775	2203	749	305	19	42	9.8
39734078	4/28/22	H21-14B-B	B	6-18"	5/10/22	10:39	5/20/22	8.5	0.9	2	2	650	465	14	747	2810	1019	439	18	40	14.4
39734079	4/28/22	H21-14B-C	C	18-30"	5/10/22	10:39	5/20/22	8.7	1.2	2	2	510	279	8	615	5072	1414	511	12	37	18.7
39734080	4/28/22	H21-17B-A	A	0-6"	5/10/22	9:37	5/20/22	8.4	0.8	5	2	1170	608	88	797	2118	767	283	15	32	10.3
39734081	4/28/22	H21-17B-B	B	6-18"	5/10/22	9:37	5/20/22	8.3	1.2	2	2	630	493	14	858	2230	1267	502	21	42	15.7
39734082	4/28/22	H21-17B-C	C	18-30"	5/10/22	9:37	5/20/22	8.7	1.4	2	2	480	275	6	662	5754	1835	736	17	48	23.1
39734083	4/25/22	H21-02B-A	A	0-6"	4/27/22	13:45	5/20/22	8.5	0.6	8	2	1130	566	76	672	2016	655	260	13	30	9.9
39734084	4/25/22	H21-02B-B	B	6-18"	4/27/22	13:45	5/20/22	8.5	1.3	3	1	610	487	17	720	3176	1180	647	31	62	16.7
39734085	4/25/22	H21-02B-C	C	18-30"	4/27/22	13:45	5/20/22	8.3	2.1	2	1	480	336	7	599	5795	1513	724	32	104	15.8
39734087	5/2/22	H21-07A-A	A	0-6"	5/4/22	12:58	5/20/22	8.4	0.8	9	4	1050	595	63	692	2744	719	264	15	33	9.6
39734088	5/2/22	H21-07A-B	B	6-18"	5/4/22	12:58	5/20/22	8.6	1	2	1	590	478	12	746	4479	1040	241	12	26	9.8
39734089	5/2/22	H21-07A-C	C	18-30"	5/4/22	12:58	5/20/22	8.7	1.5	1	1	1690	274	8	545	6331	1282	445	10	36	16.8
39734090	5/2/22	H21-07ADUP-A	A	0-6"	5/4/22	12:36	5/20/22	8.3	0.8	11	7	1610	628	68	726	2851	705	274	19	41	8.8
39734091	5/2/22	H21-07ADUP-B	B	6-18"	5/4/22	12:36	5/20/22	8.4	0.8	2	1	610	493	12	756	3493	955	313	14	31	11.6
39734092	5/2/22	H21-07ADUP-C	C	18-30"	5/4/22	12:36	5/20/22	8.4	1.3	2	1	440	289	8	594	6384	1189	325	7.3	22	15.4
39734095	4/18/22	H21-12A-A D	A	0-6"	4/21/22	11:20	5/20/22	8.5	0.7	5	3	1020	676	62	870	2734	904	349	18	42	11.3
39734096	4/18/22	H21-12A-A	A	0-6"	4/21/22	11:20	5/20/22	8.5	0.7	5	2	1020	689	65	838	2465	913	321	15	32	11.7
39734097	4/18/22	H21-12A-B	B	6-18"	4/21/22	11:20	5/20/22	8.4	1.8	2	1	700	473	13	730	4894	1743	819	32	72	20.1

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Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
39734098	4/18/22	H21-12A-C	C	18-30"	4/21/22	11:20	5/20/22	8.3	2.6	2	1	490	277	9	542	7136	1902	1185	46	159	21.2
39734099	4/18/22	H21-12B-A	A	0-6"	4/21/22	10:56	5/20/22	8.4	0.6	4	2	1150	711	71	842	2668	781	249	15	36	8.8
39734100	4/18/22	H21-12B-B	B	6-18"	4/21/22	10:56	5/20/22	8.6	1.2	2	1	620	489	11	753	4816	1148	399	16	41	13.3
39734101	4/18/22	H21-12B-C	C	18-30"	4/21/22	10:56	5/20/22	8.6	1.7	2	1	490	279	7	604	6531	1555	780	28	82	18.9
39734102	4/25/22	H21-13A-A	A	0-6"	4/27/22	13:15	5/20/22	8.5	0.7	10	3	910	512	31	788	2817	725	287	17	39	9.7
39734103	4/25/22	H21-13A-B	B	6-18"	4/27/22	13:15	5/20/22	8.6	1	4	2	640	427	10	800	5309	1033	344	16	38	11.9
39734104	4/25/22	H21-13A-C	C	18-30"	4/27/22	13:15	5/20/22	8.7	1	2	1	440	291	10	685	8294	1104	412	14	39	14.4
39734105	4/25/22	H21-13ADUP-A	A	0-6"	4/27/22	11:39	5/20/22	8.5	0.7	8	2	970	526	35	803	2984	701	294	17	38	10.0
39734106	4/25/22	H21-13ADUP-B	B	6-18"	4/27/22	11:39	5/20/22	8.6	0.9	4	2	620	417	8	795	5113	1036	423	20	45	13.2
39734107	4/25/22	H21-13ADUP-C	C	18-30"	4/27/22	11:39	5/20/22	8.7	1	2	1	430	294	10	687	8468	1068	384	13	35	14.1
39734108	4/25/22	H21-09A-A	A	0-6"	4/27/22	10:50	5/20/22	8.4	0.8	7	1	1130	648	43	789	4611	742	296	16	36	10.2
39734109	4/25/22	H21-09A-B	B	6-18"	4/27/22	10:50	5/20/22	8.6	0.8	2	1	600	459	11	725	5989	994	343	13	30	13.2
39734110	4/25/22	H21-09A-C	C	18-30"	4/27/22	10:50	5/20/22	8.8	1.2	1	1	380	264	6	516	10150	1115	383	9	30	15.6
39734113	4/25/22	H21-09B-A D	A	0-6"	4/27/22	10:27	5/20/22	8.5	0.8	8	2	1130	782	63	885	2941	912	369	20	45	11.5
39734114	4/25/22	H21-09B-A	A	0-6"	4/27/22	10:27	5/20/22	8.5	0.8	8	2	1110	776	62	876	2883	900	346	19	43	11.0
39734115	4/25/22	H21-09B-B	B	6-18"	4/27/22	10:27	5/20/22	8.4	1.1	5	2	700	560	11	821	5382	1148	412	19	45	13.0
39734116	4/25/22	H21-09B-C	C	18-30"	4/27/22	10:27	5/20/22	8.6	1.6	2	1	470	312	8	614	9188	1504	837	29	87	19.8
39734117	4/26/22	H21-06A-A	A	0-6"	4/27/22	10:10	5/20/22	8.6	0.7	3	2	930	585	61	716	2267	780	361	16	35	12.6
39734118	4/26/22	H21-06A-B	B	6-18"	4/27/22	10:10	5/20/22	8.4	1.1	1	1	570	486	19	705	2877	1149	573	22	41	17.9
39734119	4/26/22	H21-06A-C	C	18-30"	4/27/22	10:10	5/20/22	8.6	1.5	1	1	450	307	7	603	5122	1523	1087	43	102	22.7
39734120	4/26/22	H21-06B-A	A	0-6"	4/27/22	9:49	5/20/22	8.6	0.7	2	3	880	610	55	815	2831	801	364	20	42	11.5
39734121	4/26/22	H21-06B-B	B	6-18"	4/27/22	9:49	5/20/22	8.5	1.3	1	1	550	508	13	808	3388	1329	660	27	51	18.5
39734122	4/26/22	H21-06B-C	C	18-30"	4/27/22	9:49	5/20/22	8.6	1.8	1	1	420	280	6	596	5329	1732	787	21	62	22.1
39734123	4/26/22	H21-21A-A	A	0-6"	4/27/22	9:27	5/20/22	8.8	0.5	5	2	790	512	55	755	4222	554	234	12	32	8.9
39734124	4/26/22	H21-21A-B	B	6-18"	4/27/22	9:27	5/20/22	8.7	0.6	3	2	700	332	13	644	6522	682	317	13	39	11.2
39734126	4/26/22	H21-21A-C	C	18-30"	4/27/22	9:27	5/20/22	8.7	0.7	2	1	410	214	7	465	10450	799	334	7.5	36	13.1
39734127	4/26/22	H21-22A-A	A	0-6"	4/27/22	9:10	5/20/22	8.7	0.7	9	2	820	555	55	731	2423	796	326	12	30	12.8
39734128	4/26/22	H21-22A-B	B	6-18"	4/27/22	9:10	5/20/22	8.5	1.7	3	1	530	414	18	643	4041	1589	796	21	45	24.4
39734129	4/26/22	H21-22A-C	C	18-30"	4/27/22	9:10	5/20/22	8.3	3.2	2	1	420	300	7	580	5555	2341	1668	64	228	25.1

HLAS 2023

Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
39734132	4/25/22	H21-02A-A DUP	A	0-6"	4/27/22	14:20	5/20/22	8.5	0.5	5	2	870	571	65	714	2122	651	261	13	34	9.5
39734133	4/25/22	H21-02A-A	A	0-6"	4/27/22	14:20	5/20/22	8.6	0.6	5	2	840	577	66	718	2135	655	280	13	31	10.5
39734134	4/25/22	H21-02A-B	B	6-18"	4/27/22	14:20	5/20/22	8.6	0.8	3	2	600	451	12	704	3161	1039	495	17	39	16.5
39734135	4/25/22	H21-02A-C	C	18-30"	4/27/22	14:20	5/20/22	8.6	1.6	2	1	500	279	9	552	5445	1618	1040	32	93	23.7
39734136	4/28/22	H21-15A-A	A	0-6"	5/10/22	13:21	5/20/22	8.5	0.7	6	3	960	552	64	729	2219	718	413	23	45	12.5
39734137	4/28/22	H21-15A-B	B	6-18"	5/10/22	13:21	5/20/22	8.4	1.1	2	1	580	522	20	768	2357	1207	505	17	33	17.8
39734138	4/28/22	H21-15A-C	C	18-30"	5/10/22	13:21	5/20/22	8.4	2	2	1	480	334	6	633	5097	1668	1410	69	189	22.3
39734139	4/28/22	H21-15B-A	A	0-6"	5/10/22	13:07	5/20/22	8.4	1	10	2	1100	685	73	939	2437	1000	630	47	98	13.0
39734140	4/28/22	H21-15B-B	B	6-18"	5/10/22	13:07	5/20/22	8.4	1.2	3	1	640	593	15	885	2688	1297	601	30	68	15.2
39734141	4/28/22	H21-15B-C	C	18-30"	5/10/22	13:07	5/20/22	8.4	1.3	2	2	530	319	6	665	6442	1571	686	23	70	18.1
39734142	4/28/22	H21-14A-A	A	0-6"	5/10/22	11:05	5/20/22	8.1	0.8	9	4	1050	605	61	791	2617	788	365	21	50	10.8
39734143	4/28/22	H21-14A-B	B	6-18"	5/10/22	11:05	5/20/22	8.5	1.2	2	3	650	416	18	661	5010	1261	519	15	39	17.8
39734144	4/28/22	H21-14A-C	C	18-30"	5/10/22	11:05	5/20/22	8.2	1.9	2	2	540	282	11	520	6006	1730	1028	31	22	32.9
39734145	4/28/22	H21-17A-A	A	0-6"	5/10/22	10:15	5/20/22	8.2	0.8	7	3	980	545	43	702	2978	881	540	28	65	14.1
39734146	4/28/22	H21-17A-B	B	6-18"	5/10/22	10:15	5/20/22	8.1	1.2	3	3	690	506	14	812	2627	1217	602	27	60	16.2
39734147	4/28/22	H21-17A-C	C	18-30"	5/10/22	10:15	5/20/22	8.3	1.4	2	3	530	312	9	636	5181	1427	708	28	86	16.9

Section B

Soil Sample

Sampling and Compositing

Time and Date Information

C[illegible] of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook FY2022-2023

HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 0 8 A	H0 8 A	4-25	1	a, b, c	0730	2		Signature
Analyses:	H0 8-2	4-25	2	a, b, c	0801	1		Date
pH EC NO3-N NH4-N TKN	H0 8-6	4-25	3	a, b, c	0817	4		Time
P K Na Mg Ca SAR	H0 8-7	4-25	4	a, b, c	0828	2	Depths:	
	H0 8-5	4-25	5	a, b, c	0844	3	a = 0-6"	
Container: HDPE Tube	H0 8-4	4-25	6	a, b, c	0903	2	b = 6-18"	
Preservative: Ice	H0 8-3	4-25	7	a, b, c	0912	0	c = 18-30"	
H23 H 1 1 A	H 1 1-A	4-25	1	a, b, c	0958	2		Signature
Analyses:	H 1 1-4	4-25	2	a, b, c	1009	3		Date
pH EC NO3-N NH4-N TKN	H 11-A6	4-25	3	a, b, c	1027	2		Time
P K Na Mg Ca SAR	H 11-A1	4-25	4	a, b, c	1035	4	Depths:	
	H 11-A5	4-25	5	a, b, c	1044	2	a = 0-6"	
Container: HDPE Tube	H 11-A3	4-25	6	a, b, c	1051	3	b = 6-18"	
Preservative: Ice	H 11-A 2	4-25	7	a, b, c	1123	4	c = 18-30"	
H23 H 1 1 B	H 1 1-1	4-26	1	a, b, c	0701	2		Signature
Analyses:	H 11B-6	4-26	2	a, b, c	0712	2		Date
pH EC NO3-N NH4-N TKN	H 11B-5	4-26	3	a, b, c	0718	4		Time
P K Na Mg Ca SAR	H 11B-2	4-26	4	a, b, c	0727	4	Depths:	
	H 11B-3	4-26	5	a, b, c	0737	2	a = 0-6"	
Container: HDPE Tube	H 11B-4	4-26	6	a, b, c	0758	4	b = 6-18"	
Preservative: Ice	H 11B-1	4-26	7	a, b, c	0843	4	c = 18-30"	

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Soil Sampling Logbook FY2022-2023

HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H01A	H01-1	4-26	1	a, b, c	0925	4	Signature	
Analyses:	H01-6	4-26	2	a, b, c	0942	2		Date
pH EC NO3-N NH4-N TKN	H01-2	4-26	3	a, b, c	0949	0		Time
P K Na Mg Ca SAR	H01-3	4-26	4	a, b, c	0957	2	Depths:	
	H01-4	4-26	5	a, b, c	1006	2	a = 0-6"	
Container: HDPE,Tube	H01-7	4-26	6	a, b, c	1014	0	b =6-18"	
Preservative: Ice	H01-5	4-26	7	a, b, c	1021	2	c =18-30"	
H23 H03A	H03-A-1	4-26	1	a, b, c	1034	2	Signature	
Analyses:	H03-6	4-26	2	a, b, c	1048	2		Date
pH EC NO3-N NH4-N TKN	H03-4	4-26	3	a, b, c	1055	2		Time
P K Na Mg Ca SAR	H03-5	4/26	4	a, b, c	1103	2	Depths:	
	H03-2	4/26	5	a, b, c	1109	4	a = 0-6"	
Container: HDPE Tube	H03-3	4/26	6	a, b, c	1116	0	b =6-18"	
Preservative: Ice	H03-7	4/26	7	a, b, c	1127	4	c =18-30"	
H23 H[illegible]	H[illegible]	[illegible]	1	a, b, c	[illegible]	2	Signature	
Analyses:	H03-B-2	4-27	2	a, b, c	0805	0		Date
pH EC NO3-N NH4-N TKN	H03-B-7	4-27	3	a, b, c	0814	5		Time
P K Na Mg Ca SAR	H03-B-6	4-27	4	a, b, c	0826	2	Depths:	
	H03-B-5	4-27	5	a, b, c	0832	2	a = 0-6"	
Container: HDPE Tube	H03-B-4	4-27	6	a, b, c	0839	4	b =6-18"	
Preservative: Ice	H03B-3	4-27	7	a, b, c	0900	3	c =18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H O 2 B	H O 2-B1	4 27	1	a, b, c	0917	1	Signature	
Analyses:	HO 2-B6	4-27	2	a, b, c	0926	1		Date
pH EC NO3-N NH4-N TKN	HO 2-B-7	4-27	3	a, b, c	0933	2		Time
P K Na Mg Ca SAR	HO2-B-5	4-27	4	a, b, c	0940	2	Depths:	
	HO2-B3	4-27	5	a, b, c	0946	5	a = 0-6"	
Container: HDPE Tube	HO2-B-4	4-27	6	a, b, c	0954	0	b =6-18"	
Preservative: Ice	HO2B-2	4-27	7	a, b, c	1000	4	c =18-30"	
H23 H O 2 A	H O 2 A-1	4-27	1	a, b, c	1019	4	Signature	
Analyses:	HO 2A5	4-27	2	a, b, c	1028	2		Date
pH EC NO3-N NH4-N TKN	HO 2-A-7	4-27	3	a, b, c	1034	3		Time
P K Na Mg Ca SAR	HO2-A-6	4-27	4	a, b, c	1045	2	Depths:	
	HO2A-4	4-27	5	a, b, c	1051	0	a = 0-6"	
Container: HDPE Tube	HO2A-3	4-27	6	a, b, c	1059	4	b =6-18"	
Preservative: Ice	HO2A-2	4-27	7	a, b, c	1111	4	c =18-30"	
H23 _ _ _ _	H _ _ _		1	a, b, c			Signature	
Analyses:			2	a, b, c				Date
pH EC NO3-N NH4-N TKN			3	a, b, c				Time
P K Na Mg Ca SAR			4	a, b, c			Depths:	
			5	a, b, c			a = 0-6"	
Container: HDPE Tube			6	a, b, c			b =6-18"	
Preservative: Ice			7	a, b, c			c =18-30"	

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Soil Sampling Logbook FY2022-2023

HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 0 9 A	H 0 9 A1	5/3	1	a, b, c	0720	5	Signature	
Analyses:	H09A6	5/3	2	a, b, c	0730	4		Date
pH EC NO3-N NH4-N TKN	H09A7	5/3	3	a, b, c	0735	4		Time
P K Na Mg Ca SAR	H09A5	5/3	4	a, b, c	0745	5	Depths:	/
	H09A3	5/3	5	a, b, c	0755	1	a = 0-6"	
Container: HDPE Tube	H09A4	5/3	6	a, b, c	0801	4	b = 6-18"	
Preservative: Ice	H09A2	5/3	7	a, b, c	0813	4	c = 18-30"	
H23 H 0 9 B	H 0 9 B1	5/3	1	a, b, c	0831	4	Signature	
Analyses:	H09B5	5/3	2	a, b, c	0839	1		Date
pH EC NO3-N NH4-N TKN	H09B6	5/3	3	a, b, c	0845	4		Time
P K Na Mg Ca SAR	H09B4	5/3	4	a, b, c	0901	4	Depths:	
	H09B2	5/3	5	a, b, c	0913	2	a = 0-6"	
Container: HDPE Tube	H09B3	5/3	6	a, b, c	0919	1	b = 6-18"	
Preservative: Ice	H09B7	5/3	7	a, b, c	0926	2	c = 18-30"	
H23 H 1 2 A	H 1 2 A1	5/3	1	a, b, c	0955	2	Signature	
Analyses:	H12-A-6	5/3	2	a, b, c	1002	2		Date
pH EC NO3-N NH4-N TKN	H12-A-7	5/3	3	a, b, c	1009	2		Time
P K Na Mg Ca SAR	H12A-5	5/3	4	a, b, c	1016	1	Depths:	
	H12A-4	5/3	5	a, b, c	1028	2	a = 0-6"	
Container: HDPE Tube	H12A-3	5/3	6	a, b, c	1039	1	b = 6-18"	
Preservative: Ice	H12A-2	5/3	7	a, b, c	1047	1	c = 18-30"	

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Soil Sampling Logbook FY2022-2023

HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 1 2 B-8	H 1 2 B1	5/3	1	a, b, c	1115	1	Signature	
Analyses:	H 1 2 B2	5/3	2	a, b, c	1122	0		Date
pH EC NO3-N NH4-N TKN	H 1 2 B 7	5/3	3	a, b, c	1127	2		Time
P K Na Mg Ca SAR	H 1 2 B 6	5/3	4	a, b, c	1134	5	Depths:	
	H 1 2 B 4	5/3	5	a, b, c	1139	0	a = 0-6"	
Container: HDPE Tube	H 1 2 B 5	5/3	6	a, b, c	1143	4	b =6-18"	
Preservative: Ice	H 1 2 B 3	5/3	7	a, b, c	1158	2	c =18-30"	
H23 H 1 6 A	H 1 6 1	5/8	1	a, b, c	0727	1	Signature	
Analyses:	H 16-6	5/8	2	a, b, c	0748	5		Date
pH EC NO3-N NH4-N TKN	H 16-2	5/8	3	a, b, c	0758	4		Time
P K Na Mg Ca SAR	H 16-5	5/8	4	a, b, c	0808	1	Depths:	
	H 16-7	5/8	5	a, b, c	0829	2	a = 0-6"	
Container: HDPE Tube	H 16-4	5/8	6	a, b, c	0841	2	b =6-18"	
Preservative: Ice	H 16-3	5/8	7	a, b, c	0856	2	c =18-30"	
H23 H 1 6 Dup	H 1 6 1	5/8	1	a, b, c	0732	1	Signature	
Analyses:	H 16-6	5/8	2	a, b, c	0748	5		Date
pH EC NO3-N NH4-N TKN	H 16-2	5/8	3	a, b, c	0758	4		Time
P K Na Mg Ca SAR	H 16-5	5/8	4	a, b, c	[illegible]	1	Depths:	
	H 16-7	5/8	5	a, b, c	0829	2	a = 0-6"	
Container: HDPE Tube	H 16-4	5/8	6	a, b, c	0829	1	b =6-18"	
Preservative: Ice	H 16-3	5/8	7	a, b, c	0856	2	c =18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 1 9 A	H 1 9 1	5/8	1	a, b, c	0925	5	Signature	
Analyses:	H 1 9 6	5/8	2	a, b, c	0935	2		Date
pH EC NO3-N NH4-N TKN	H 1 9 7	5/8	3	a, b, c	0945	2		Time
P K Na Mg Ca SAR	H 1 9 5	5/8	4	a, b, c	0958	2	Depths:	
	H 1 9 3	5/8	5	a, b, c	1007	4	a = 0-6"	
Container: HDPE Tube	H 1 9 4	5/8	6	a, b, c	1016	4	b = 6-18"	
Preservative: Ice	H 1 9 2	5/8	7	a, b, c	1033	2	c = 18-30"	
H23 H 1 9 B	H 1 9 1	5/8	1	a, b, c	1046	4	Signature	
Analyses:	H 1 9 4	5/8	2	a, b, c	1055	5		Date
pH EC NO3-N NH4-N TKN	H 1 9 6	5/8	3	a, b, c	1107	5		Time
P K Na Mg Ca SAR	H 1 9 7	5/8	4	a, b, c	1115	4	Depths:	
	H 1 9 5	5/8	5	a, b, c	1126	2	a = 0-6"	
Container: HDPE Tube	H 1 9 3	5/8	6	a, b, c	1132	5	b = 6-18"	
Preservative: Ice	H 1 9 2	5/8	7	a, b, c	1140	4	c = 18-30"	
H23 H 1 5 B	H 1 5 1	5/9	1	a, b, c	0806	4	Signature	
Analyses:	H 1 5 2	5/9	2	a, b, c	0813	5		Date
pH EC NO3-N NH4-N TKN	H 1 5 6	5/9	3	a, b, c	0822	4		Time
P K Na Mg Ca SAR	H 1 5 5	5/9	4	a, b, c	0831	3	Depths:	
	H 1 5 3	5/9	5	a, b, c	0840	1	a = 0-6"	
Container: HDPE Tube	H 1 5 7	5/9	6	a, b, c	0850	0	b = 6-18"	
Preservative: Ice	H 1 5 4	5/9	7	a, b, c	0900	2	c = 18-30"	

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Soil Sampling Logbook FY2022-2023

HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 1 5 A	H 1 5 1	5/9	1	a, b, c	0915	4		Signature
Analyses:	H 5 2	5/9	2	a, b, c	0921	0		Date
pH EC NO3-N NH4-N TKN	H 5 6	5/9	3	a, b, c	0927	1		Time
P K Na Mg Ca SAR	H 5 5	5/9	4	a, b, c	0945	1	Depths:	
	H 5 7	5/9	5	a, b, c	0955	2	a = 0-6"	
Container: HDPE Tube	H 5 4	5/9	6	a, b, c	0955	2	b = 6-18"	
Preservative: Ice	H 5 3	5/9	7	a, b, c	1002	1	c = 18-30"	
H23 H 1 4 A	H 1 4 1	5/9	1	a, b, c	1019	3		Signature
Analyses:	H 4 6	5/9	2	a, b, c	1026	5		Date
pH EC NO3-N NH4-N TKN	H 4 2	5/9	3	a, b, c	1034	1		Time
P K Na Mg Ca SAR	H 4 3	5/9	4	a, b, c	1047	4	Depths:	
	H 4 4	5/9	5	a, b, c	1053	[illegible]	a = 0-6"	
Container: HDPE Tube	H 4 5	5/9	6	a, b, c	1100	4	b = 6-18"	
Preservative: Ice	H 4 7	5/9	7	a, b, c	1101	2	c = 18-30"	
H23 H 1 4 B	H 1 4 1	5/10	1	a, b, c	0729	2		Signature
Analyses:	H 4 6	5/10	2	a, b, c	0735	2		Date
pH EC NO3-N NH4-N TKN	H 4 2	5/10	3	a, b, c	0743	0		Time
P K Na Mg Ca SAR	H 4 7	5/10	4	a, b, c	0752	1	Depths:	
	H 4 5	5/10	5	a, b, c	0800	1	a = 0-6"	
Container: HDPE Tube	H 4 3	5/10	6	a, b, c	0806	2	b = 6-18"	
Preservative: Ice	H 4 4	5/10	7	a, b, c	0814	5	c = 18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 1 7 A	H 1 7 1	5/10	1	a, b, c	0834	3	Signature	
Analyses:	H 1 7 4	5/10	2	a, b, c	0855	4	Date	
pH EC NO3-N NH4-N TKN	H 1 7 6	5/10	3	a, b, c	[illegible]	4	Time	
P K Na Mg Ca SAR	H 1 7 7	5/10	4	a, b, c	0921	5	Depths:	
	H 1 7 5	5/10	5	a, b, c	1034	2	a = 0-6"	
Container: HDPE Tube	H 1 7 3	5/10	6	a, b, c	1045	4	b =6-18"	
Preservative: Ice	H 1 7 2	5/10	7	a, b, c	1058	1	c =18-30"	
H23 H 1 8 B	H 1 8 1	5/11	1	a, b, c	0757	2	Signature	
Analyses:	H 1 8 2	5/11	2	a, b, c	0807	2	Date	
pH EC NO3-N NH4-N TKN	H 1 8 3	5/11	3	a, b, c	0816	1	Time	
P K Na Mg Ca SAR	H 1 8 6	5/11	4	a, b, c	0825	4	Depths:	
	H 1 8 7	5/11	5	a, b, c	0830	4	a = 0-6"	
Container: HDPE Tube	H 1 8 5	5/11	6	a, b, c	0841	4	b =6-18"	
Preservative: Ice	H 1 8 4	5/11	7	a, b, c	0857	0	c =18-30"	
H23 H 1 8 A	H 1 8 1	5/11	1	a, b, c	0910	5	Signature	
Analyses:	H 1 8 5	5/11	2	a, b, c	0917	5	Date	
pH EC NO3-N NH4-N TKN	H 1 8 7	5/11	3	a, b, c	0924	0	Time	
P K Na Mg Ca SAR	H 1 8 4	5/11	4	a, b, c	0936	5	Depths:	
	H 1 8 2	5/11	5	a, b, c	0944	5	a = 0-6"	
Container: HDPE Tube	H 1 8 6	5/11	6	a, b, c	0951	5	b =6-18"	
Preservative: Ice	H 1 8 3	5/11	7	a, b, c	1009	5	c =18-30"	

C[illegible] of Lubbock/Sampling and Monitoring Department
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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H L O B	H 1 0 1	5/16	1	a, b, c	0717	4		Signature
Analyses:	H10 2	5/16	2	a, b, c	0723	0		Date
pH EC NO3-N NH4-N TKN	H10 6	5/16	3	a, b, c	0732	5		Time
P K Na Mg Ca SAR	H10 7	5/16	4	a, b, c	0738	3	Depths:	
	H10 4	5/16	5	a, b, c	0746	4	a = 0-6"	
Container: HDPE Tube	H10 3	5/16	6	a, b, c	0756	2	b =6-18"	
Preservative: Ice	H10 5	5/16	7	a, b, c	0803	2	c =18-30"	
H23 H L O H	H 1 0 1	5/16	1	a, b, c	0822	2		Signature
Analyses:	H10 2	5/16	2	a, b, c	0831	2		Date
pH EC NO3-N NH4-N TKN	H10 3	5/16	3	a, b, c	0839	4		Time
P K Na Mg Ca SAR	H10 6	5/16	4	a, b, c	0848	5	Depths:	
	H10 5	5/16	5	a, b, c	0852	2	a = 0-6"	
Container: HDPE Tube	H10 4	5/16	6	a, b, c	0900	3	b =6-18"	
Preservative: Ice	H10 7	5/16	7	a, b, c	0910	2	c =18-30"	
H23 H O 1 A	H 0 1 1	5/16	1	a, b, c	1030	4		Signature
Analyses:	H07 4	5/16	2	a, b, c	1043	4		Date
pH EC NO3-N NH4-N TKN	H07 5	5/16	3	a, b, c	[illegible]	2		Time
P K Na Mg Ca SAR	H07 7	5/16	4	a, b, c	[illegible]	3	Depths:	
	H07 6	5/16	5	a, b, c	1015	2	a = 0-6"	
Container: HDPE Tube	H07 2	5/16	6	a, b, c	1029	3	b =6-18"	
Preservative: Ice	H07 3	5/16	7	a, b, c	1045	3	c =18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H07A	H071	5/16	1	a, b, c	0930	4	Signature	
Analyses:	H074	5/16	2	a, b, c	0943	2		Date
pH EC NO3-N NH4-N TKN	H075	5/16	3	a, b, c	0954	2		Time
P K Na Mg Ca SAR	H077	5/16	4	a, b, c	1006	3	Depths:	
	H076	5/16	5	a, b, c	1015	2	a = 0-6"	
Container: HDPE Tube	H072	5/16	6	a, b, c	1029	3	b = 6-18"	
Preservative: Ice	H073	5/16	7	a, b, c	1045	3	c = 18-30"	
H23 H04B	H041	5/17	1	a, b, c	0736	3	Signature	
Analyses:	H047	5/17	2	a, b, c	0742	4		Date
pH EC NO3-N NH4-N TKN	H042	5/17	3	a, b, c	0751	5		Time
P K Na Mg Ca SAR	H046	5/17	4	a, b, c	0757	5	Depths:	
	H046	5/17	5	a, b, c	0804	5	a = 0-6"	
Container: HDPE Tube	H043	5/17	6	a, b, c	0810	2	b = 6-18"	
Preservative: Ice	H044	5/17	7	a, b, c	0816	1	c = 18-30"	
H23 H04A	H041	5/17	1	a, b, c	0829	4	Signature	
Analyses:	H046	5/17	2	a, b, c	0839	3		Date
pH EC NO3-N NH4-N TKN	H047	5/17	3	a, b, c	0848	5		Time
P K Na Mg Ca SAR	H045	5/17	4	a, b, c	0855	0	Depths:	
	H049	5/17	5	a, b, c	0905	3	a = 0-6"	
Container: HDPE Tube	H043	5/17	6	a, b, c	0912	0	b = 6-18"	
Preservative: Ice	H042	5/17	7	a, b, c	0924	2	c = 18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 1 3 A	H 1 3 1	5/18	1	a, b, c	0932	2	Signature	
Analyses:	H135	5/18	2	a, b, c	0954	3		Date
pH EC NO3-N NH4-N TKN	H137	5/18	3	a, b, c	1035	5		Time
P K Na Mg Ca SAR	H136	5/18	4	a, b, c	1101	3	Depths:	
	H132	5/18	5	a, b, c	1110	5	a = 0-6"	
Container: HDPE Tube	H133	5/18	6	a, b, c	1121	3	b =6-18"	
Preservative: Ice	H134	5/18	7	a, b, c	1135	4	c =18-30"	
H23 H 1 3 A DUP	H 1 3 1	5/18	1	a, b, c	0932	2	Signature	
Analyses:	H135	5/18	2	a, b, c	0954	3		Date
pH EC NO3-N NH4-N TKN	H137	5/18	3	a, b, c	1035	5		Time
P K Na Mg Ca SAR	H136	5/18	4	a, b, c	1101	3	Depths:	
	H132	5/18	5	a, b, c	1110	5	a = 0-6"	
Container: HDPE Tube	H133	5/18	6	a, b, c	1121	3	b =6-18"	
Preservative: Ice	H134	5/18	7	a, b, c	1135	4	c =18-30"	
H23 _ _ _ _	H _ _ _		1	a, b, c			Signature	
Analyses:			2	a, b, c				Date
pH EC NO3-N NH4-N TKN			3	a, b, c				Time
P K Na Mg Ca SAR			4	a, b, c			Depths:	
			5	a, b, c			a = 0-6"	
Container: HDPE Tube			6	a, b, c			b =6-18"	
Preservative: Ice			7	a, b, c			c =18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H L 7 B	H 1 7 1	5/17	1	a, b, c	1000	4	Signature	
Analyses:	H 1 7 6	5/17	2	a, b, c	1010	4		Date
pH EC NO3-N NH4-N TKN	H 1 7 7	5/17	3	a, b, c	1017	2		Time
P K Na Mg Ca SAR	H 1 7 5	5/17	4	a, b, c	1024	1	Depths:	
	H 1 7 2	5/17	5	a, b, c	1030	5	a = 0-6"	
Container: HDPE,Tube	H 1 7 3	5/17	6	a, b, c	1037	2	b =6-18"	
Preservative: Ice	H 1 7 4	5/17	7	a, b, c	1044	4	c =18-30"	
H23 H L 9 B	H 1 9 1	5/18	1	a, b, c	0720	3	Signature	
Analyses:	H 1 9 2	5/18	2	a, b, c	0735	2		Date
pH EC NO3-N NH4-N TKN	H 1 9 6	5/18	3	a, b, c	0743	5		Time
P K Na Mg Ca SAR	H 1 9 7	5/18	4	a, b, c	0751	5	Depths:	
	H 1 9 5	5/18	5	a, b, c	0758	4	a = 0-6"	
Container: HDPE Tube	H 1 9 3	5/18	6	a, b, c	0806	4	b =6-18"	
Preservative: Ice	H 1 9 4	5/18	7	a, b, c	0813	4	c =18-30"	
H23 H 2 0 B	H 2 0 1	5/18	1	a, b, c	0823	3	Signature	
Analyses:	H 2 0 6	5/18	2	a, b, c	0833	4		Date
pH EC NO3-N NH4-N TKN			3	a, b, c				Time
P K Na Mg Ca SAR			4	a, b, c			Depths:	
			5	a, b, c			a = 0-6"	
Container: HDPE Tube			6	a, b, c			b =6-18"	
Preservative: Ice			7	a, b, c			c =18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 0 6 A	H 0 6 1	5/23	1	a, b, c	0714	4	Signature	
Analyses:	H065	5/23	2	a, b, c	0721	4		Date
pH EC NO3-N NH4-N TKN	H061	5/23	3	a, b, c	0730	2		Time
P K Na Mg Ca SAR	H064	5/23	4	a, b, c	0740	4	Depths:	
	H066	5/23	5	a, b, c	0746	5	a = 0-6"	
Container: HDPE Tube	H063	5/23	6	a, b, c	0752	2	b = 6-18"	
Preservative: Ice	H063	5/23	7	a, b, c	0805	5	c = 18-30"	
H23 H 0 6 B	H 0 6 1	5/23	1	a, b, c	815	2	Signature	
Analyses:	H065	5/23	2	a, b, c	0829	0		Date
pH EC NO3-N NH4-N TKN	H066	5/23	3	a, b, c	0840	0		Time
P K Na Mg Ca SAR	H061	5/23	4	a, b, c	0845	2	Depths:	
	H062	5/23	5	a, b, c	0857	5	a = 0-6"	
Container: HDPE Tube	H063	5/23	6	a, b, c	0904	2	b = 6-18"	
Preservative: Ice	H064	5/23	7	a, b, c	0910	4	c = 18-30"	
H23 H 1 1 A	H 1 1 1	5/23	1	a, b, c	0954	2	Signature	
Analyses:	H116	5/23	2	a, b, c	1021	5		Date
pH EC NO3-N NH4-N TKN	H115	5/23	3	a, b, c	1031	5		Time
P K Na Mg Ca SAR	H117	5/23	4	a, b, c	1047	4	Depths:	
	H112	5/23	5	a, b, c	1053	3	a = 0-6"	
Container: HDPE Tube	H113	5/23	6	a, b, c	1059	2	b = 6-18"	
Preservative: Ice	H114	5/23	7	a, b, c	1105	4	c = 18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 2 0 B	H 2 0 1	5/31	1	a, b, c	102	4	Signature	
Analyses:	H206	5/31	2	a, b, c	1026	3		Date
pH EC NO3-N NH4-N TKN	H205	5/31	3	a, b, c	1032	2		Time
P K Na Mg Ca SAR	H207	5/31	4	a, b, c	1037	4	Depths:	
	H204	5/31	5	a, b, c	1044	1	a = 0-6"	
Container: HDPE Tube	H203	5/31	6	a, b, c	1052	4	b = 6-18"	
Preservative: Ice	H202	5/31	7	a, b, c	1101	1	c = 18-30"	
H23 H 2 0 A	H 2 0 1	5/31	1	a, b, c	1113	5	Signature	
Analyses:	H206	5/31	2	a, b, c	1122	2		Date
pH EC NO3-N NH4-N TKN	H204	5/31	3	a, b, c	1129	2		Time
P K Na Mg Ca SAR	H203	5/31	4	a, b, c	1134	2	Depths:	
	H202	5/31	5	a, b, c	1141	1	a = 0-6"	
Container: HDPE Tube	H205	5/31	6	a, b, c	1150	5	b = 6-18"	
Preservative: Ice	H207	5/31	7	a, b, c	1159	2	c = 18-30"	
H23 H 0 5 A	H 0 5 A1	5/31	1	a, b, c	0332	5	Signature	
Analyses:	H055	5/31	2	a, b, c	0343	4		Date
pH EC NO3-N NH4-N TKN	H054	5/31	3	a, b, c	1353	5		Time
P K Na Mg Ca SAR	H056	5/31	4	a, b, c	1359	2	Depths:	
	H053	5/31	5	a, b, c	1419	2	a = 0-6"	
Container: HDPE Tube	H057	5/31	6	a, b, c	1429	3	b = 6-18"	
Preservative: Ice	H052	5/31	7	a, b, c	1439	2	c = 18-30"	

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HLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
H23 H 1 5B	H 051	6/6	1	a, b, c	0810	3	Signature	
Analyses:	H056	6/6	2	a, b, c	0816	4		Date
pH EC NO3-N NH4-N TKN	H057	6/6	3	a, b, c	0824	4		Time
P K Na Mg Ca SAR	H055	6/6	4	a, b, c	0829	3	Depths:	
	H053	6/6	5	a, b, c	0847	4	a = 0-6"	
Container: HDPE Tube	H052	6/6	6	a, b, c	0902	2	b = 6-18"	
Preservative: Ice	H054	6/6	7	a, b, c	09[illegible]	1	c = 18-30"	
H23 H 2 2 A	H221	6/6	1	a, b, c	013	3	Signature	
Analyses:	H224	6/6	2	a, b, c	1020	1		Date
pH EC NO3-N NH4-N TKN	H226	6/6	3	a, b, c	1026	4		Time
P K Na Mg Ca SAR	H227	6/6	4	a, b, c	1032	4	Depths:	
	H222	6/6	5	a, b, c	1042	4	a = 0-6"	
Container: HDPE Tube	H223	6/6	6	a, b, c	1046	5	b = 6-18"	
Preservative: Ice	H225	6/6	7	a, b, c	1051	5	c = 18-30"	
H23 _____	H _____		1	a, b, c			Signature	
Analyses:			2	a, b, c				Date
pH EC NO3-N NH4-N TKN			3	a, b, c				Time
P K Na Mg Ca SAR			4	a, b, c			Depths:	
			5	a, b, c			a = 0-6"	
Container: HDPE Tube			6	a, b, c			b = 6-18"	
Preservative: Ice			7	a, b, c			c = 18-30"	

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	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H11-A-	A	4-25	7	A	1410	Yes	
2	H-23-H11A-	B	4-25	7	B	1410	Yes	
3	H-23-H11A-	C	4-25	7	C	1410	Yes	
4	H-23-H08-A	A	4-25	7	A	1508	Yes	
5	H-23-HC8-A	B	4-25	7	B	1508	Yes	
6	H-23-H08-A	C	4-25	7	C	1508	Yes	
7	H-23-HC3-A	A	4/26	7	A	1318	Yes	
8	H-23-HC3-A	B	4-26	7	B	1318	Yes	
9	H-23-HC3-A	C	4-26	7	C	1318	Yes	
10	H23-H11-B	A	4-26	7	A	1438	Yes	
11	H23-H11-B	B	4-26	7	B	1438	Yes	
12	H23-H11-B	C	4-26	7	C	1438	Yes	

Notes:

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	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H01-A	A	4-26	7	A	1530	Yes	RS
2	H23-H01-A	B	4-26	7	B	1530	Yes	
3	H23-H01-A	C	4-26	7	C	1530	Yes	
4	H23-H02-A	A	4-27	7	A	1345	Yes	RG
5	H23-H02-A	B	4-27	7	B	1345	Yes	
6	H23-H02-A	C	4-27	7	C	1345	Yes	
7	H23-H03-B	A	4-27	7	A	14-0	Yes	RG
8	H23 H03-B	B	4-27	7	B	1430	Yes	
9	H23 H03-B	C	4-27	7	C	1430	Yes	
10	H23-H02-B	A	4-27	7	A	1515	Yes	
11	H23-H02-B	B	4-27	7	B	1515	Yes	
12	H23 H02-B	C	4-27	7	C	1515	Yes	

Notes:

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	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H09-A	A	5/3	7	A	14:00	Yes	
2	H23-H09-A	B	5/3	7	B	1400	Yes	
3	H23-H09-A	C	5/3	7	C	1400	Yes	
4	H23-H09-B	A	5/3	7	A	1440	Yes	
5	H23-H09-B	B	5/3	7	B	1440	Yes	
6	H23-H09-B	C	5/3	7	C	1440	Yes	
7	H23-H12-B	A	5/3	7	A	1510	Yes	
8	H23-H12-B	B	5/3	7	B	1510	Yes	
9	H23-H12-B	C	5/3	7	C	1510	Yes	
10	H23-H12-A	A	5/4	7	A	0835	Yes	
11	H23-H12-A	B	5/4	7	B	0835	Yes	
12	H23-H12-A	C	5/4	7	C	0835	Yes	

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	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H19-B	A	5/8	7	A	1400	Yes	
2	H23-H19-B	B	5/8	7	B	1400	Yes	
3	H23-H19-B	C	5/8	7	C	1400	Yes	
4	H23-H19-A	A	5/8	7	A	1450	Yes	
5	H23-H19-A	B	5/8	7	B	1450	Yes	
6	H23-H19-A	C	5/8	7	C	1450	Yes	
7	H23-H16-A	A	5/8	7	A	1528	Yes	
8	H23-H16-A	B	5/8	7	B	1528	Yes	
9	H23-H16-A	C	5/8	7	C	1528	Yes	
10	H23-16A DUP	A	5/9	7	A	1400	Yes	
11	H23-16A-DUP	B	5/9	7	B	1400	Yes	
12	H23-16A-DUP	C	5/9	7	C	1400	Yes	

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	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H15-A	A	5/9	7	A	1500	Yes	
2	H23-H15-A	B	5/9	7	B	1500	Yes	
3	H23-H15-A	C	5/9	7	C	1500	Yes	
4	H23-H14-A	A	5/10	7	A	1240	Yes	
5	H23-H14-A	B	5/10	7	B	1240	Yes	
6	H23-H14-A	C	5/10	7	C	1240	Yes	
7	H15-B H23-H15B	A	5/10	7	A	1330	Yes	
8	H23-H15-B	B	5/10	7	B	1330	Yes	
9	H23-H15-B	C	5/10	7	C	1330	Yes	
10	H23 H14B	A	5/10	7	A	1430	Yes	
11	H23-H14B	B	5/10	7	B	1430	Yes	
12	H23-H14B	C	5/10	7	C	1430	Yes	

Notes:

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	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H17-A	A	5/10	7	A	1550	Yes	
2	H23-H17-A	B	5/10	7	B	1550	Yes	
3	H23-H17-A	C	5/10	7	C	1550	Yes	
4	H23-H18-B	A	5/11	7	A	1315	Yes	
5	H23-H18-B	B	5/11	7	B	1315	Yes	
6	H23-H18-B	C	5/11	7	C	1315	Yes	
7	H23-H18-A	A	5/11	7	A	1430	Yes	
8	H23-H18-A	B	5/11	7	B	1430	Yes	
9	H23-H18-A	C	5/11	7	C	1430	Yes	
10				7			Yes	
11				7			Yes	
12				7			Yes	

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	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H10-B	A	5/16	7	A	1430	Yes	
2	H23-H10-B	B	5/16	7	B	1430	Yes	
3	H23-H10-B	C	5/16	7	C	1430	Yes	
4	H23-H10-A	A	5/16	7	A	1530	Yes	
5	H23-H10-A	B	5/16	7	B	1530	Yes	
6	H23-H10-A	C	5/16	7	C	1530	Yes	
7	H23-H07-A	A	5/17	7		1338	Yes	
8	H23-H07-A	B	5/17	7		1338	Yes	
9	H23-H07-A	C	5/17	7		1338	Yes	
10	H23-H07-A-Dup	A	5/17	7	A	1430	Yes	
11	H23-H07-A-Dup	B	5/17	7	B	1430	Yes	
12	H23-H07-A-Dup	C	5/17	7	C	1430	Yes	

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City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY2022/2023

	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H04-A H23-H04-A	A	5/17	7	A	1530	Yes	
2	H23-H04-A	B	5/17	7	B	1530	Yes	
3	H23-H04-A	C	5/17	7	C	1530	Yes	
4	H23-H04-B	A	5/18	7	A	1430	Yes	
5	H23-H04-B	B	5/18	7	B	1430	Yes	
6	H23-H04-B	C	5/18	7	C	1430	Yes	
7	H23-H17-B	A	5/18	7	A	1510	Yes	
8	H23-H17-B	B	5/18	7	B	1510	Yes	
9	H23-H17-B	C	5/18	7	C	1510	Yes	
10				7			Yes	
11				7			Yes	
12				7			Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY2022/2023

	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H19-B-A	A	5/23	7	A	1330	Yes	
2	H23-H19-B-B	B	5/23	7	B	1330	Yes	
3	H23-H19-B-C	C	5/23	7	C	1330	Yes	
4	H23-H13-A	A	5/23	7	A	1345	Yes	
5	H23-H13-A	B	5/23	7	B	1345	Yes	
6	H23-H13-A	C	5/23	7	C	1345	Yes	
7	H23-H13-A	A	5/23	7	A	1400	Yes	
8	H23-H13-A	B	5/23	7	B	1400	Yes	
9	H23-H13-A	C	5/23	7	C	1400	Yes	
10	H23-H06-A	A	5/23	7	A	1430	Yes	
11	H23-H06-A	B	5/23	7	B	1430	Yes	
12	H23-H06-A	C	5/23	7	C	1430	Yes	

DUP

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY2022/2023

	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H23-H06-B	A	5/30	7	A	0720	Yes	
2	H23-H06-B	B	5/30	7	B	0720	Yes	
3	H23-H06-B	C	5/30	7	C	0720	Yes	
4	H23-H21-A	A	5/30	7	A	0820	Yes	
5	H23-H21-A	B	5/30	7	B	0820	Yes	
6	H23-H21-A	C	5/30	7	C	0820	Yes	
7	H23-H05-A	A	6/1	7	A	0825	Yes	
8	H23-H05-A	B	6/1	7	B	0825	Yes	
9	H23-H05-A	C	6/1	7	C	0825	Yes	
10	H23-H20-A	A	6/1	7	A	0930	Yes	
11	H23-H20-A	B	6/1	7	B	0930	Yes	
12	H23-H20-A	C	6/1	7	C	0930	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY2022/2023

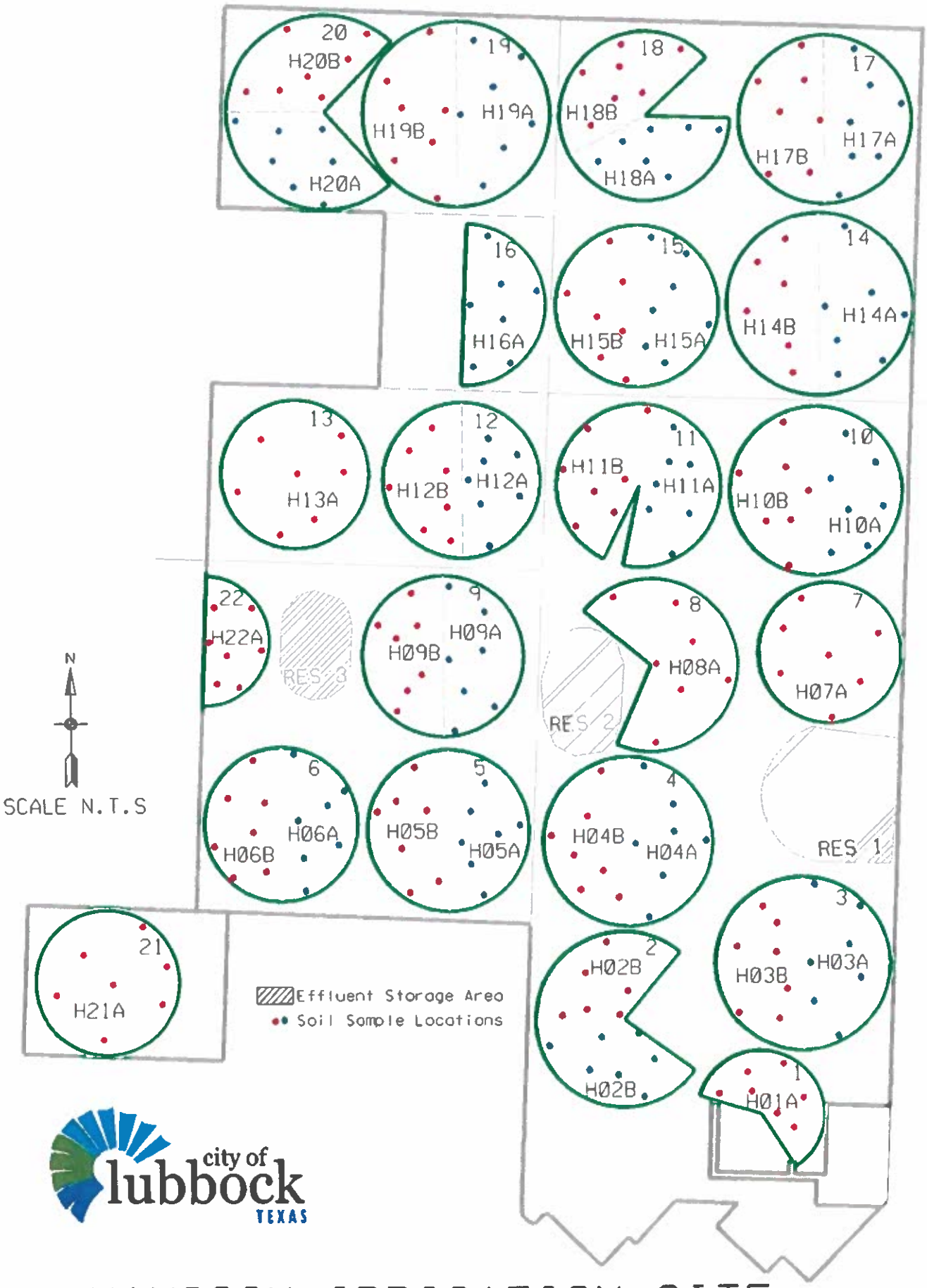
	HLAS Sample ID	Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	H125-H120-B	A	6/1	7	A	1046	Yes	
2	H123-H120-B	B	6/1	7	B	1046	Yes	
3	H125-H120-B	C	6/1	7	C	1046	Yes	
4	H123-H105-B	A	6/6	7	A	1300	Yes	
5	H123-H105-B	B	6/6	7	B	1300	Yes	
6	H123-H105-B	C	6/6	7	C	1300	Yes	
7	H123-H122-A	A	6/6	7	A	1345	Yes	
8	H123-H122-A	B	6/6	7	B	1345	Yes	
9	H123-H122-A	C	6/6	7	C	1345	Yes	
10				7			Yes	
11				7			Yes	
12				7			Yes	

Notes:

Section C

Soil Sample

Location Map



city of lubbock TEXAS

HANCOCK IRRIGATION SITE

Section D

Soil Sample

Collection and Processing

Procedures

Soil Sampling, Processing, and Shipping:

Equipment

1. Hydraulic sampling machine, currently Giddings 15-TS Model GSRTS, tractor mounted
2. Sampling tube, 1.75 inches or larger
3. Sampling tube bit and attachments
4. Sampling tube brush
5. Screwdriver
6. Wyle Soil Mill
7. ASTM 0.375 inch mesh soil sieves, one sieve per depth zone
8. Mixing pans, one pan per depth zone
9. GPS unit, currently Garmin Nuvi 750
10. Plastic sample bags and labels
11. Sampling and Compositing Logbook

Sample Locations

1. Background: Each field is subdivided into approximately 80 acre or less sampling areas. Within each of these sampling areas, seven (7) soil sampling locations are identified. Samples to 30" depth from each of these seven locations are collected and subdivided into 0 – 6" (A), 6 – 18" (B), and 18 – 30" (C), depth zones. The seven subsamples from each depth zone are mixed into a composite sample, which is shipped to the analysis laboratory for analysis.
2. In the office/lab, download the sample location waypoints to the GPS unit.
3. In the field, select waypoint for navigation.
4. Move tractor to selected point, within 10 feet of waypoint according to GPS unit.
5. Record sequential sample ID, field location, date, time, and waypoint distance in Soil Sampling Field Logbook.
6. Repeat steps 3 through 5 for each subsample location.

Sample Collection

1. Position sampling machine for use.
2. Insert plastic liner in sampling tube and attach sampling tube.
3. Use sampling machine to push sampling tube into soil to the 30" mark (or other designated depth).
4. Remove tube from soil, removing excess soil from outside of tube.
5. Remove plastic sleeve from sampling tube, label the sample and depths, and place end caps on the plastic sleeve with a red cap on the top end of the sample and a black cap on the bottom of the sample.
6. Place the sample in an ice chest with ice packs.

7. Repeat sample collection steps 1 through 6 at each of the seven subsample locations.
8. After sampling, place cores in controlled access, refrigerated storage and sign, date, and time the logbook sheet.

Sample Processing

1. Remove the seven subsample cores from the controlled access, refrigerated storage.
2. Segment the core into the 0 – 6" (A), 6 – 18" (B), and 18 – 30" (C) depth zones (or other designated depth zones), placing depth zone cores into the respective depth zone mixing pans/sieves.
3. Break up each core by hand or with the Wyle soil mill so that all soil will pass the 0.375" sieve, discard rocks larger than the sieve openings.
4. After the 7th subsample is segmented and passed through the sieve and all soil material is mixed in each depth zone pan, collect two (2) split samples from each depth zone. Each sample should be approximately 2/3 of a quart and collected in a plastic, quart sized bag. Each bag should be labeled with preprinted adhesive labels. The sample that will be shipped to the laboratory should be double bagged, with both bags being labeled.
5. Record the logbook information for each sample. Please note that the samples are coded with a unique number system for each year, and the Id given to the lab is not the plot information.
6. Place bagged samples in refrigerated, controlled access storage and sign, date, and time the logbook entry.

Shipment

1. The samples are carefully placed into an ice chest with icepacks and shipped by UPS to Midwest Laboratory.
2. The chain of custody is signed, dated, and timed. Samples shall remain in an ice chest with ice packs or refrigerated until receipt by the laboratory, where they will be air dried, processed, and analyzed.

Section E

Soil Sample

Chains of Custody

16 1

41533950 – 41533965

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	HLAS

Box 1 of 4

Page 1 of 4

Number of Samples 15

DUP

	Sample Info							Analysis Required											Work Order #
								SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
	Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	None	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia - Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
1	H23-H02-A-A	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	H23-H02-B	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	H23-H02A-C	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	H23-H03-B-A	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	H23-H03-B-B	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	H23-H03-B-C	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	H23-H02-B-A	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	H23-H02-B-B	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	H23-H02-B-C	4/27/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	H23-H09-A-A	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	H23-H09-A-B	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	H23-H09-A-C	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	H23-H09-B-A	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	H23-H09-B-B	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	H23-H09-B-C	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Hayden Sadler Date: 5/16/23 Time:

Shipped UPS/ARS Tracking # 12 635 783 90 9095 8420

Received By: K Blyppard Date: 5/19/23 Time

HLAS Shipping

16 1

41533913 – 41533928

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	HLAS

Box 2 of 4

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Number of Samples 15

	Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	None	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
			Sample Info					SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	Work Order #
1	H23-H11-A-A	4/25/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	H23-H11-A-B	4/25/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	H23-H11-A-C	4/25/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	H23-H11-A-A	4/25/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	H23-H11-A-B	4/25/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
	H23-H11-A-C	4/25/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	H23-H03-A-A	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	H23-H03-A-B	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	H23-H03-A-C	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	H23-H11-B-A	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	H23-H11-B-B	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	H23-H11-B-C	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	H23-H01-A-A	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	H23-H01-A-B	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	H23-H01-A-C	4/26/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Dup 1

Dup 2 LIE

Shipped By: Hayden Sadler | Date: 5/16/23 | Time:

Shipped UPS/ARS Tracking # 12 635 783 90 9095 8420

Received By: KB Hazzard | Date: 5/19/23 | Time:

HLAS Shipping

Also rec. H23-H08-A-A
" " -A-B
" " -A-C @ end.

16 1

41533932 – 41533947

Box 3 of 4

Page 3 of 4

Number of Samples 15

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	HLAS

	Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Etc	Notes	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
			Sample Info					SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	Work Order #
1	H23-H12-B-A	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	H23-H12-B-B	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	H23-H12-B-C	5/3/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	H23-H12-A-A	5/4/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	H23-H12-A-B	5/4/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	H23-H12-A-C	5/4/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	H23-H19-B-A	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	H23-H19-B-B	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	H23-H19-B-C	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	H23-H19-A-A	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	H23-H19-A-B	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	H23-H19-A-C	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	H23-H16-A-A DUP	5/9/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	H23-H16-A-B DUP	5/9/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	H23-H16-A-C DUP	5/9/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

DUP

Shipped By: Hayden Sallee — Date: 5/16/23 — Time:

Shipped UPS/ARS Tracking # 12 635 783 90 9194 8818

Received By: [signature] — Date: 5/19/23 — Time:

HLAS Shipping

16 1

41533968 – 41533984

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Box 4 of 4

Page 4 of 4

Number of Samples 15

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	HLAS

Sample Info							Analysis Required											Work Order #
							SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Manu - Soil	Ice	None	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
DUP H23-H15-A-A	5/9/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2 H23-H15-A-B	5/9/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3 H23-H15-A-C	5/9/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4 H23-H14-A-A	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5 H23-H14-A-B	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6 H23-H14-A-C	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7 H23-H15-B-A	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8 H23-H15-B-B	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9 H23-H15-B-C	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10 H23-H14-B-A	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11 H23-H14-B-B	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12 H23-H14-B-C	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13 H23-H17-A-A	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14 H23-H17-A-B	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15 H23-H17-A-C	5/10/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Hayden Sadler	Date: 5/16/23	Time:
Shipped UPS/ARS Tracking # 12 635 783 40 9183 8638		
Received By: V Blizzard HLAS Shipping	Date: 5/19/23	Time:

(16)

16 1

,935
41625924 – 41625940

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Box 1 of 3

Page 1 of 3

Number of Samples 15

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	HLAS

Dup#1

Sample ID	Composite Date	Type - Composite	Zip Lock Bag	Mason - Soil	Ice	Vent	pH 2:1 (v:v)	E.C. 2:1 (v:v)	Nitrate - Nitrogen membrane 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
							SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
1 H23-H18-B-A	5/11/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2 H23-H18-B-B	5/11/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3 H23-H18-B-C	5/11/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4 H23-H18-A-A	5/11/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5 H23-H18-A-B	5/11/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6 H23-H18-A-C	5/11/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7 H23-H10-B-A	5/16/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8 H23-H10-B-B	5/16/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9 H23-H10-B-C	5/16/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10 H23-H10-A-A	5/16-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11 H23-H10-A-B	5/16/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12 H23-H10-A-C	5/16-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13 H23-H07-A-A	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14 H23-H07-A-B	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15 H23-H07-A-C	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Hayden Sadler	Date: 6/1/23	Time: 14:50
Shipped UPS/ARS Tracking #		
Received By: HM	Date: 6/6/23	Time:

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41625943 – 41625958

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

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Page 2 of 3

Number of Samples _____

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	HLAS

Dup #1

	Sample Info						Analysis Required											Work Order #
							SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
	Sample ID	Composite Date	Type - Composite	Zip Lock Bag	Matrix - Soil	Ice	Note	pH 2.1 (v/v)	E.C 2.1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
1	H23-H07-A-A-Dup	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	H23-H07-A-B-Dup	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	H23-H07-A-C-Dup	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	H23-H04-A-A	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	H23-H04-A-B	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	H23-H04-A-C	5/17/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	H23-H04-B-A	5/18/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	H23-H04-B-B	5/18/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	H23-H04-B-C	5/18/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	H23-H17-B-A	5/18/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	H23-H17-B-B	5/18/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	H23-H17-B-C	5/18/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	H23-H17-B-A	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	H23-H19-B-B	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	H23-H19-B-C	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Hayden Sadler	Date: 6/1/23	Time: 1500	
Shipped UPS/ARS Tracking #			
Received By: HM	Date: 6/6/23	Time:	

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City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

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Account#	
Grower	HLAS

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Number of Samples 16

Dup #1

Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	None	pH 2:1 (v:v) (SM4500-H+)	E.C. 2:1 (v:v) mmho/cm (SM 2510B)	Nitrate - Nitrogen 1 N KCL Extract (E 300.0)	Ammonia-Nitrogen (SM4500-NH3 B,C)	TKN (E 351.3)	Phosphorus - P Mehlich III (S 6010B)	Potassium - K Plant Available (S 6010B)	Sodium - Na Plant Available (S 6010B)	Magnesium - Mg Plant Available (S 6010B)	Calcium - Ca Plant Available (S 6010B)	SAR (USDA 60)	Lab Sample ID
1 H23-H13-A-A	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2 H23-H13-R-B	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3 H23-H13-A-C	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4 H23-H13-A-A-Dup	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5 H23-H13-A-B-Dup	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6 H23-H13-A-C-Dup	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7 H23-H06-A-A	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8 H23-H06-A-B	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9 H23-H06-A-C	5/23/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10 H23-H06-B-A	5/30/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11 H23-H06-B-B	5/30/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12 H23-H06-B-C	5/30/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13 H23-H21-A-A	5/30/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14 H23-H21-A-B	5/30/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15 H23-H21-A-C	5/30/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Hayden Stadler	Date: 6/1/23	Time: 15:20	
Shipped UPS/ARS Tracking #			
Received By: HM	Date: 6/6/23	Time:	

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City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

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Number of Samples 9

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	HLAS

Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	None	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
							SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
1 H23-H16-A-A	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2 H23-H16-A-B	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3 H23-H16-A-C	5/8/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4 H23-H20-B-A	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5 H23-H20-B-B	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6 H23-H20-B-C	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7 H23-H20-A-A	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8 H23-H20-A-B	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9 H23-H20-A-C	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Work Order #

Shipped By:	Hayden Sadler	Date: 6/6/23	Time: 1445
Shipped UPS/ARS Tracking #	1Z635 7834 0963 54009		
Received By:	BW 6/9/23	Date:	Time:

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41644457 – 41644467

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

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Number of Samples 9

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	HLAS

	Sample Info							Analysis Required											Work Order #
								SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
	Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	None	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
1	H23-H05-A-A	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	H23-H05-A-B	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	H23-H05-A-C	5/31/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	H23-H05-B-A	6/6/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	H23-H05-B-B	6/6/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	H23-H05-B-C	6/6/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	H23-H22-A-A	6/6/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	H23-H22-A-B	6/6/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	H23-H22-A-C	6/6/23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Hayden Sadler	Date: 6/6/23	Time: 1500	
Shipped UPS/ARS Tracking # 12 6 35 783 909891 5881			
Received By: [illegible] 6/9/23	Date:	Time:	

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Section F

Laboratory Procedures

Provided by

Midwest Laboratories

Midwest Laboratories®

Analysis of Nitrate/Nitrite by Automated Cadmium Reduction (EPA 353.2)

Scope/ Application: This procedure is applicable to analysis of nitrate/nitrite nitrogen in surface, ground, waste, and well water, and aqueous extracts of solid materials such as soils or plants. The applicable range is 0.2 to 20 mg/L NO_3/NO_2-N. The range may be extended with sample dilution.

Purpose: To determine the nitrate/nitrite-N concentration in samples by segmented flow analysis (SFA) instrumentation and a cadmium reduction coil.

Summary of Test Method: A sample is passed through a copperized cadmium coil to reduce nitrate to nitrite. The nitrite that was originally present plus reduced nitrate is determined by diazotizing with sulfanilamide dihydrochloride to form a highly colored azo dye which is measured colorimetrically.

References: EPA 353.2 – Nitrogen, Nitrate-Nitrite (Colorimetric, Automated, Cadmium Reduction)

"Nitrate+Nitrite Nitrogen in Soil Extracts" (Perstorp Analytical, 2/94)

Definitions: **SFA** - Segmented Flow Analyzer. An instrument that uses a gas (nitrogen or oxygen) to separate liquid flows and pumps the gas to force liquid through the system.

MDL - Method Detection Limit- Lowest possible concentration that can be reasonably quantitated by method or instrument. Also referred to as the limit of detection or LOD.

SRS - Secondary Resource Standard- A standard whose primary standard is a different original material than the primary standard of calibrants.

MS/MSD - Matrix Spike/Matrix Spike Duplication- Sample fortified with known concentration and known volume of analyte of interest.

OTCR – Open Tubular Cadmium Rector – also called Cadmium Coil

LCR – Linear Calibration Range – a concentration range over which the instrument response is linear using a blank and at least 3 standards. LCR must be carried out every 6 months.

LCS – Laboratory Control Sample – Known or certified value used to monitor accuracy

Batch - set of samples that are extracted and analyzed as a set and the acceptance of the batch is based on a review of the Quality Control samples analyzed in conjunction with the set of samples. For this Procedure, a batch consists of twenty (20) samples or fewer.

Method Modifications:

1. **MWL uses Sodium Hydroxide to adjust the pH of the ammonium chloride-EDTA solution. Section 7.9 of EPA 353.2 specifies the use of Ammonium Hydroxide.**
2. **MDL procedures for EPA 353.2 state that an MDL must be run every 6 months. However, the current EPA Method Update Rule from 2017 specifies a different MDL procedure with data collected and compiled over the course of the year.**

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3. Section 7.10 of EPA 353.2 states that the Stock SRS 1000 mg/L Nitrate Nitrogen solution must be preserved with Chloroform. MWL uses Sulfuric Acid because that is the preservative that is used on all of the rest of the samples and controls.
4. Section 7.13 of EPA 353.2 states that the Working 20 ppm Nitrite solution is unstable and must be prepared as required. MWL makes the solution and is good for one month or until the coil efficiency is reduced to below 75%.
5. Section 11.1 of EPA 353.2 states that the sample pH must be adjusted to 5-9 before putting on the instrument. MWL is not adjusting the pH and the samples are preserved to <2 (per the reference method).

Sample Preservation & Storage: Aqueous samples should be preserved with sulfuric acid to pH <2 S.U. and refrigerated to 0-6°C. If preserved, regulatory sample holding time is 28 days and 48 hours if not. Clients are alerted to the presence and hazards of sulfuric acid and instructions are provided on the safe handling of sulfuric acid. The normal volume required is 250 mL and can be submitted in either a glass or Nalgene container. Nalgene is the preferred container. Original samples are retained for at least thirty (30) days after the final report is generated. When samples are finally disposed, they are placed into a solid waste dumpster that is removed by a licensed waste disposal company with final disposal in a licensed municipal landfill.

Reagents: **Brij-35 (21% Solution):** Purchased. Degraded surfactants reduce cadmium reduction efficiency, so never use expired or visibly contaminated Brij-35. Suspended mold can appear as a grayish haze.

NO_3 Buffer (ammonium chloride – EDTA solution): 340g Ammonium chloride, 0.4g Ethylenediaminetetraacetic acid (also known as Edetate Disodium or EDTA), 0.04g $CuSO_4$, and 50 mL of 40% w/v NaOH diluted and dissolved in 4L of DI water. Filter and degas prior to use. An EDTA/$CuSO_4$ solution can be made by weighing 2g EDTA and 0.2g $CuSO_4$ and dissolving in 250mL. Use 50mL of this solution per 4L. Solution is good for 1 month at room temperature.

NO_3 Color Reagent: 100mL H_3PO_4, 40g Sulfanilamide, and 2g N-1-Napthylethylenediamine Dihidrochloride (NED) diluted and dissolved in 1L of DI water. Filter and degas prior to use.

Stock Nitrate Solution 1000 mg/L: Purchased.

Stock SRS 1000 mg/L Nitrate Nitrogen (1L): Dry granular KNO_3. Dissolve 7.218 grams dry KNO_3 in approximately 900 mL deionized water in a 1000 mL volumetric flask. Dilute the solution to 1000 mL with deionized water. Preserve with 1 mL sulfuric acid. Keep refrigerated and remake after 3 months. This stock standard may be purchased.

Stock 1000 mg/L Nitrite Nitrogen (1 L): Dry KNO_2 in an oven. Dissolve 6.072 grams dry KNO_2 in approximately 900 mL deionized water in a 1000 mL volumetric flask. Dilute the solution to 1000 mL with deionized water. Preserve the stock with 2 mL chloroform. Keep refrigerated and remake after 6 months.

Working Standards: Into four 1000 mL volumetric flasks, pipette 1 mL, 5 mL, 10 mL and 20 mL of the stock nitrate solution to make 1 ppm, 5 ppm, 10 ppm and 20 ppm

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working standards. Preserve each with 1 mL of concentrated sulfuric acid, fill to volume with deionized water and mix. To make the 0.2 ppm standard, pipette 10 mL of 20 ppm standard into a 1 L flask, preserve, fill to volume with DI water, and mix. Good for the lesser of six (6) months at room temperature or the expiration date of the stock standard.

Reagent Sand: Used for blank and LCS when testing solids.

2M KCl: Dissolve 149.1g KCl per 1L of DI water. Additionally, 2M KCl can be acquired from the nitrate station in the Soils department.

Working 20 ppm Nitrite (500 mL): Pipette 10 mL stock 1000 ppm NO_2 into a 500 mL volumetric flask. Dilute with deionized water. This solution will serve to measure the efficiency of the cadmium column. Good for one (1) month at room temperature.

100 ppm Spike Solution: 10 mL of stock SRS 1000 ppm nitrate N solution. Dilute to 100 mL. Good for 2 weeks at room temperature.

Safety: Cadmium is considered a hazardous metal. Use gloves and safety glasses while handling cadmium coils during copperization technique. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

Instruments: Autosampler – Model 3360 or equivalent

O.I. Analytical Flow Solution System (III or IV) FIA Lab or equivalent
- Detector
- Pump
- Supercartridge

Apparatus: 2 mL plastic vials

Whatman 4 Filter Paper

Filter and syringe

Various pipettes (Class A)

Computer and Winflow 4.2 software or equivalent

1000-5000 µL Nichipet Ex autopipet or equivalent

Balance sensitive to at least 0.01 g

Interferences: One known interference is caused by colored samples because it is a colorimetric procedure. Highly colored samples must be filtered and diluted, if necessary. Samples with suspended solids greater than 10 microns should be filtered or they may clog the autosampler needle. Iron and copper and other metals in high concentration, also are known interferences.

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Calibration/Standardization:

1. All balances must be checked for proper verification daily by weighing at least three (3) different weights: 2 g, 10 g, and 50 g. All data is recorded. If these weights are not within appropriate acceptable range, the balance should not be used.

2. Daily autopipette calibrations must be performed prior to use. Set the autopipette to the amount desired for analysis. Dispense DI water (in duplicate) onto calibrated balance and record weight. Adjust autopipette as needed if weight values are not within acceptable ranges (± 2%). All data is recorded.

3. LCR – A linear curve must be performed for any instrument running the analysis using NO_3-N Stock Solution every six (6) months.

   a. A series of three (3) standards at different ranges (including a blank) should be run according to procedure section. Data is recorded and a copy is forwarded to the Technical Applications Scientist.

   b. Using a validated spreadsheet, enter the results to create a standard curve. Correlation value must be ≥ 0.995.

Procedure:

Preparing the Instrument:

1. Check to see if the autosampler is turned on.

2. Verify that the nitrate/nitrite supercartridge is attached to the pump tubing.

3. Attach the pump tubing to the appropriate reagent bottles (2 buffer bottles and 1 color reagent bottle).

4. Secure the platens into place and tighten them on the tubing, if necessary. When the platens are in place, there should be a click.

5. Check to make sure the nitrogen pillow is full, and the valve is open. Begin the reagent flow by pressing RUN button on the pump dispenser. Allow the reagents to flow for at least five (5) minutes.

6. After the reagents have flowed through, pinch off the exit tube for approximately 10 seconds to get rid of any air bubbles in the OTCR.

   NOTE: The nitrogen (or other inert gas) must be of high quality and the tubing airtight so no oxygen from the air passes through the OTCR during use.

7. The OTCR must be prepared for use. It is stored looped against itself using a jumper. Unscrew one of the nuts on the jumper and quickly push approximately 3 mL of DI water through the

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OTCR using a syringe, knocking the old copper-cadmium complex out of the column. Be careful to not allow any air into the OTCR at any time.

NOTE: To activate a new OTCR or to restore an older OTCR's performance, first use DI water to knock out the old copper-cadmium complex. Using a new syringe, draw 5 mL of 0.5N HCl and push through the coil, followed immediately by 5 mL of DI water. Do not leave the acid in the coil for more than a few seconds. Next, push 5 mL of 2% cupric sulfate through the coil and allow to sit for 10 minutes. Rinse with DI water.

8. Replace the jumper on the supercartridge with the activated OTCR. Allow the reagents to flow through the coil until a stable baseline is achieved. If the OTCR is being used for the first time, put the sample line in 20 ppm nitrate standard and condition for 10 minutes. Reattach the sample line to the probe.

9. In the Winflow program, the baseline may be monitored by pressing the "play" button on the left side of the analysis window. Any baseline with a total range of 500 uAU or less is considered stable.

Preparing Samples:

1. Sludges and environmental soil nitrates usually need to be analyzed on a dry weight basis. Dry the sludges in an oven overnight. Grind the sludges with a mortar and pestle. Weigh 5 ± 0.05 g of sample and extract with 25 mL 2N KCl. Shake vigorously for approximately 5 minutes and filter through pre-folded paper filters into medicine cups.

NOTE: The manner in which solid/sludge samples were prepared needs to be noted:

- "DryWt" indicates the sample was run and reported on a dry weight basis.
- "AsR" indicates the sample was reported on an as received basis.
- "Foods" indicates the sample was extracted by the foods department and reported as received (usually at 20X dilution and reported to MDL).
- "Rd" indicates the sample was run dry but reported on an as received basis by multiplying the dilution factor by the percent solids (expressed as a decimal). For example, 5 g of sample with 16.0% percent solid value extracted with 25 mL 2N KCl has a dilution factor of 25/5 x 0.16 = 0.80.

2. Line up samples to be analyzed. Determine the appropriate dilutions using history, physical appearance, or nitrate test strips when unsure.

NOTE: High salt content (2N KCl, seawater, etc.) suppresses the color response of nitrate strips, resulting in false low readings.

3. If samples have debris or visible suspended solids, filter using filter paper before pouring in the sample cups. Notate on the batch sheet that samples were filtered. A separate filtered LCS and blank must also be added to the run.

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4. Pour samples into a 2 mL sample cup and place them in a 90-count sample tray, along with QC samples. They very last sample cup should be a CCB blank, which is DI water.

5. Calibrants are located separately as 10 tube slots on the autosampler.

   Tube 1 is DI water used in blank checks and washes
   Tube 2 is 0.2 ppm nitrate standard
   Tube 3 is 1 ppm nitrate standard
   Tube 4 is 5 ppm nitrate standard
   Tube 5 is 10 ppm nitrate standard.
   Tube 6 is 20 ppm nitrate standard. These sample tubes are used to create the standard curve. The correlation coefficient of the standard calibration should be 0.9990 or better.
   Tube 7 is 20 ppm nitrite standard which serves as a check of the cadmium coil efficiency.

<u>Running Samples:</u>

1. After initially starting the Winflow program from the START menu, the sample table can be prepared by clicking on "Sample Table" button. Copy the first 17 rows from any previous run to a new sample table. These rows include the standard curve as well as the calibration checks.

2. Type in sample numbers in the order that they will be analyzed, including QC samples. Make sure the sample cup numbers are consecutive and appropriate for the autosampler. The sample trays each begin with 101, 201, 301, and end with 190, 290, 390. Enter the appropriate dilution factors for each sample into the sample table.

3. All the samples are of type "U" for unknown. Insert five (5) additional lines for the check calibrant and washes after every ten (10) sample cups.

1	W	U	1	1	1
1	W	RB	1	1	1
4	CCV-STD3	CCV	1	1	1
5	CCV-STD4	CCV	1	1	1
1	W	U	1	1	1

   The RB is the baseline check. The CCV is two (2) calibration check standards: (Tube 4) 5 ppm and (Tube 5) 10 ppm. At the end of the run, add the above five (5) lines plus an RB line.

4. Save the sample table in the "file" menu. The standard procedure for naming environmental nitrate runs is according to the date followed by the letter "w." For example, a nitrate run analyzed on May 8, 2011 would be named "110508w."
5. Click the "Collect Data" button and select the saved sample table and method (i.e. water method) to be analyzed.

6. Start the baseline by clicking the "play" button the Winflow menu. Once a stable baseline is achieved, click on the "fast forward" button (the one with 2 arrows pointing right) to start the autosampler and the run.

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7. When the run is complete, maximize the results table and print using the "file" menu.

Shutting Down Instrument:

1. Remove the OTCR from the supercartridge, reconnecting all jumper screws.
2. Flush the OTCR with DI water using a syringe.
3. Remove reagent lines from reagent bottles and attached to DI water container. Flush the system with deionized water until all the Brij is out of the lines.
4. Release the platens. If the pressure on the platens is not released, the pump tubing will experience premature flattening and cracking resulting in poor reagent flow through the system.

Calculation(s):

$$\text{Cadmium Column Efficiency} = \frac{NO_3^- \text{ concentration}}{NO_2^- \text{ concentration}} \times 100$$

The Cadmium Column efficiency must be 75% or better. If the efficiency is not 75% or better, recopperize the column.

Method calculation is carried out by the Winflow program.

Method QC:

Quality Control Procedures:

1. The quality control of environmental nitrate/nitrite samples consists of one blank and one LCS per batch of 20 samples. A Matrix Spike/Matrix Spike Duplicate and CCV are analyzed every 10 samples, rounded up. Each run must also include a 5 ppm Secondary Resource Standard.
2. Solid samples are run in separate batches from aqueous samples and have their own quality control.
3. A CCV and blank are also run at the end of the run. The CCV consists of calibration standards 4 and 5.
4. **SRS:** The SRS consists of a purchased 1000 ppm nitrate standard diluted to 5 ppm. An in-house 1000 ppm nitrate standard may also be used in place of a purchased standard by dissolving 7.218 g KNO_3 in 1 L of DI water and preserving with 1 mL of H_2SO_4.
5. **Method Blank:**
   a. The water method blank consists of 2 mL DI water.

b. The solid method blank consists of 5 g of reagent sand. Fill to 25 mL volume with 2N KCl solution and extract as a solid client sample.

6. **LCS:**

a. The water LCS consists of 2 mL of 5 ppm NO_3-N.

b. The solid LCS consists of 1 mL of 100 ppm NO_3-N spike added to 5 g sand. Fill to 25 mL volume with 2N KCl solution and extract as a solid client sample.

7. **MS/MSD:**

a. The water MS/MSD consists of 2 mL of 100 ppm NO_3-N spike added to 50 mL sample and mixed, creating a 4-ppm spike level.

b. The solid MS/MSD consists of 1 mL of 100 ppm NO_3-N spike added to the sample. Fill to 25 mL volume with 2N KCl solution and extract.

Aqueous Matrix

QC Type	Method Performance Criteria	Out of Control Action
SRS	90-110% recovery	Entire run must be re-analyzed.
Method Blank	<0.2 ppm	Blank may be re-analyzed once. If re-analysis fails, the associated batch must be re-analyzed. Documented Out of Specification form must be initiated before continuing analysis.
LCS	90-110% recovery, or within control limits established during characterization	LCS may be re-analyzed. If re-analysis fails, the associated batch must be re-analyzed. Documented Out of Specification form must be initiated before continuing analysis.
MS	90-110% recovery	Sample and matrix spikes may be re-analyzed. If re-analysis fails, the sample is inspected for homogeneity and a notation of matrix effect is reported.
MSD	<10% RPD	One duplicated sample must be re-analyzed. The samples are checked for homogeneity and a notation is made on the final report. RPD failure does not fail the batch.
CCV	90-110% recovery	Data before and after the failing CCV must be rerun.

Solid Matrix

QC Type	Method Performance Criteria	Out of Control Action
SRS	90-110% recovery	Entire run must be re-analyzed.

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Method Blank	1.0 ppm (as a 5X dilution)	Blank may be re-analyzed once. If re-analysis fails, the associated batch must be re-analyzed. Documented Out of Specification form must be initiated before continuing analysis.
LCS	85-115% recovery, or within control limits established during characterization	LCS may be re-analyzed. If re-analysis fails, the associated batch must be re-analyzed. Documented Out of Specification form must be initiated before continuing analysis.
MS	80-120% recovery	Sample and matrix spikes may be re-analyzed. If re-analysis fails, the sample is inspected for homogeneity and a notation of matrix effect is reported.
MSD	<20% RPD	One duplicated sample must be re-analyzed. The samples are checked for homogeneity and a notation is made on the final report. RPD failure does not fail the batch.
CCV	90-110% recovery	Data before and after the failing CCV must be rerun.

MDL: An MDL is carried out according to QA 033 (Establishing Detection Limits) and is based on current EPA regulations regarding MDL studies.

Pollution Prevention: There are no pollutants produced in this procedure.

Waste Management: All remaining sterile soil and containers is placed in the municipal dumpster for disposal.

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Ammoniacal Nitrogen in Soils

Scope/ Application: This method covers the determination of Ammoniacal Nitrogen (NH_3 as N) in soil samples. The applicable upper limit is 50 mg/kg NH_3 as N. The method range can be extended by manual or instrument dilution.

Purpose: To determine the Ammoniacal Nitrogen (NH_3 as N) of soil samples.

Summary of Test Method: Samples, reagents, and calibrants are loaded into the same rack and reagents reservoirs. Ammonia reacts with alkaline phenol and hypochlorite to form indophenol blue and the intensity of the color is measured. Results are automatically determined by linear regression.

References: SM 4500-NH_3-G – (mod) Nitrogen (Ammonia): Automated Phenate

SmartChem 200™ Method 210-200B

Definitions: **RBL** (Reagent Base Line) – Absorbance from the diluent and reagents.

WBL (Wash Base Line) – Absorbance from the DI water and cuvette.

CCV (Continuing calibration verification) – A check sample ran periodically to establish that the instrument is continuing to function properly.

CCB (Continuing calibration blank) – A blank ran periodically to establish that the instrument is continuing to function properly.

SRS (Secondary Resource Standards) – A standard whose primary standard is a different original material than the primary standard of the calibrants.

LCS – Laboratory Control Sample – Known or certified value used to monitor accuracy

Batch: set of samples that are extracted and analyzed as a set and the acceptance of the batch is based on a review of the Quality Control samples analyzed in conjunction with the set of samples. For this Procedure, a batch consists of twenty (20) samples or less.

REMS (RMS)- USDA acronym for restricted movement of soils. The USDA/MWL compliance agreement provides guidance for how the soil is treated to prevent spread of potential pathogens.

Technical Notes:

1. This procedure is amenable to low level samples.
2. It has been modified from SM 4500-NH_3-G to be carried out on a discrete analyzer.
3. This procedure may be performed on REMS samples, although special handling procedures may apply.

Sample Preservation & Storage: Sample preservation and storage for restricted samples (REMS) follows the USDA protocol. REMS samples are held only in an authorized hazardous material building, transported in a sealed container, and treated and disposed of in a manner following regulations.

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Reagents: **Reagents are ACS reagent grade or better**

Sodium phenolate (Alkaline phenol): Fill 100 mL Erlenmeyer flask half full with DI H_2O. Add 8 mL of 10 N (40%) NaOH and 8.3 g of phenol (C_6H_5OH). Dissolve and dilute to 100 mL in volumetric flask with DI water. Store in opaque bottle at room temperature and is good for two (2) weeks.

Sodium Hypochlorite Solution: Use a bleach source containing 8.3% available chlorine, such as Clorox™. Add a ratio of 5 parts DI : 3 parts bleach to a reagent bottle and swirl gently. Prepare fresh daily.

Disodium ethylenediamine-tetraacetate (EDTA): Dissolve 18.75 g of EDTA disodium salt dihydrate, $C_{10}H_{14}N_2Na_2O_8 \cdot 2H_2O$ and 5.16 mL of 40% NaOH in approximately 750 mL DI water. Fill to 1 L with DI water. Invert 5 times to mix. Good for six (6) months at room temperature.

Sodium Nitro ferricyanide (Sodium Nitroprusside): Dissolve 0.3 g $Na_2Fe(CN)_5NO \cdot 2H_2O$ in approximately 50 mL of DI H_2O in a 100 mL Erlenmeyer flask and fill to volume with DI water. Good for one (1) week at room temperature. Add 0.5 mL concentrated probe rinse solution.

2M KCl Diluent: Add 17kg KCl to 30 Gallons of DI water (done in soils department)

Probe Rinse Solution: Add 1.0 mL of concentrated Probe Rinse Solution to 2 L and fill to volume with DI water. Invert five (5) times to mix. Store at room temperature and is good for one (1) year.

Ammonia Stock Solution (1000 mg/L): Dissolve 3.819 g of anhydrous ammonium chloride, (NH_4Cl), dried at 105°C for four (4) hours, in reagent water, and dilute to volume in a 1 L volumetric flask. (1.0 mL = 1.0 mg NH_3-N. (1000 ppm). Good for six (6) months at room temperature. This can also be a purchased standard.

10 ppm NH_3 Soil Standard: Pipette 2.5mL of 1000ppm NH_3-N standard. Dilute to 250mL with KCl solution.

Cleaning Solution: 30 mL of concentrated cleaning solution in 2 L of DI water. Mix gently. Good for 15 days at room temperature.

Safety: To some people, bleach can cause nasal irritation. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

Instruments: Westco Smart Chem™ Discrete Wet Chemistry Analyzer or equivalent

Apparatus: Class A glassware: 5 mL pipette, 500 mL, and 1.000 L volumetric flask

Balance capable of accurately weighing to at least 0.0001 g

Interferences:

1. Calcium and magnesium ions may be present in concentration sufficient to cause precipitation problems during analysis. A 5% EDTA solution is used to prevent the precipitation of calcium and magnesium ions from river water and industrial waste.

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For seawater, a sodium potassium tartrate solution is used. It is not anticipated that Midwest will receive seawater samples.

2. Sample extract turbidity and color may interfere with this method. No turbid samples are run by this method. Sample color that absorbs in the photometric range will also interfere.
3. Cyanate, which may be encountered in certain industrial effluents, will hydrolyze to some extent even at the pH of 9.5 S. U. at which distillation is carried out.

Procedure:

1. Turn on Westco Smart Chem™ by power switch on the left side.
2. Fill reagent and diluent bottles.
   a. The diluent bottle is filled with 2M KCl diluent.
   b. Fill clean reagent bottles with the appropriate reagents for this method. When filling the disodium EDTA, nitroprusside, and hypochlorite reagent bottles, pour the solutions slowly to minimize foaming. Each bottle must be labeled with the source of the reagent (at minimum, the MWL Chemical Tracking number and expiration date).

   NOTE: Do not overfill reagent bottles. The proper fill point on reagent bottle is just below the shoulder.
3. On the computer, select the method to be used (NH_3S) and start method as follows for sample extracts from soils department:
   a. Go to sample entry.
   b. Double click on the desired method to be run, "NH_3S."
   c. Enter number of samples and press the green check mark or import an external run by pressing the file icon. Go to the AmmonCmd folder and select the Run plan.
   d. Enter the sample ID's and dilutions. (These may be imported from an electronic command file.)
   e. Review the Run Plan Sample ID List and click "Save."
   f. Enter the Run Plan description (i.e. NH_3) and click "OK."
   g. The instrument will ask 'Do you want to save run plan?", click 'Yes'.
   h. Instrument will ask if you want to 'Save sample ID's to an External file?'. Click 'Yes' if you typed up the plan manually or 'No' if plan was imported.
   i. Next it will ask 'Do you want to print run plan?'. Click 'Yes' to print or 'No' to go to System Monitor and select your plan from the plan list.

j. Go to System Monitor.

k. Select and click on the Run Plan that was created.

l. Verify that the selected Run Plan is correct.

m. Load samples, standards, controls and empty cups as displayed in the System Monitor. **Note: Do not overfill sample cups. The proper fill point of a sample cup is within 3 mm of the lip.**

n. Check the probe rinse, DI water, and cleaning solution bottles and fill as necessary.

NOTE: **When filling the probe rinse and cuvette wash reservoirs, pour the solutions slowly to minimize foaming. If the probe, DI water, and/or cuvette wash reservoirs require filling while a run is in progress, do not remove the cap or lift the siphon tube above the liquid surface. Insert a long stem funnel through the open port in the reservoir cap and fill the container slowly with the respective solution to minimize foaming.**

o. Click "Start" in the System Monitor to display user selectable options before beginning analysis.

p. If a cuvette wash and/or WBL are required before the start of the analysis, then click on the appropriate box. It is recommended that a WBL be run at the start of each day.

   a. The RBL boxes should always have a check mark. If this is the first run of this method for the day, then check 'Calib.' to perform a calibration curve. If this is a subsequent test, uncheck 'Calib.'

q. Click the "Start" button to begin the analysis.

r. Check the correlation coefficient of the standard calibration. The correlation must be 0.9990 or better. If the correlation does not meet this requirement, recalibrate the instrument. (see Method Performance Criteria).

4. If the sample is a REMS sample, return remaining sample aliquots and any items used to sample or store extracts to soils receiving for heat treatment. All supplies that can't be heat treated need to be sanitized with 10% bleach for 30 minutes or quaternary ammonia products according to the manufacturer's label. All other samples and supplies may be disposed of regularly.

Calculation(s):

1. The programs will construct and display the calibration curve and calculate all samples results. When the dilutions are made, the dilution corrected results will be reported based on the dilution factors used in the results section of the report.

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2. Report results in mg NH_3-N/kg.

Method QC:

Quality Control Procedures:

1. Run one (1) 5 ppm CCV every 10 samples and one (1) CCB every 20 samples, and at the end of the run. The instrument is set up to do this automatically. The CCB is taken from one of the Blank Bottle Checks to make sure that department KCl matches the KCl the samples were extracted from.

2. Check samples will be included in the run, at the discretion of the soils department.

Method Performance Criteria:

1. Blanks and CCBs should be less than 0.10 mg/L.

2. CCV recovery must be between 90-110%.

3. Check sample recovery is established by the Soils department. These values can change when a new batch of check soil is brought into use.

4. Only those results (adjusted for dilution factor) under the highest calibration standards are reportable. Results above the highest standard are diluted and reanalyzed.

Out of Control Data:

1. If a CCV or CCB fails, data before and after the failing CCV, to the closest passing CCV on each side, is invalid and must be rerun.

   a. If CCB fails (runs high or low), check to see if a new bucket of KCl was made in the soil lab.

2. If the check sample does not meet expected values, the data reviewer will be contacted.

3. In the event of an instrument caused QC failure, stop analysis, investigate, determine the cause of the failure, and correct it. All samples since the last acceptable QC sample must be reanalyzed. If samples cannot be reanalyzed, the report to the client must reflect the QC failure.

MDL: An MDL study is not required for this procedure.

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Pollution Prevention: Due to the potential exposure of untreated regulated samples (REMS) to the environment, a comprehensive cleaning/disinfection protocol must be followed. This protocol includes sterilizing or heat treating all sample materials, such as sample scoops, balance plates, beakers, etc., after contact with REMS samples or extracts. In the laboratory, floors, walls, and work areas are amenable to washing with disinfectants such as bleach. If a sample is spilled or dropped, sweep the sample into a hard pan and then heat treat the sample. Clean any area that the spilled sample touched using 10% bleach. This may possibly include walls, floors, and bench tops. Bleach requires saturation of the surface being treated for a minimum period of 30 minutes. 70% ethanol and disinfectants containing quaternary ammonium compounds currently have no time limit associated with their use. Discard the bleach solution into the laboratory wastewater system. Since the material is not volatile or airborne, treatment or disinfecting of ceiling areas or HVAC ducts is not needed.

Purchase chemicals in limited amounts so they do not expire.

Waste Management: Non-REMS aqueous wastes and all instrument outflows (which are bleach treated) are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge. Non-REMS solid wastes can be discarded in the municipal dumpster.

All REMS waste is disposed of in a designated, sealed bin. The waste is then heated in accordance with RC 028 to destroy any potentially regulated organisms. Once it has been treated, the waste can be discarded in the municipal dumpster.

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Analysis of Aqueous Extracts by ICP-AES

Scope/ Application: Inductively coupled plasma-atomic emission spectrometry (ICP-AES) determines trace elements, including metals, in solution. This method is applicable to Al, B, Ca, Cu, Fe, K, Mg, Mn, Mo, Na, P, and Zn. This analysis procedure is primarily intended for (but not limited to) aqueous extracts of samples provided by various departments.

Purpose: This is a procedure for the analysis of various extractions and preparations from various departments.

Summary of Test Method: Samples are solubilized, digested, extracted, or diluted using appropriate sample preparation procedures prior to analysis.

This method measures multiple element levels by use of characteristic emission spectra. Sample aerosol is created by a nebulizer and transported by the nebulizing gas to a radio frequency argon plasma. The element specific spectra are produced by interaction of the plasma with the sample. The spectra of the sample are separated by a grating spectrometer that provides the line spectra to photon detection devices. The intensity of individual wavelengths and their surrounding spectra are determined. Background levels are removed allowing calculation of the specific wavelength intensity which is proportioned to the amount of emitting element present.

References: EPA 6010B – Inductively Coupled Plasma-Atomic Emission Spectrometry

Definitions:

ICP-AES: Inductively Coupled Plasma-Atomic Emission Spectrometry

HNO_3: Nitric Acid

ICV: Initial Calibration Verification

CCV: Continuing Calibration Verification

ICB: Initial Calibration Blank

CCB: Continuing Calibration Blank

Water: All references to water in the method refer to DI (deionized) water or better. All water will be interference free.

Relative Percent Difference: Measurement of precision between two (2) values and calculated as: {[X1-X2]/[(X1+X2)/2]} *100

LCS: Laboratory Control Sample – Known, certified, or characterized value used to monitor accuracy

Batch: set of samples that are extracted and analyzed as a set. The acceptance of the batch is based on a review of the Quality Control samples analyzed in conjunction with the set of samples. A batch consists of all samples between two calibration events.

Technical Notes: Inductively coupled plasma-atomic emission spectrometry (ICP-AES) determines trace elements, including metals, in solution.

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Sample Preservation & Storage: There is no sample storage or preservation required because this procedure is an analytical procedure. Sample storage requirements are found in the sample preparation procedure.

Reagents: **Reagent or trace metals grade chemicals shall be used in all tests.** Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is sufficiently high purity to permit its use without lessening the accuracy of the determination. If the purity is in question, analyze the reagent for contamination.

Nitric Acid (concentrated), HNO_3, - Store at ambient conditions for up to three (3) years.

Water – All references to water in this method refer to water unless otherwise specified. Water will be interference free.

Standard stock solutions may be purchased, from an approved vendor, or may be prepared from ultra-high purity grade chemicals or metals (99.99% pure or greater).

X-17 purchased custom multi-element standard that includes 5000ppm Ca, 2000ppm K, Mg, P, 500ppm Na, S, and 100ppm Al, B, Cu, Fe, Mn, Mo, Sn, Sr, Zn.

X-16 purchased custom multi-element standard that includes 4000ppm Ca, 2000ppm K, P, 1000ppm Mg, Na, 500ppm S, and 50ppm Al, B, Cu, Fe, Mn, Mo, Zn.

1% Water Tray STD is made by diluting X-17 stock solution 1:20 with water and HNO_3 to create a 1% HNO_3 standard. Typically, this is accomplished by:

a) 1.0L class A volumetric flask
b) Add approximately 50mL water
c) Add 10mL HNO_3, Swirl to mix
d) Add 50mL X-17 stock solution
e) Bring to a final volume of 1.0L with water and invert to mix.
*Varying amounts of standard can be made if the above ratios are retained.

Waters Check is made by diluting X-16 stock solution 1:40 with water and HNO_3 to create a 1% HNO_3 check. Typically, this is accomplished by:

a) 2.0L class A volumetric flask
b) Add approximately 100mL water
c) Add 20mL HNO_3, swirl to mix
d) Add 50mL X-16 stock solution
e) Bring to a final volume of 2.0L with water and invert to mix.
*Varying amount of check can be made if the above ratios are retained.

Waters QC BLK is made by diluting HNO_3 with water. Typically, this is accomplished by:

a) 2.0L class A volumetric flask
b) Add approximately 100mL water

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c) Add 20mL HNO_3, swirl to mix
d) Bring to a final volume of 2.0L with water and invert to mix.
*Varying amount of blank can be made if the above ratios are retained.

Safety: Inorganic acids are highly corrosive and must be handled carefully. A face shield is required when handling concentrated acids. All acid additions are carried out in the hood and technicians/analysts are to wear gloves, protective eyewear, and a face shield. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheet (SDS) for chemicals/reagents used in the method.

Instruments: Thermo Scientific 6000, 7000, or Pro series ICP or equivalent
Cetac Autosampler or equivalent
Cetac ASXpress or equivalent (optional)

Apparatus: Argon gas supply – high purity (>99.998%)
Class A volumetric flasks of suitable precision and accuracy
Class A volumetric pipettes or suitable precision and accuracy
Autosampler rack(s) and corresponding plastic test tubes

Interferences: Spectral interferences are caused by background emission from continuous or recombination phenomena, stray light from the line emission of high concentration elements, overlap of a spectral line from another element, or unresolved overlap of molecular band spectra

Procedure:

1. Samples are prepared by appropriate sample preparation procedures.

2. Fill out Routine Instrument Maintenance Log (located at \\File\Metals\Maintenance Logs\Routine Instrument Maintenance) according to ME 088. It is the analyst's discretion for cleaning and replacing of the consumable and glass parts.

3. Turn plasma on. The instrument should be thermally stable before beginning analysis. Typically, at least 30 minutes of operation is allowed prior to calibration.

4. Open the appropriate method, ME092_YYYY-MM-DD, where YYYY is the year, MM is the month, and DD is the date of creation for that database.

5. Create the autosampler table and give a unique name to the sequence (analytical) batch; typically, the date as YYYY-MM-DD is used to do this. The autosampler for some sample types can be "Imported from Delimited Text File," when adding the sequence.

6. Calibrate the instrument. The calibration lines are created using a blank and one standard. Below is a list of the standards and their associated elements and concentration.

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Table 1:

Standards	Analyte Level (ppm)
Standard Blank	< MDL, all calibrated elements
High Standard	5 ppm - Al, B, Cu, Fe, Mn, Mo, Zn 25 ppm – S, Na 100 ppm – K, Mg, P 250ppm - Ca

1. Verify the calibration by running an ICB and an ICV. The list of their associated elements and concentrations are as follows:

Table 2:

Checks	Analyte Level (ppm)
ICB/CCB - QC Blank	<MDL, all calibrated elements
ICV/CCV - WCK	1.25ppm - Al, B, Cu, Fe, Mn, Mo, Zn 12.5ppm - S 25ppm – Mg, Na 50ppm – K, P 100ppm - Ca

See below for the Wavelength Table listing for the wavelengths used in this method.

Table 3:

Al	308.215
B	249.678
Ca	315.887
Cu	324.754
Fe	259.940
K	766.490
Mg	383.826
Mn	257.610
Mo	202.030
Na	589.592
P	178.284
S	182.034
Zn	213.856

2. Review data for acceptance of instrument checks and preparation batch QC.

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Calculation(s): Sample weights, volumes, final volumes, and dilution factors are entered during the creation of the autosampler sequence.

Method QC:

Quality Control Procedures:

1. GME
    a. There is no associated QC.
2. SAR
    a. There is no associated QC.
3. Haney
    a. At least one blank per batch
    b. At least one LCS per batch
4. Water Soluble Soil
    a. At least one reagent blank per batch
    b. At least one method blank per batch
    c. At least one soil check every 40 samples
5. Mehlich
    a. At least one reagent blank per batch
    b. At least one method blank per batch
    c. At least one duplicate per batch
    d. At least one soil check every 40 samples
6. Available Phosphorus
    a. At least one blank per batch
    b. At least one LCS per batch
    c. At least one duplicate per batch
7. CEC
    a. At least one blank per 20 samples
    b. At least one LCS per 20 samples
    c. At least one duplicate per every 10 samples

Method Performance Criteria:

1. ICB and CCB levels must be within two (2) times the reporting limit.
2. ICV levels must be within 10% of the true value.
3. CCV levels must be within 15% of the true value.
4. Sample prep blank
    a. Water Soluble Soil:
        i. Method blank Less than detection limit
        ii. Reagent blank Less than detection limit
    b. Mehlich
        i. Less than detection limit
    c. Available Phosphorus
        i. Less than detection limit
    d. CEC

i. Less than detection limit (0.1 meq/100g)

e. Haney

i. Less than detection limit

5. Sample LCS/Extraction(digest) check
   a. Water Soluble Soil:
      i. Between upper and lower control limits as determined by the most recent LCS characterization
   b. Mehlich
      i. Between upper and lower control limits as determined by the most recent LCS characterization
   c. Available Phosphorus
      i. Between upper and lower control limits as determined by the most recent LCS characterization
   d. CEC
      i. Between upper and lower control limits as determined by the most recent LCS characterization
   e. Haney
      i. Between upper and lower control limits as determined by the most recent LCS characterization
6. Sample duplication
   a. Water Soluble Soil
      i. Less than 20% RPD
   b. Mehlich
      i. Less than 20% RPD
   c. Available Phosphorus
      i. Less than 10% RPD
         1. For indirect extraction, if the sample result is less than 1%, the RPD is not calculated.
   d. CEC
      i. Less than 10% RPD

Out of Control Data:

1. If the ICB or ICV fails for individual elements, it is the analyst's discretion to determine if recalibration is needed or if the run can continue. For analyte(s) that fail, re-analysis is needed if analyte(s) are to be reported.

2. CCV failure(s) require re-analysis of samples back to the last acceptable calibration verification (CCV or ICV) for reported elements. If the CCV has been exceeded high and there are non-detects in the batch, those non-detects can be reported. If the CCV is exceeded low, samples that exceed the maximum regulatory level may be reported.

3. CCB failure(s) require re-analysis of samples back to the last acceptable CCB. For reported analytes, if the blank is less than 1/10 of the concentration of the determined reporting limit of interest and no sample is within 10% of the action limit, samples need not be re-analyzed.

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4. If the QC failure is an unacceptable sample preparation (%RPD exceeds limit), the sample will be observed to determine if the sample is homogenous. The sample and duplicate can be re-ground to obtain a homogenous matrix and the sample re-analyzed. The batch may not be failed if the precision is outside the acceptable range.

5. If the batch QC has recovery levels of the LCS/Extraction Check outside acceptable ranges, the affected LCS/Extraction check may be re-analyzed. If on the second analysis, the LCS/Extraction Check is still outside the acceptable range, then all samples within the batch that require the analyte(s) falling outside acceptable range must be re-digested and re-analyzed. LCS/Extraction Check failure is noted in the control chart for each analyte that fails.

6. If indigenous method digest blank level (unmultiplied) is above 2.2 times the MRL and greater than 1/5 the indigenous sample level, re-analysis may be performed. If method digest blank fails upon re-analysis, re-digest is needed. Samples with analytes below the determined reporting limit need not be re-analyzed/re-digested.

MDL: This procedure is not amenable to MDL studies.

Pollution Prevention: Order reagents in limited quantities so they do not expire. The method uses few chemicals.

Waste Management: Aqueous wastes are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge.

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Determination of Soil pH

Scope/ Application:	This method is applicable to all types of soil.
Purpose:	This procedure describes an accepted method to determine the pH of a soil sample.
Summary of Test Method:	Scoop 10 g (1:1) or 5 g (1:2) of sample into a pH tray and add 10 mL of DI water. Let sit for 10-30 minutes. Read pH tray on pH instruments.
References:	Recommended Chemical Soil Test Procedures for the North Central Region. Revised 2015. NCR-13. SO 047 – pH Meter Calibration
Definitions:	pH – negative log of the hydronium ion concentration
Technical Notes:	N/A
Sample Preservation & Storage:	Samples are stored at room temperature and retained for a minimum of ten (10) days after analysis. The remainder is disposed into the municipal landfill dumpster.
Reagents:	pH Buffer 4.00 ± 0.01 at 25 °C pH Buffer 5.00 ± 0.01 at 25 °C pH Buffer 6.00 ± 0.01 at 25 °C pH Buffer 7.00 ± 0.01 at 25 °C Electrode Filling Solution, Potassium Chloride, 4 Molar, saturated with Silver Chloride
Safety:	Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.
Instruments:	Denver Model 215 pH meter or equivalent Thermo Scientific Orion 9165BNWP Combination Sure-Flow pH Electrode
Apparatus:	pH tray – one (1) tray contains 40 vessels NCR-13, 10 g scoop Repipette dispenser, calibrated to 10 mL Thermo Scientific MaxQ 2000 Benchtop Orbital Shaker Velmex VXM-2 Stepping Motor Controller

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Velmex BiSlide MN10-0100-L01-21

Velmex BiSlide MN10-0500-E04-31

Interference: N/A

pH 1:1 Procedure:

1. Check probes and calibrate pH meters prior to analysis (reference SO 047).
2. Add 10 g of sample into the designated pH tray.
3. Add 10 mL of DI water using the repipette dispenser.
4. Allow the samples to sit for 10-30 minutes.
5. Place the pH tray on the orbital shaker and scan the bar code.

pH 1:2 Procedure:

1. Check probes and calibrate pH meters prior to analysis (reference SO 047).
2. Add 5 g of sample into the designated pH tray.
3. Add 10 mL of DI water using the repipette dispenser.
4. Allow the samples to sit for 10-30 minutes.
5. Place the pH tray on the orbital shaker and scan the bar code.

Calculation(s): N/A

Method QC:

Quality Control Procedures:

1. Calibrate pH meters daily within the acceptable range of pH buffer 4.00 and pH buffer 7.00, and run a pH check tray with two known values (reference SO 047).
2. One (1) table check every 40 samples or one (1) per pH tray.
3. One (1) bottle check approximately every 300 samples or one (1) per day.
4. Check pH buffer 4.00 and pH buffer 7.00 every two pH trays read.

Method Performance Criteria:

1. pH of check tray must be within ± 0.25 of the two known values.

2. pH of 4.00 and 7.00 buffers must be within ± 0.10 of the known values.

3. pH of the table check must be within the established acceptable range and will be highlighted green for passing or red for failing on the pH program.

Out of Control Data:

1. In the event of an instrument-caused QC failure, stop analysis and determine the cause of the failure and repair the instrument. All samples since the previous acceptable QC sample must be re-analyzed.

MDL: An MDL study is not required for this procedure.

Pollution Prevention: No pollution is produced in this method.

Waste Management: Aqueous wastes are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge.

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Soil Nitrate and Ammonia Extraction Procedure

Scope/ Application: This method is applicable for all types of soil. It may be used for untreated regulated samples known as restricted movement soils (RMS). RMS samples apply to all soil samples originating from select foreign countries and U.S. counties, excluding portions of Canada regulated for soil movements, regulated state, and/or county that require analysis.

Purpose: This procedure describes an accepted method for extracting nitrate and ammonia in soil samples. For RMS specific samples, this procedure describes an accepted method for extracting ammonia while meeting the regulated soil compliance protocol as required by the USDA/APHIS regarding foreign imports.

Summary of Test Method: Scoop 2.5 g of sample into rack and add 12.5 mL of 2.0 M KCl solution. Shake for 15 minutes and filter. Re-filter if extract is cloudy. Pour extract into test tube block and give to Wet Chemistry North for analysis.

References: Recommended Chemical Soil Test Procedures for the North Central Region. Revised 2015. NCR-13.

RC 028 – Handling Permitted Imported and Regulated Soils

EN 004 – Analysis of Nitrate/Nitrite by Automated Cadmium Reduction

EN 118 – Ammoniacal Nitrogen in Soils

USDA/APHIS Instructions for Soil Compliance Agreements

USDA/APHIS Instructions for PPQ 525 Permits

USDA/APHIS Instructions for PPQ 526 Permits

Definitions: **LCS** – Laboratory Control

USDA – The United States Department of Agriculture

APHIS – Animal and Plant Health Inspection Service

RMS – USDA acronym for restricted movement of soils. The USDA/MWL compliance agreement provides guidance for how the soil is treated to prevent spread of potential pathogens.

Technical Notes: When handling RMS samples, properly disinfect or remove and dispose items (e.g., gloves) to help prevent contamination.

When transferring RMS samples, there will be use of primary and secondary containment.

Sample Preservation & Storage: Samples are retained for a minimum of 10 days after analysis and the remainder is discarded into the municipal landfill dumpster. Sample preservation and storage for restricted samples (RMS) follows the USDA protocol. RMS samples are treated and disposed of in a manner following regulations.

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Reagents: **2.0 M Potassium Chloride (KCl) Solution**: Dissolve 17.0 kg KCl of reagent grade in approximately 115 L of deionized water. Store at ambient temperature and is good for one (1) year.

Nitrate Stock Solution (30ppm): Add 30mL of Nitrate Standard (1000ppm) in 1 L of 2.0 M KCl solution. Store at ambient temperature and is good for six (6) months.

1.0 M Potassium Chloride (KCl) Solution: Measure 1 part 2.0 M KCl Solution to 1 part deionized water and mix. For example, measure 1000 mL 2.0 M KCl into a volumetric flask and transfer to a clean, 4 L glass bottle. Measure 1000 mL of deionized water in the volumetric flask and transfer to the same 4 L glass bottle and mix.

10% Bleach – Mix 1 part bleach to 9 parts deionized water

Safety: Use gloves and wear safety glasses. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

Instruments: N/A

Apparatus: NCR-13, 2.5g scoop

Repipette dispenser, calibrated to 12.5 mL.

Reciprocating mechanical shaker, capable of 160-200 oscillations per minute.

Extraction vessels and associated filtration vessel

Whatman No. 42 or equivalent highly retentive filter paper

Interferences: There are no known interferences

2.0 M KCl Procedure:

1. Add 2.5 g of sample that is indicated on the Nitrate and/or Ammonia scoopsheet(s) into designated extraction vessel.
2. Add 2.5 mL of 30 ppm Nitrate Stock to the second duplicated sample (8th position) and the second blank (10th position) on the last duplicated rack.
3. Add 12.5 mL of 2.0 M KCl extraction solution using the repipette dispenser.
4. Place extraction vessel(s) on reciprocating mechanical shaker for 15 minutes.
5. Filter extract(s). Re-filter if extract is cloudy.
6. Pour sample(s) through manifold into test tube block.
7. Deliver to Wet Chemistry North for analysis.

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1.0 M KCl Procedure:

1. Add 2.5 g of sample that is indicated on the Lubbock Nitrate scoopsheet(s) into designated extraction vessels.
2. Add 12.5 mL of 1.0 M KCl extraction solution using the repipette dispenser.
3. Place extraction vessel(s) on reciprocating mechanical shaker for 15 minutes.
4. Filter extract(s). Re-filter if extract is cloudy.
5. Pour sample(s) through manifold into test tube block.
6. Deliver to Wet Chemistry North for analysis.

RMS Procedure:

1. Place the empty RMS rack next to the regulated soil samples in the metal tray on the RMS table.
2. Add 2.5 g of sample into the extraction vessel using the RMS soil scoop and dowel.
3. Place parafilm/lid over sample(s) and set in secondary container to transfer the cart back to Soils.
4. Add 12.5 mL of 2.0 M KCl extraction solution using the repipette dispenser.
5. Properly cover samples with individual caps or a plastic bag.
6. Place RMS rack(s) on reciprocating mechanical shaker for 15 minutes.
7. Filter extract(s) into medicine cup(s). Re-filter if extract is cloudy.
8. Pour sample(s) from medicine cup(s) into disposable test tube(s).
9. Place parafilm over test tube(s) and place in secondary container to transfer to Wet Chemistry North for analysis.
10. All non-disposable items that encounter RMS soil will be disinfected with 10% bleach for 20 minutes. All disposable items (e.g., filters, medicine cups, parafilm, gloves) will be placed on the RMS table in Soils Receiving to be heat-treated before disposal.

Calculation(s): N/A

Method QC:

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Quality Control Procedures:

1. Each day there will be 17 duplicate samples, one (1) duplicate spike, one (1) blank, and one (1) blank spike.

2. One set of bottle checks will be run at least once per 300 samples (approximately).

3. An LCS will be run every 40 samples.

Method Performance Criteria:

1. There is no data collected with this procedure. This is an extraction procedure.

Out of Control Data:

1. There is no data collected with this procedure. This is an extraction procedure.

MDL: This procedure is not amenable to MDL studies.

Pollution Prevention: Due to the potential exposure of untreated regulated samples to the environment, a comprehensive cleaning/disinfection protocol must be followed. This protocol includes sterilizing or heat treating all sample materials, such as sample scoops, balance plates, beakers, etc., after contact with RMS samples or extracts. In the laboratory, floors, walls, and work areas are amenable to washing with disinfectants such as bleach. If a sample is spilled or dropped, sweep the sample into a hard pan and then heat treat the sample. Clean any area that the spilled sample touched using 10% bleach. This may possibly include walls, floors, and bench tops. Bleach requires saturation of the surface being treated for a minimum period of 20 minutes. Other options are 70% ethanol immersed for at least 30 minutes and disinfectants containing quaternary ammonium compounds per manufacturer's specifications. Discard the bleach solution into the laboratory wastewater system. Since the material is not volatile or airborne, treatment or disinfecting of ceiling areas or HVAC ducts is not needed.

Waste Management: All RMS waste is disposed of in a designated, sealed bin/bag. The waste is then heated in accordance with RC 028 to destroy any potentially regulated organisms. Once it has been treated, the waste can be discarded in the municipal dumpster.

All remaining sterile soil is placed in the municipal dumpster for disposal.

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Determination of Soil EC

Scope/ Application:	This method is applicable to all types of soil.
Purpose:	This procedure describes an accepted method to determine soluble salts by measuring the electrical conductivity of a soil sample.
Summary of Test Method:	Scoop 10 g (1:1) or 5 g (1:2) of soil into a soluble salts rack and add 10 mL of DI water. Shake for 15 minutes. Read EC on Conductivity Meter.
References:	Recommended Chemical Soil Test Procedures for the North Central Region. Revised 2015. NCR-13. SO 049 – EC Meter Calibration
Definitions:	**Electrical Conductivity (EC)** – a measurement of a solution's ability to conduct an electrical current **Siemens per meter (S/m)** – SI unit of electrical conductivity
Technical Notes:	N/A
Sample Preservation & Storage:	Samples are stored at room temperature and retained for a minimum of ten (10) days after analysis. The remainder is disposed into the municipal landfill dumpster.
Reagents:	DI water Conductivity Standard, 1000 µS/cm at 25°C (495 ppm TDS as NaCl)
Safety:	Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.
Instruments:	Thermo Scientific Orion 150 Conductivity Meter Thermo Scientific Orion DuraProbe 4-Electrode Conductivity Probe (013005MD)
Apparatus:	Soluble Salts Rack – one (1) rack contains 20-dram vials NCR-13, 10.0 g scoop Repipette dispenser, calibrated to 10.0 mL Reciprocating mechanical shaker, capable of 160-200 oscillations per minute
Interference:	N/A

EC 1:1 Procedure:

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1. Add 10 g of sample into the designated soluble salts rack.
2. Add 10 mL DI water using the repipette dispenser.
3. Shake the sample for 15 minutes.
3. Verify the EC meter using the 1000 µS/cm conductivity standard.
4. Read the conductivity of the suspension.
5. Rinse the EC probe with DI water in between samples.

EC 1:2 Procedure:

1. Add 5 g of sample into the designated soluble salts rack.
2. Add 10 mL DI water using the repipette dispenser.
3. Shake the sample for 15 minutes.
3. Verify the EC meter using the 1000 µS/cm conductivity standard.
4. Read the conductivity of the suspension.
5. Rinse the EC probe with DI water in between samples.

Calculation(s): N/A

Method QC:

Quality Control Procedures:

1. Verify EC meter daily within the acceptable range of the conductivity standard.
2. One (1) table check every 39 samples.
3. One (1) bottle check approximately every 250 samples.

Method Performance Criteria:

1. Conductivity standard must be within ± 50 µS/cm of 1000 µS/cm (950 µS/cm -1050 µS/cm).
2. EC of the table check must be within the established acceptable range.
3. EC of the bottle check must be within the established acceptable range.

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Out of Control Data:

1. If the conductivity standard is reading out of range, contact laboratory supervisor to calibrate the EC Meter.

2. In the event of an instrument-caused QC failure, stop analysis and determine the cause of the failure and repair the instrument. All samples since the previous acceptable QC sample must be re-analyzed.

MDL: An MDL study is not required for this procedure.

Pollution Prevention: No pollution produced in this method.

Waste Management: Aqueous wastes are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge.

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Mehlich III ICP-AES Extraction

Scope/ Application: This method is applicable to all types of soils.

Purpose: This procedure describes an accepted method to determine levels of Al, B, Ca, Cu, Fe, K, Mg, Mn, Mo, Na, P, S, Zn in a soil sample.

Summary of Test Method: Scoop 2 g of sample into rack and add 20 mL of Mehlich III solution. Shake for five (5) minutes and filter. Re-filter if the filtrate is cloudy. Pour extract into test tube block and give to Metals for analysis.

References: Recommended Chemical Soil Test Procedures for the North Central Region. Revised 2015. NCR-13.

ME 092 – Analysis of Aqueous Extracts by ICP-AES

Definitions: **EDTA:** Ethylenediaminetetraacetic Acid

ICP-AES: Inductively Coupled Plasma-Atomic Emission Spectrometry

LCS: Laboratory Control Sample

Technical Notes: N/A

Sample Preservation & Storage: Samples are stored at room temperature and retained for a minimum of ten (10) days after analysis. The remainder is disposed into the municipal landfill dumpster.

Reagents: Mehlich III, Part A Concentrate: Water, Ammonium Fluoride, and EDTA.

Mehlich III, Part B Concentrate: Water, Ammonium Nitrate, Acetic Acid, and Nitric Acid.

Mehlich III Solution (0.2 N CH_3COOH, 0.25 M NH_4NO_3, 0.015 M NH_4F, 0.013 N HNO_3, 0.001 M EDTA): Fill cylindrical tank to about 1/3 full of DI water. Start mixer and add Mehlich III, Part A Concentrate. Continuously add water and mix solution while adding in Mehlich III, Part B Concentrate. Bring to approximately 50 L final volume. After the solution has mixed for about 20 minutes, check the pH of the solution. The pH should be within 2.5 ± 0.05. If needed, adjust the pH with Nitric Acid or Ammonium Hydroxide.

Safety: Use gloves and wear safety glasses. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

Instruments: N/A

Apparatus: NCR-13, 2.0 g scoop

Repipette dispenser, calibrated to 20 mL

Reciprocating mechanical shaker, capable of 160-200 oscillations per minute

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Mehlich Rack – one (1) rack contains 10 dram vials

Whatman No. 42 or equivalent highly retentive filter paper

Interference: N/A

Procedure:

1. Add 2 g of sample that is indicated on the Mehlich ICP scoopsheet(s) into designated extraction vessel.
2. Add 20 mL of Mehlich III solution using the repipette dispenser.
3. Place extraction vessel(s) on reciprocating shaker for 5 minutes.
4. Filter extract(s). Re-filter if extract is cloudy.
5. Transfer sample(s) to test tube block.
6. Deliver samples to Metals for analysis.

Calculation(s): N/A

Method QC:

Quality Control Procedures:

1. Each batch will be run with a reagent blank, method blank, and a duplicate.
2. One (1) LCS per batch or every 30 samples.

Method Performance Criteria:

1. There is no data collected with this procedure. This is an extraction procedure.

Out of Control Data:

1. There is no data collected with this procedure. This is an extraction procedure.

MDL: An MDL study is not required for this procedure.

Pollution Prevention: No pollution produced in this method.

Waste Management: No waste produced in this method.

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Determination of Total Kjeldahl Nitrogen (TKN)

Scope/ Application: This method covers the determination of Total Kjeldahl Nitrogen in manures, sludges, composts, biosolids, filters, food products and other solid or semisolid sample types.

Purpose: To provide direction and information for sample preparation and analyses following a validated method for Total Kjeldahl Nitrogen.

Summary of Test Method: Sample is digested with a copper catalyst and sulfuric acid for approximately 90 minutes at 400 ± 20°C in a digestion block. It is then distilled into Boric Acid receiving solution and titrated with 0.25N H_2SO_4 (sulfuric acid). Results are reported as % or ppm nitrogen.

References: International Association of Official Analytic Chemists (AOAC) 2001.11: Protein (Crude) in Animal Feed, Forage (Plant Tissue), Grain, and Oilseeds - Block Digestion Method Using Copper Catalyst and Steam Distillation into Boric Acid

FO DOC 12 Ankom Protein Determination Procedure-SDF/TDF,IDF

Definitions: **Organic Nitrogen** - Forms of nitrogen that includes proteins, amino acids, amines, nitrogenous bases, and urea. For calculation purposes, organic nitrogen is measured by subtracting the ammonia nitrogen from the TKN.

TKN - Total Kjeldahl Nitrogen

LCS – Laboratory Control Sample – Known or certified value used to monitor accuracy

SRS- Secondary Resource Standard-A standard whose primary standard is a different original material than the primary standard of the calibrants.

Batch - samples that are extracted and analyzed as a set. The acceptance of the batch is based on a review of the Quality Control samples analyzed in conjunction with the set of samples. For this Procedure, a batch consists of up to twenty (20) samples, four (4) of which are QC samples.

Technical Notes: N/A

Sample Preservation & Storage: Samples are not kept cool until they are retained. There are no regulatory requirements for sample preservation, containers, or holding times. Original samples are retained for at least thirty (30) days after the final report is generated. When samples are finally disposed, they are placed into a solid waste dumpster that is removed by a licensed waste disposal company with final disposal in a licensed municipal landfill.

Reagents: **ALL REAGENTS ARE ACS REAGENT GRADE OR BETTER**

Ammonium Chloride (NH_4Cl) Stock Solution: (1000 ppm) (SRS) - 1 mL = 1 mg NH_3·N. Dissolve 3.819 g NH_4Cl in deionized water and bring to volume in a 1 L volumetric flask. Preserve with 1 mL H_2SO_4 Good for six (6) months or until the most imminent expiration date of a parent chemical(s), whichever occurs first. Store at room temperature.

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Catalyst: Alfie Packer TT-57 ProPac™ tablets or equivalent. Store at room temperature for up to five (5) years or the expiration date provided by the manufacturer, whichever occurs first.

Sulfuric Acid (H2SO4) Titrant: 0.02 N used for low level samples and 0.25 N used for high level samples. Store according to the conditions specified by the manufacturer. Reagent is good for three (3) years, or the expiration date specified by the manufacturer of the parent chemical(s), whichever occurs first.

40% Sodium Hydroxide (NaOH): Purchased certified lot. Store according to the conditions specified by the manufacturer. Reagent is good for three (3) years, or the expiration date specified by the manufacturer, whichever occurs first.

Boric Acid Buffer Receiving Solution: Add 0.40 g of Bromocresol Green, 0.40 g of Methyl Red, 400 g of Boric Acid, and 80 mL of 0.10 N NaOH to a 35 L of DI water. Dissolve reagents and fill to 40 L final volume with DI. Pour the solution into the receiving solution reservoir below the instrument. Reagent can be stored at ambient conditions and is good for one (1) year or until the most imminent expiration date of a parent chemical(s), whichever occurs first.

Concentrated Sulfuric Acid (H_2SO_4) – Purchased concentrated certified lot. Store according to the conditions specified by the manufacturer. Reagent is good for three (3) years or the expiration date specified by the manufacturer, whichever occurs first.

0.1 N Sodium Hydroxide (NaOH) Solution: Reagent can be stored at ambient conditions and is good for three (3) years or the expiration date specified by the manufacturer, whichever occurs first.

Diatomaceous Earth: Purchased blank. Store according to the conditions specified by the manufacturer. Good for five (5) years or until the expiration date specified by the manufacturer, whichever occurs first.

Safety: Sulfuric acid is caustic. Carry out digest in the hood with aspirator and scrubber connected. Normal safety practices and equipment are to be followed when carrying out the method. There are few reagents used in the method and it is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

SPECIAL NOTE: Use caution, when adding concentrated sulfuric acid to the samples. Samples with very high pH or solid lime samples may react violently and result in severe injury to the analyst.

Instruments: Foss Tecator Model# Kjeltec 8400 Auto-Distillation unit or equivalent

Apparatus: Tecator Digestor 2520 and Aspirator or equivalent

Digest Tubes – 250 mL (20 per rack)

Analytical balance sensitive to 0.001 g

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Interferences: The digestion process eliminates of most interference; however, samples with extremely high organic matter present may need sample size reduced to enable complete digestion.

Procedure:

1. Pre-heat digestion block at 400 ± 20°C.

2. Homogenize sample and weigh 0.5 to 10.0 g of sample into digestion tubes. Use less sample if TKN value is expected to be greater than 1%.

3. Add 1 ProPac tab to each digestion tube. **For all Foods samples subsequently analyzed by WC 048, add 2 Pro Pac tablets to each digestion tube.** Treat with antifoam.

4. Add 20 mL of concentrated H_2SO_4 into each digestion tube and place in pre-heated digestion block located in fume hood. **All Foods samples subsequently analyzed by WC 048, add 20 ml of concentrated H_2SO_4 into each digestion tube and place in pre-heated digestion block located in fume hood. For Foods samples coming from the FO 027 Dietary Fiber method, add 27 ml of concentrated H_2SO_4 into each digestion tube and place in pre-heated digestion block located in fume hood.**

   Safety Notice: If adding acid to lime samples or samples with pH >10, use extreme caution by diluting acid with DI and adding acid slowly.

5. Immediately set up vacuum system and place exhaust manifold and scrubber assembly on digestion tubes.

6. Digest samples for approximately 90 minutes.

7. Take samples out of digestion block and allow them to cool. Leave the exhaust manifold in place for at least 15 minutes.

8. Turn off exhaust for vacuum and remove exhaust manifold.

9. Allow samples to cool to room temperature. Add approximately 80 mL of DI water.

10. Place sample on blanked auto distillation unit and analyze using "Kjeldahl 3" program. This ensures the instrument will add a sufficient amount of sodium hydroxide to the sample. Record data in mg N/g.

11. When analysis is complete, pour contents of tube down sink. Run water to dilute.

    Digestion tube is extremely hot: use caution when handling.

Calculation(s): $$\% \text{ Nitrogen} = \frac{(\text{mg N/g})}{\text{Sample Weight (g)}}$$

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Method QC:

Quality Control Procedures:

1. Quality Control includes one (1) blank, one (1) LCS, one (1) duplicate, and one (1) SRS per batch.

Method Performance Criteria:

1. Recovery of LCS must be within ±3 standard deviations as determined by the most recent LCS characterization.

2. Recovery of SRS must fall within ± 10% of the established value.

3. Duplicate RPD must be less than 10%. RPD >10% is acceptable if sample results are within 10X the reporting limit.

4. Blank level must be less than method reporting limit of 0.005 % N.

5. Refer to procedure FO 075 for Quality Control Procedures, and Method Performance Criteria for all Food samples.

Out of Control Data:

1. In the event of an instrument-caused QC failure, stop analysis and determine the cause of the failure and repair the instrument. All, samples since the previous acceptable QC sample must be re-analyzed. If samples cannot be re-analyzed, the report to the client must reflect the QC failure and an Out of Specification (OOS) investigation must be completed.

2. If the sample duplicate is an unacceptable precision (% RPD exceeds control limits), the sample will be observed to determine if the sample is homogenous. The sample and duplicate can be re- ground to obtain a homogenous matrix and the sample re-analyzed. The batch will not be failed if the precision is outside the acceptable range.

3. If the batch QC has recovery levels of the Blank/LCS/SRS outside acceptable ranges, the affected QC will be re-analyzed. If on the second analysis, the QC is found to be acceptable, the batch QC is approved. If the re-analysis of the LCS is still outside the acceptable range, analysis is stopped, and the failed accuracy result communicated to the department supervisor. The cause for the failure is determined and corrected before subsequent analyses take place. All samples since the previous acceptable QC are re-analyzed unless it is not possible to reanalyze the samples. If it is not possible to re-run the samples, an OOS Checklist must also be completed to document the LCS failure.

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MDL: This procedure is not amenable to MDL studies.

Pollution Prevention: Pro-Pac tablets used to do not contain mercury. Nesslerization has been phased out.

Waste Management: Digested samples can be emptied into the chemical drain when analysis is complete. Aqueous wastes are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge.

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City of
Lubbock
TEXAS

Lubbock Land Application Site
T.P.D.E.S. WQ0010353002
Annual Soil report
2023

COPY

City of Lubbock
Lubbock Land Application Site
TPDES Permit Number WQ0010353002

Annual Soil Sampling Analysis
September 2023

City of Lubbock
Lubbock Land Application Site
TPDES Permit Number WQ0010353002

Annual Soil Sampling Analysis
September 2023

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Laboratory Procedures provided by Midwest Laboratories

City of Lubbock TEXAS

September 21, 2023

April Hoh
TCEQ Water Quality Assessment Team
P.O. Box 13087
Austin, TX 78711-3087

Re: **Permit WQ0010353002, City of Lubbock Lubbock Land Application Site Annual Soil Analysis, 2023**

Attached is the 2023 Annual Soil Analysis Report for soil samples taken on the Lubbock Land Application Site. This report contains six (6) sections, Sections A through F. As required by TPDES Permit WQ0010353002, OTHER REQUIREMENTS #14, the report presents, for each soil sample:

1). The soil sample analysis results, date and time analysis was performed (Section A)
2). The date and time of sampling (Section B)
3). The location of samples on each irrigation plot (Section C)
4). How each sample was obtained (Section D)
5). The means of conveyance for samples to the laboratory (Section E)
6). A detailed account of the procedures for each analysis (Section F)

The City of Lubbock continues to operate its land application operations with an absolute commitment to meet or exceed all conditions of its permit(s). If you have any questions regarding the contents of this report, please do not hesitate to contact me at (806) 775-2585.

Sincerely,

Aubrey Spear

Aubrey A. Spear, P.E.
Director of Water Utilities

cc: Christopher Mayben, P.G. TCEQ Regional Director, Region 2
Jennifer Talley, TCEQ, Compliance Monitoring Section, Enforcement Division (MC 224)

Section A

Soil Sample

Analysis Results

2022/2023

LLAS 2023

Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
40706223	10/6/22	L22-L35C-A DUP	A	0-6	10/13/22	14:00	11/14/2022	8.1	0.4	21	4	750	509	124	540	3953	258	164	20	54.3	4.8
40706224	10/6/22	L22-L35C-A	A	0-6	10/13/22	14:00	11/14/2022	8	0.3	22	4	880	499	127	517	3975	241	170	21	58.8	4.8
40706225	10/6/22	L22-L35C-B	B	6-18	10/13/22	14:00	11/14/2022	8.2	0.3	18	3	580	351	151	612	2959	364	169	12	31.1	6.5
40706226	10/6/22	L22-L35C-C	C	18-30	10/13/22	14:00	11/14/2022	8.4	0.6	8	3	480	378	113	689	3524	685	318	15	40.5	11
40706227	10/6/22	L22-L35C-A-DUP	A	0-6	10/13/22	14:40	11/14/2022	8	0.4	23	4	760	525	129	569	3844	297	231	28	76.1	5.7
40706228	10/6/22	L22-L35C-B-DUP	B	6-18	10/13/22	14:40	11/14/2022	8.3	0.3	16	5	630	372	144	600	3256	340	193	14	37.6	6.8
40706229	10/6/22	L22-L35C-C-DUP	C	18-30	10/13/22	14:40	11/14/2022	8.5	0.6	7	3	450	360	110	655	3367	648	446	22	57.4	13
40706230	10/6/22	L22-L35B-A	A	0-6	10/14/22	15:30	11/14/2022	8.4	0.6	10	3	980	343	123	524	4086	559	329	17	48.4	10
40706231	10/6/22	L22-L35B-B	B	6-18	10/14/22	15:30	11/14/2022	7.8	1.3	22	4	650	294	144	521	3377	647	805	143	450	8.4
40706232	10/6/22	L22-L35B-C	C	18-30	10/14/22	15:30	11/14/2022	7.9	0.9	9	4	380	298	72	528	3340	721	698	64	177	11
40706233	10/18/22	L22-L32A-A	A	0-6	10/18/22	11:00	11/14/2022	8.1	1	27	6	1290	418	155	584	6185	700	421	28	78.8	10
40706234	10/18/22	L22-L32A-B	B	6-18	10/18/22	11:00	11/14/2022	8	1	14	3	880	288	143	609	5518	800	662	57	159	11
40706235	10/18/22	L22-L32A-C	C	18-30	10/18/22	11:00	11/14/2022	8.1	1.4	13	4	730	278	109	577	5917	799	585	73	282	8
40706236	10/20/22	L22-L35A-A	A	0-6	10/20/22	11:15	11/14/2022	8.4	0.7	15	4	1220	440	136	659	5653	701	365	21	56.5	11
40706237	10/20/22	L22-L35A-B	B	6-18	10/20/22	11:15	11/14/2022	8.4	0.9	4	4	590	248	73	642	6324	715	491	38	83.2	11
40706238	10/20/22	L22-L35A-C	C	18-30	10/20/22	11:15	11/14/2022	8.3	1.2	2	3	370	216	14	638	27237	660	561	52	107	11
40706242	9/22/2022	L22-L04A-A DUP	A	0-6	9/22/22	13:00	11/14/2022	8.6	0.4	11	4	800	338	40	604	5052	425	200	14	41.6	6.9
40706243	9/22/2022	L22-L04A-A	A	0-6	9/22/22	13:00	11/14/2022	8.6	0.4	11	3	770	303	36	545	4990	379	232	17	52	7.1
40706244	9/22/2022	L22-L04A-B	B	6-18	9/22/22	13:00	11/14/2022	8.6	0.4	10	3	760	328	39	597	5171	416	215	14	41	7.3
40706245	9/22/2022	L22-L04A-C	C	18-30	9/22/22	13:00	11/14/2022	8.5	0.8	5	3	430	213	14	644	7884	753	485	35	83.9	11
40706246	9/22/2022	L22-L04B-A	A	0-6	9/22/22	13:20	11/14/2022	8.4	0.6	24	3	800	300	46	560	5392	320	205	22	58.6	5.7
40706247	9/22/2022	L22-L04B-B	B	6-18	9/22/22	13:20	11/14/2022	8.7	0.4	7	3	560	272	28	679	2049	579	235	11	28.4	9.4
40706248	9/22/2022	L22-L04B-C	C	18-30	9/22/22	13:20	11/14/2022	8.6	0.9	7	4	450	261	12	721	5449	949	539	31	62.6	14
40706249	9/27/2022	L22-L05A-A	A	0-6	9/26/22	11:20	11/14/2022	8.7	0.4	5	4	560	254	21	500	5925	476	204	8.6	30.6	8.4
40706250	9/27/2022	L22-L05A-B	B	6-18	9/26/22	11:20	11/14/2022	8.6	0.7	4	3	410	191	9	492	7398	627	439	28	84.1	11
40706251	9/27/2022	L22-L05A-C	C	18-30	9/26/22	11:20	11/14/2022	8.5	0.7	3	3	330	125	2	558	27440	564	390	21	65.7	11

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Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
40706252	9/27/2022	L22-L05A-A-DUP	A	0-6	9/26/22	11:40	11/14/2022	8.7	0.4	5	3	590	235	18	476	6219	470	234	11	40.9	8.3
40706253	9/27/2022	L22-L05A-B-DUP	B	6-18	9/26/22	11:40	11/14/2022	8.5	0.7	4	3	480	185	7	479	7548	602	433	27	90.1	10
40706254	9/27/2022	L22-L05A-C-DUP	C	18-30	9/26/22	11:40	11/14/2022	8.5	0.6	3	3	340	132	5	553	26155	574	286	14	42.8	9.7
40706257	9/28/2022	L22-L08A-A DUP	A	0-6	9/28/22	11:15	11/14/2022	8.8	0.5	4	3	660	183	21	426	7185	521	438	20	59.6	13
40706258	9/28/2022	L22-L08A-A	A	0-6	9/28/22	11:15	11/14/2022	8.6	0.5	5	4	640	185	20	441	7996	519	374	15	42.1	13
40706259	9/28/2022	L22-L08A-B	B	6-18	9/28/22	11:15	11/14/2022	8.2	0.6	3	5	600	195	17	610	5348	778	509	39	97	11
40706260	9/28/2022	L22-L08A-C	C	18-30	9/28/22	11:15	11/14/2022	8.3	1	2	3	630	171	5	623	9506	858	835	64	147	15
40706261	9/29/2022	L22-L08B-A	A	0-6	9/29/22	12:03	11/14/2022	8.3	0.5	5	4	710	255	59	556	2623	560	378	23	57.9	11
40706262	9/29/2022	L22-L08B-B	B	6-18	9/29/22	12:03	11/14/2022	8.3	0.5	5	4	550	201	30	597	1687	664	406	25	57.6	11
40706263	9/29/2022	L22-L08B-C	C	18-30	9/29/22	12:03	11/14/2022	8.5	0.6	2	3	440	220	9	694	3130	840	629	44	97.1	13
40706264	10/4/2022	L22-L13A-A	A	0-6	10/4/22	13:04	11/14/2022	8.4	1	36	3	1100	551	130	602	5864	799	761	63	168	13
40706265	10/4/2022	L22-L13A-B	B	6-18	10/4/22	13:04	11/14/2022	8.5	0.9	11	4	640	406	91	628	5250	843	879	76	174	14
40706266	10/4/2022	L22-L13A-C	C	18-30	10/4/22	13:04	11/14/2022	8.5	1.3	5	3	590	391	55	641	5054	1184	1216	82	202	18
40706267	10/6/2022	L22-L13B-A	A	0-6	10/6/22	13:00	11/14/2022	8.5	0.5	22	4	1430	430	183	562	4785	550	406	25	73.5	10
40706268	10/6/2022	L22-L13B-B	B	6-18	10/6/22	13:00	11/14/2022	8.4	0.6	13	4	730	374	154	744	3926	792	603	52	119	12
40706269	10/6/2022	L22-L13B-C	C	18-30	10/6/22	13:00	11/14/2022	8.5	0.9	4	4	480	410	120	696	5189	864	741	52	116	14
40706270	10/6/2022	L22-L13C-A	A	0-6	10/6/22	13:30	11/14/2022	8.4	0.7	30	5	1550	499	217	713	4997	705	434	33	82.4	10
40706271	10/6/2022	L22-L13C-B	B	6-18	10/6/22	13:30	11/14/2022	8.4	0.9	8	4	950	349	131	774	5740	891	581	47	109	12
40706272	10/6/2022	L22-L13C-C	C	18-30	10/6/22	13:30	11/14/2022	8.3	1.1	3	3	570	296	112	674	8071	921	648	54	115	12
41079947	11/13/22	L22-L19B-A DUP	A	0-6	11/15/22	11:00	1/4/2023	8.5	0.7	30	2	1050	457	174	479	3601	487	311	21	57.1	8.9
41079948	11/13/22	L22-L19B-A	A	0-6	11/15/22	11:00	1/4/2023	8.5	0.6	28	2	1050	497	188	515	3801	532	436	29	78.9	11
41079949	11/13/22	L22-L19B-B	B	6-18	11/15/22	11:00	1/4/2023	8.2	0.5	15	2	1010	370	101	706	2213	696	477	49	89.2	10
41079951	11/13/22	L22-L19B-C	C	18-30	11/15/22	11:00	1/4/2023	8.5	0.7	7	1	470	340	75	720	4918	1074	508	26	51.4	14
41079952	12/6/22	L22-L20-A	A	0-6	12/6/22	14:10	1/4/2023	8.3	0.4	8	3	1030	464	201	465	3245	378	267	20	56.5	7.7
41079953	12/6/22	L22-L20-B	B	6-18	12/6/22	14:10	1/4/2023	8.1	0.6	17	1	650	305	107	640	4386	650	344	27	63	9.1
41079954	12/6/22	L22-L20-C	C	18-30	12/6/22	14:10	1/4/2023	8.4	0.6	4	1	460	298	84	671	5449	905	594	43	86.7	13

LLAS 2023

Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
41079955	12/6/22	L22-L20-A DUP	A	0-6	12/6/22	14:10	1/4/2023	8.4	0.4	9	2	1080	500	235	465	3093	371	210	15	43.6	7
41079956	12/6/22	L22-L20-B DUP	B	6-18	12/6/22	14:10	1/4/2023	8.1	0.7	18	2	680	265	101	593	4414	591	445	42	86.6	9.8
41079957	12/6/22	L22-L20-C DUP	C	18-30	12/6/22	14:10	1/4/2023	8.3	1	5	1	470	280	84	648	5170	852	565	44	89.5	12
41079958	12/6/22	L22-L21-A	A	0-6	12/6/22	15:00	1/4/2023	8.4	0.3	6	2	1170	479	107	513	5146	422	292	23	64.6	7.9
41079959	12/6/22	L22-L21-B	B	6-18	12/6/22	15:00	1/4/2023	8.4	0.7	9	2	770	267	67	561	7952	575	455	38	83.8	10
41079960	12/6/22	L22-L21-C	C	18-30	12/6/22	15:00	1/4/2023	8.7	0.5	3	1	440	258	72	518	11160	459	268	16	37.5	9.2
41079961	12/11/22	L22-22A-A	A	0-6	12/15/22	7:00	1/4/2023	8.4	0.5	8	7	970	485	111	540	5977	504	367	37	89.5	8.2
41079962	12/11/22	L22-22A-B	B	6-18	12/15/22	7:00	1/4/2023	8.5	0.4	3	2	670	351	115	611	2494	514	329	26	55.7	9.1
41079963	12/11/22	L22-22A-C	C	18-30	12/15/22	7:00	1/4/2023	8.5	0.6	5	2	610	298	64	726	4828	702	385	25	47.9	11
41079966	10/20/22	L22-L35A-A DUP	A	0-6	10/20/22	12:00	1/4/2023	8.6	0.7	16	3	1150	385	132	562	4902	653	434	26	65.1	12
41079967	10/20/22	L22-L35A-A DUP	A	0-6	10/20/22	12:00	1/4/2023	8.6	0.7	16	2	1170	378	127	550	5095	643	487	28	69.9	12
41079968	10/20/22	L22-L35A-B DUP	B	6-18	10/20/22	12:00	1/4/2023	8.4	0.8	4	2	560	246	75	613	5968	745	532	40	83.7	12
41079969	10/20/22	L22-L35A- C DU	C	18-30	10/20/22	12:00	1/4/2023	8.5	0.9	3	2	390	245	42	612	15030	681	784	70	139	14
41079970	10/26/22	L22-L17A-A	A	0-6	10/26/22	12:47	1/4/2023	8.5	0.4	9	2	790	348	50	440	4434	426	350	24	59	9.7
41079971	10/26/22	L22-L17A-B	B	6-18	10/26/22	12:47	1/4/2023	8.3	0.5	8	2	520	295	40	488	1796	573	389	25	58.3	11
41079972	10/26/22	L22-L17A-C	C	18-30	10/26/22	12:47	1/4/2023	8.6	0.7	6	2	460	313	9	626	4599	669	498	35	73.7	12
41079973	10/26/22	L22-L17B-A	A	0-6	10/26/22	13:20	1/4/2023	8.5	0.4	12	2	750	336	36	502	6672	470	422	33	71.4	10
41079974	10/26/22	L22-L17B-B	B	6-18	10/26/22	13:20	1/4/2023	8.1	0.5	15	2	540	279	53	527	1388	590	455	39	78.7	10
41079975	10/26/22	L22-L17B-C	C	18-30	10/26/22	13:20	1/4/2023	8.5	0.5	6	2	610	316	28	592	4192	621	416	22	42.7	13
41079976	10/26/22	L22-L18A	A	0-6	11/10/22	7:00	1/4/2023	8.2	0.3	31	2	1000	350	103	552	4622	280	208	28	66.7	5.4
41079977	10/26/22	L22-L18B	B	6-18	11/10/22	7:00	1/4/2023	8.4	0.4	15	2	610	278	91	635	2791	598	316	19	39.8	10
41079978	10/26/22	L22-L18C	C	18-30	11/10/22	7:00	1/4/2023	8.4	0.7	5	2	510	292	50	633	4698	727	458	29	58.9	12
41079979	11/9/22	L22-L19A-A	A	0-6	11/10/22	7:30	1/4/2023	8.1	0.9	40	2	1010	539	174	571	3720	678	598	65	155	10
41079980	11/9/22	L22-L19A-B	B	6-18	11/10/22	7:30	1/4/2023	8.4	0.7	12	2	630	349	76	725	4592	679	413	29	74.9	10
41079981	11/9/22	L22-L19A-C	C	18-30	11/10/22	7:30	1/4/2023	8.7	0.9	5	2	460	286	65	664	5190	1025	638	34	65.6	16
41122902	1/4/23	L22-L02B-A DUP	A	0-6	1/4/23	11:15	1/26/2023	8.6	0.4	7	6	1190	369	81	515	2952	468	399	32	67.3	10

LLAS 2023

Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
41122903	1/4/23	L22-L02B-A	A	0-6	1/4/23	11:15	1/26/2023	8.7	0.4	6	5	1100	362	80	499	2840	451	361	26	56.2	10
41122904	1/4/23	L22-L02B-B	B	6-18	1/4/23	11:15	1/26/2023	8.6	0.7	3	6	640	308	38	591	4741	717	442	25	51.4	13
41122905	1/4/23	L22-L02B-C	C	18-30	1/4/23	11:15	1/26/2023	8.7	0.3	2	2	420	320	9	687	5583	697	517	37	65.3	13
41122906	1/4/23	L22-L01B-A	A	0-6	1/5/23	9:15	1/26/2023	8.6	0.5	8	3	1170	370	121	540	2186	488	309	18	41	10
41122907	1/4/23	L22-L01B-B	B	6-18	1/5/23	9:15	1/26/2023	8.7	0.6	3	2	520	288	37	587	1518	680	292	16	33.1	10
41122908	1/4/23	L22-L01B-C	C	18-30	1/5/23	9:15	1/26/2023	8.8	1	2	1	460	269	7	706	3783	920	576	35	63.3	14
41122909	1/4/23	L22-L01A-A	A	0-6	1/5/23	8:50	1/26/2023	8.3	0.6	25	2	1230	465	98	546	2586	499	373	30	65	9.5
41122910	1/4/23	L22-L01A-B	B	6-18	1/5/23	8:50	1/26/2023	8.7	0.6	6	2	550	270	34	577	4149	592	364	21	44.8	11
41122911	1/4/23	L22-L01A-C	C	18-30	1/5/23	8:50	1/26/2023	8.6	0.7	4	2	390	202	13	634	5967	651	473	31	59.2	12
41122912	1/9/23	L22-LAA-A	A	0-6	1/9/23	13:30	1/26/2023	8.8	0.3	6	2	460	467	118	416	1700	275	181	8	22.1	8.4
41122913	1/9/23	L22-LAA-B	B	6-18	1/9/23	13:30	1/26/2023	8	1	9	1	420	294	17	522	1570	684	694	60	127	13
41122914	1/9/23	L22-LAA-C	C	18-30	1/9/23	13:30	1/26/2023	8.5	0.8	4	1	390	229	5	516	3668	901	497	19	56.7	15
41122915	1/9/23	L22-LAB-A	A	0-6	1/9/23	13:50	1/26/2023	8.8	0.3	7	1	490	558	117	476	1610	312	179	9.1	22.1	8.1
41122916	1/9/23	L22-LAB-B	B	6-18	1/9/23	13:50	1/26/2023	8.1	0.9	5	1	650	300	19	530	1621	680	729	58	131	13
41122917	1/9/23	L22-LAB-C	C	18-30	1/9/23	13:50	1/26/2023	8.3	1	3	1	390	206	11	482	5155	920	667	30	107	15
41122920	1/3/23	L22-L07B-A DUP	A	0-6	1/3/23	10:00	1/26/2023	8.5	0.5	8	6	1050	352	113	446	1978	492	447	31	66	11
41122921	1/3/23	L22-L07B-A	A	0-6	1/3/23	10:00	1/26/2023	8.6	0.5	9	6	1100	352	118	454	2078	481	420	25	52.8	12
41122922	1/3/23	L22-L07B-B	B	6-18	1/3/23	10:00	1/26/2023	8.4	0.6	4	1	570	233	44	545	1450	675	421	23	49.6	12
41122923	1/3/23	L22-L07B-C	C	18-30	1/3/23	10:00	1/26/2023	8.4	0.8	3	1	520	304	12	711	5088	729	487	44	83.2	11
41122924	12/28/22	L22-L07A-A	A	0-6	1/3/23	16:40	1/26/2023	8.6	0.4	10	1	1010	328	87	440	2887	461	371	21	47.2	11
41122925	12/28/22	L22-L07A-B	B	6-18	1/3/23	16:40	1/26/2023	8.3	0.8	6	1	510	212	49	532	4340	638	473	37	76.9	11
41122926	12/28/22	L22-L07A-C	C	18-30	1/3/23	16:40	1/26/2023	8.5	0.6	2	1	420	231	15	591	5085	490	362	33	59.4	9.3
41122927	1/3/23	L22-L03B-A	A	0-6	1/3/23	15:45	1/26/2023	8.5	0.5	5	1	1200	340	89	483	2528	422	318	21	44.8	9.8
41122928	1/3/23	L22-L03B-B	B	6-18	1/3/23	15:45	1/26/2023	8.7	0.7	4	1	630	273	50	538	4614	647	281	16	32	10
41122929	1/3/23	L22-L03B-C	C	18-30	1/3/23	15:45	1/26/2023	8.7	0.7	2	1	480	319	10	658	4988	705	8.88	0.6	2.1	1.4
41122930	1/3/23	L22-L03A-A	A	0-6	1/3/23	16:02	1/26/2023	8.5	0.4	5	1	1180	320	75	474	2910	415	278	19	39.2	9.1

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Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
41122931	1/3/2023	L22-L03A-B	B	6-18	1/3/23	16:02	1/26/2023	8.7	0.6	3	1	540	244	40	508	4693	631	261	15	32.6	9.5
41122933	1/3/2023	L22-L03A-C	C	18-30	1/3/23	16:02	1/26/2023	8.6	0.8	3	1	430	295	13	644	5289	637	452	38	67.3	11
41122934	1/4/2023	L22-L02A-A	A	0-6	1/4/23	11:00	1/26/2023	8.5	0.3	6	1	1170	387	87	521	3005	445	315	22	48	9.4
41122935	1/4/2023	L22-L02A-B	B	6-18	1/4/23	11:00	1/26/2023	8.5	0.8	5	2	530	309	29	552	2937	746	385	25	53.3	11
41122936	1/4/2023	L22-L02A-C	C	18-30	1/4/23	11:00	1/26/2023	8.5	0.9	2	1	420	309	10	632	5105	838	500	31	60.2	13
41122939	12/21/22	L22-L16A-A DUP	A	0-6	12/22/22	11:15	1/26/2023	8.5	11	1	5	950	320	90	483	2832	411	263	19	44.5	8.3
41122940	12/21/22	L22-L16A-A	A	0-6	12/22/22	11:15	1/26/2023	8.6	10	1	6	920	333	82	503	3050	426	358	24	55.1	10
41122941	12/21/22	L22-L16A-B	B	6-18	12/22/22	11:15	1/26/2023	8.7	7	1	1	550	252	30	552	4376	576	326	16	35.1	11
41122942	12/21/22	L22-L16A-C	C	18-30	12/22/22	11:15	1/26/2023	8.5	3	1	1	410	277	9	651	9501	676	402	25	48.8	12
41122943	12/27/22	L22-L09B-A	A	0-6	12/27/22	11:11	1/26/2023	8.3	8	0	2	1040	379	83	505	4121	381	297	23	56.1	8.4
41122944	12/27/22	L22-L09B-B	B	6-18	12/27/22	11:11	1/26/2023	8.6	12	1	1	620	274	31	564	4939	605	353	18	43.8	11
41122945	12/27/22	L22-L09B-C	C	18-30	12/27/22	11:11	1/26/2023	8.4	5	1	1	490	266	20	632	7288	693	552	37	49.5	14
41122946	12/27/22	L22-L09A-A	A	0-6	12/27/22	16:35	1/26/2023	8.3	14	1	7	960	372	117	429	2496	406	376	28	64.7	9.8
41122947	12/27/22	L22-L09A-B	B	6-18	12/27/22	16:35	1/26/2023	8.6	13	1	3	610	254	32	556	3250	706	579	32	67.7	15
41122948	12/27/22	L22-L09A-C	C	18-30	12/27/22	16:35	1/26/2023	8.5	9	1	1	500	228	8	712	5275	781	619	49	87.5	13
41122949	12/28/22	L22-L06A-A	A	0-6	12/28/22	16:10	1/26/2023	8.4	7	0	1	930	351	148	486	2054	399	338	22	47.7	10
41122950	12/28/22	L22-L06A-B	B	6-18	12/28/22	16:10	1/26/2023	8.3	11	1	3	500	206	57	541	1412	619	474	27	50.4	13
41122951	12/28/22	L22-L06A-C	C	18-30	12/28/22	16:10	1/26/2023	8.2	7	1	1	470	228	9	706	2582	778	547	39	68	13
41122952	12/28/22	L22-L06B-A	A	0-6	12/28/22	16:25	1/26/2023	8.4	9	0	3	930	349	127	474	2356	388	312	21	45.9	9.5
41122953	12/28/22	L22-L06B-B	B	6-18	12/28/22	16:25	1/26/2023	8.2	9	1	1	510	232	57	580	2268	684	318	16	34.8	11
41122954	12/28/22	L22-L06B-C	C	18-30	12/28/22	16:25	1/26/2023	8.3	11	1	1	440	208	14	677	3467	728	617	49	83.3	13
41122957	12/13/22	L22-L22B-A DUP	A	0-6	12/15/22	9:00	1/26/2023	8.7	0.4	13	5	1030	394	116	421	6707	396	388	26	61.8	10
41122958	12/13/22	L22-L22B-A	A	0-6	12/15/22	9:00	1/26/2023	8.7	0.5	13	6	1050	349	106	454	9483	378	359	23	55.4	10
41122959	12/13/22	L22-L22B-B	B	6-18	12/15/22	9:00	1/26/2023	8.7	0.5	6	2	840	350	101	564	6099	527	324	17	37.5	11
41122960	12/13/22	L22-L22B-C	C	18-30	12/15/22	9:00	1/26/2023	8.6	0.8	9	3	470	310	43	603	7773	664	756	46	77.6	17
41122961	12/13/22	L22-L22C-A	A	0-6	12/15/22	9:30	1/26/2023	8.5	0.5	7	2	930	438	171	488	3736	383	157	9.6	24.5	6.8

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41122962	12/13/22	L22-L22C-B	B	6-18	12/15/22	9:30	1/26/2023	8.6	0.5	5	1	590	297	63	582	4776	458	257	18	40.4	8.4
41122963	12/13/22	L22-L22C-C	C	18-30	12/15/22	9:30	1/26/2023	8.8	0.6	6	3	470	264	58	578	5548	653	568	31	63.5	15
41122964	12/20/22	L22-L15B-A	A	0-6	12/20/22	17:00	1/26/2023	8.5	0.5	14	5	1160	509	103	639	4832	525	310	21	45.2	9.6
41122965	12/20/22	L22-L15B-B	B	6-18	12/20/22	17:00	1/26/2023	8.5	0.6	6	4	550	315	156	527	2019	606	323	20	45.1	10
41122966	12/20/22	L22-L15B-C	C	18-30	12/20/22	17:00	1/26/2023	8.3	0.9	7	1	450	304	46	620	3064	720	471	35	74.9	11
41122967	12/20/22	L22-L15A-A	A	0-6	12/20/22	14:40	1/26/2023	8.4	0.5	12	3	900	378	135	509	2709	397	285	18	43.1	9.1
41122968	12/20/22	L22-L15A-B	B	6-18	12/20/22	14:40	1/26/2023	8.7	0.5	7	2	510	268	44	539	2665	599	335	14	33.4	12
41122969	12/20/22	L22-L15A-C	C	18-30	12/20/22	14:40	1/26/2023	8.4	0.8	5	1	500	250	15	638	5461	716	477	34	80.5	11
41122970	12/21/22	L22-L16B-A	A	0-6	12/22/22	9:00	1/26/2023	8.6	0.5	13	2	1050	380	82	460	3245	386	290	19	47.4	9
41122972	12/21/22	L22-L16B-B	B	6-18	12/22/22	9:00	1/26/2023	8.7	0.6	10	1	600	238	42	545	4103	641	332	15	35.5	12
41122973	12/21/22	L22-L16B-C	C	18-30	12/22/22	9:00	1/26/2023	8.7	0.9	9	3	510	282	17	684	8679	799	419	26	45.7	12
41133296	1/17/23	L22-L23-A DUP	A	0-6	1/17/23	13:30	2/7/2023	8.7	0.6	12	1	900	307	95	469	3248	546	291	17	41.3	9.6
41133297	1/17/23	L22-L23-A	A	0-6	1/17/23	13:30	2/7/2023	8.7	0.6	12	1	910	312	98	482	3300	554	235	11	27.6	9.6
41133298	1/17/23	L22-L23-B	B	6-18	1/17/23	13:30	2/7/2023	8.3	1	6	1	630	283	47	596	3659	868	532	39	81.2	12
41133299	1/17/23	L22-L23-C	C	18-30	1/17/23	13:30	2/7/2023	8.6	1.1	3	1	540	294	27	610	5093	997	546	33	62.4	14
41133300	1/17/23	L22-L24A-A	A	0-6	1/30/23	11:00	2/7/2023	8.6	0.5	9	1	890	523	149	504	2373	568	218	9.9	25.9	9.2
41133301	1/17/23	L22-L24A-B	B	6-18	1/30/23	11:00	2/7/2023	8.2	0.8	5	1	600	342	54	580	2658	700	513	43	94.6	11
41133302	1/17/23	L22-L24A-C	C	18-30	1/30/23	11:00	2/7/2023	8.6	0.9	5	1	480	244	23	555	4207	879	476	28	60.5	13
41133303	1/18/23	L22-L25A-A	A	0-6	1/18/23	13:30	2/7/2023	8.6	0.6	5	1	460	383	68	534	3617	625	366	21	45.4	11
41133304	1/18/23	L22-L25A-B	B	6-18	1/18/23	13:30	2/7/2023	8.7	0.6	2	2	550	295	18	575	3810	679	299	19	42.8	9.5
41133305	1/18/23	L22-L25A-C	C	18-30	1/18/23	13:30	2/7/2023	8.7	0.7	2	1	440	304	8	632	4334	703	270	17	36	9.3
41133307	1/18/23	L22-L25B-A	A	0-6	1/18/23	14:00	2/7/2023	8.7	0.6	9	5	1190	479	89	636	3267	658	358	23	48.4	11
41133308	1/18/23	L22-L25B-B	B	6-18	1/18/23	14:00	2/7/2023	8.6	0.8	3	1	810	321	19	655	3865	765	404	27	57	11
41133309	1/18/23	L22-L25B-C	C	18-30	1/18/23	14:00	2/7/2023	8.7	0.8	2	1	480	271	10	561	4092	790	342	16	40.4	11
41133310	1/19/23	L22-L26-A	A	0-6	1/19/23	11:45	2/7/2023	8.7	0.5	6	1	1190	434	95	578	3651	510	291	22	45.9	8.8
41133311	1/19/23	L22-L26-B	B	6-18	1/19/23	11:45	2/7/2023	8.4	0.7	3	1	630	278	49	576	4585	627	318	22	44.9	9.7

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41133312	1/19/23	L22-L26-C	C	18-30	1/19/23	11:45	2/7/2023	8.6	0.6	2	1	130	324	24	608	7183	644	317	19	34.3	11
41133315	1/9/23	L22-LB-A DUP	A	0-6	1/9/23	18:25	2/7/2023	8.7	0.3	7	1	480	518	143	431	1365	268	158	11	26	6.5
41133316	1/9/23	L22-LB-A	A	0-6	1/9/23	18:25	2/7/2023	8.8	0.3	8	2	440	520	143	433	1266	268	156	10	23.3	6.8
41133317	1/9/23	L22-LB-B	B	6-18	1/9/23	18:25	2/7/2023	8	1	10	1	510	388	18	686	2024	562	446	74	121	7.8
41133318	1/9/23	L22-LB-C	C	18-30	1/9/23	18:25	2/7/2023	8.4	0.8	5	1	420	289	5	617	3895	669	342	24	53.1	9.8
41133319	1/12/23	L22-LEA-A	A	0-6	1/12/23	13:50	2/7/2023	8.5	0.5	13	1	540	519	61	574	2167	558	290	16	38.1	9.9
41133320	1/12/23	L22-LEA-B	B	6-18	1/12/23	13:50	2/7/2023	8.2	1.3	25	1	490	286	9	605	2363	1146	641	41	106	13
41133321	1/12/23	L22-LEA-C	C	18-30	1/12/23	13:50	2/7/2023	8.3	1.4	20	1	360	244	5	521	2522	1139	826	41	127	16
41133322	1/12/23	L22-LEB-A	A	0-6	1/12/23	14:20	2/7/2023	8.9	0.4	10	1	510	514	66	523	2416	419	181	10	26	7.6
41133323	1/12/23	L22-LEB-B	B	6-18	1/12/23	14:20	2/7/2023	8.4	1.5	23	1	520	252	8	616	4050	1090	515	28	74.9	13
41133324	1/12/23	L22-LEB-C	C	18-30	1/12/23	14:20	2/7/2023	8.6	1.9	33	1	470	179	9	536	6664	1388	1077	56	190	18
41133325	1/12/23	L22-LD-A	A	0-6	1/12/23	17:10	2/7/2023	8.8	0.4	7	1	560	547	80	462	1700	404	75.7	6.2	15.2	4.1
41133326	1/12/23	L22-LD-B	B	6-18	1/12/23	17:10	2/7/2023	8.6	0.8	7	1	480	314	9	554	3600	719	449	28	58.7	12
41133327	1/12/23	L22-LD-C	C	18-30	1/12/23	17:10	2/7/2023	8.5	1	5	1	450	205	5	581	4108	852	359	22	52.9	10
41133328	1/13/23	L22-LC-A	A	0-6	1/13/23	17:00	2/7/2023	8.7	0.4	12	1	590	591	85	529	1822	438	177	13	31.2	6.7
41133329	1/13/23	L22-LC-B	B	6-18	1/13/23	17:00	2/7/2023	8.4	1	21	1	580	288	8	648	3843	876	540	43	101	11
41133330	1/13/23	L22-LC-C	C	18-30	1/13/23	17:00	2/7/2023	8.5	1.3	19	1	460	200	11	637	5719	1087	743	62	155	13
41133333	1/19/23	L22-L27-A DUP	A	0-6	1/17/23	13:30	2/7/2023	8.6	0.7	6	2	930	437	81	509	3665	681	448	26	57.9	12
41133334	1/19/23	L22-L27-A	A	0-6	1/17/23	13:30	2/7/2023	8.6	0.7	6	2	990	438	79	500	3656	686	568	35	76.2	13
41133335	1/19/23	L22-L27-B	B	6-18	1/17/23	13:30	2/7/2023	8.4	0.9	3	1	710	326	27	588	5040	831	630	47	94.1	13
41133336	1/19/23	L22-L27-C	C	18-30	1/17/23	13:30	2/7/2023	8.6	0.8	2	1	400	318	6	633	6531	1014	664	68	77.2	13
41133337	1/19/23	L22-L10-A	A	0-6	1/23/23	13:30	2/7/2023	7.8	0.3	29	1	1330	949	321	506	2086	109	64.8	25	59.8	1.8
41133338	1/19/23	L22-L10-B	B	6-18	1/23/23	13:30	2/7/2023	8.3	0.5	32	1	750	504	151	695	2236	603	418	31	59.8	11
41133339	1/19/23	L22-L10-C	C	18-30	1/23/23	13:30	2/7/2023	8.5	1	15	1	460	474	104	673	3666	1251	802	37	67.4	19
41133340	1/18/23	L22-L24-A	A	0-6	1/17/23	14:00	2/7/2023	8.5	0.5	6	1	910	448	104	541	3952	616	530	33	76.3	13
41133341	1/18/23	L22-L24-B	B	6-18	1/17/23	14:00	2/7/2023	8.4	0.7	3	1	790	327	62	586	3907	631	474	41	80.6	11

LLAS 2023

Lab Sample Number	Sample Date	Location / Plot	Zone	Depth	Composite date	Composite time	Date received at Laboratory	pH s.u.	Specific Conductance MMHOS/cm	Nitrate-N mg/Kg	Ammonia-N mg/Kg	Total N mg/Kg	Extractable Potassium mg/Kg	Extractable Phosphorous mg/Kg	Extractable Magnesium mg/Kg	Extractable Calcium mg/Kg	Extractable Sodium mg/Kg	Sodium, Paste mg/L	Magnesium, Paste mg/L	Calcium, Paste mg/L	SAR Calculated
41133342	1/18/23	L22-L24-C	C	18-30	1/17/23	14:00	2/7/2023	8.5	0.7	3	1	650	324	44	618	4073	719	579	49	91.7	12
41133343	1/29/23	L22-LFA-A	A	0-6	1/30/23	11:30	2/7/2023	8.3	0.2	4	1	280	339	66	283	2023	63	50.2	15	40.3	1.7
41133344	1/29/23	L22-LFA-B	B	6-18	1/30/23	11:30	2/7/2023	8.5	0.4	6	1	460	251	26	579	3982	257	161	28	70.7	4.1
41133346	1/29/23	L22-LFA-C	C	18-30	1/30/23	11:30	2/7/2023	8.6	0.5	4	1	390	170	18	495	4576	405	374	38	102	8
41133347	1/29/23	L22-LFB-A	A	0-6	1/30/23	12:20	2/7/2023	8.3	0.1	4	1	290	380	104	246	960	58	61.2	14	41.2	2.1
41133348	1/29/23	L22-LFB-B	B	6-18	1/30/23	12:20	2/7/2023	8.4	0.2	5	1	410	313	35	347	1307	220	85.7	7.6	22.7	4
41133349	1/29/23	L22-LFB-C	C	18-30	1/30/23	12:20	2/7/2023	8.6	0.4	8	1	470	270	14	380	1883	415	134	8.4	31.7	5.5
41133352	1/29/23	L22-LGA-A DUP	A	0-6	1/30/23	12:50	2/7/2023	8.8	0.2	4	1	540	419	49	478	1617	229	83.3	8.8	19.9	3.9
41133353	1/29/23	L22-LGA-A	A	0-6	1/30/23	12:50	2/7/2023	8.7	0.2	5	1	380	380	49	437	1488	205	80	8	20.1	3.8
41133354	1/29/23	L22-LGA-B	B	6-18	1/30/23	12:50	2/7/2023	8.5	0.5	5	1	430	263	8	557	3034	445	282	25	57.4	7.8
41133355	1/29/23	L22-LGA-C	C	18-30	1/30/23	12:50	2/7/2023	8.6	0.7	3	1	330	182	6	497	6250	536	453	36	95.3	10
41133356	1/29/23	L22-LGB-A	A	0-6	1/30/23	12:59	2/7/2023	8.3	0.3	6	1	500	590	73	523	1224	374	178	15	34	6.3
41133357	1/29/23	L22-LGB-B	B	6-18	1/30/23	12:59	2/7/2023	8	0.6	4	1	410	272	18	435	1750	473	312	26	74.3	7.9
41133358	1/29/23	L22-LGB-C	C	18-30	1/30/23	12:59	2/7/2023	8.3	0.6	2	1	330	223	11	358	4501	491	381	25	87	9.3
41133359	1/29/23	L22-LGC-A	A	0-6	1/30/23	13:40	2/7/2023	8.7	0.2	4	1	310	341	19	374	978	327	1.19	0	0.12	0.9
41133360	1/29/23	L22-LGC-B	B	6-18	1/30/23	13:40	2/7/2023	8	0.5	3	1	430	237	4	478	1221	461	289	29	76.6	7.1
41133361	1/29/23	L22-LGC-C	C	18-30	1/30/23	13:40	2/7/2023	8.1	0.5	2	1	350	194	4	399	3427	432	279	19	69.1	7.6

Section B

Soil Sample

Sampling and Compositing

Time and Date Information

City of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- L04A	9-22-22	1	a, b, c	8:00	3	Signature	
Analyses:		2	a, b, c	8:10	4		Date 9-22
pH EC NO3-N NH4-N TKN		3	a, b, c	8:15	5		Time 1300
P K Na Mg Ca SAR		4	a, b, c	8:30	2	Depths:	
		5	a, b, c	8:42	4	a = 0-6"	
Container: HDPE Tube		6	a, b, c	8:55	1	b =6-18"	
Preservative: Ice		7	a, b, c	0900	3	c =18-30"	
L 22- L04B	9-22-22	1	a, b, c	0951	4	Signature	
Analyses:		2	a, b, c	1005	2		Date 9-22
pH EC NO3-N NH4-N TKN		3	a, b, c	943	3		Time 1300
P K Na Mg Ca SAR		4	a, b, c	1015	5	Depths:	
		5	a, b, c	1027	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1040	4	b =6-18"	
Preservative: Ice		7	a, b, c	1059	4	c =18-30"	
L 22- L05A	9-27-22	1	a, b, c	0800	4	Signature	
Analyses:		2	a, b, c	0810	4		Date 9-27-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0815	2		Time 1100
P K Na Mg Ca SAR		4	a, b, c	0825	4	Depths:	
		5	a, b, c	0842	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0853	2	b =6-18"	
Preservative: Ice		7	a, b, c	0912	4	c =18-30"	

City of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- 105 DUP	9-27-22	1	a, b, c	0800	4		Signature
Analyses:		2	a, b, c	0810	4		Date 09-27-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0815	3		Time 1100
P K Na Mg Ca SAR		4	a, b, c	0835	5	Depths:	
		5	a, b, c	0842	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0853	2	b =6-18"	
Preservative: Ice		7	a, b, c	0912	4	c =18-30"	
L 22- 108A	9-28-22	1	a, b, c	0900	3		Signature
Analyses:		2	a, b, c	0908	4		Date 9-28-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0915	3		Time 1040
P K Na Mg Ca SAR		4	a, b, c	0918	4	Depths:	
		5	a, b, c	0922	2	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0937	3	b =6-18"	
Preservative: Ice		7	a, b, c	0946	4	c =18-30"	
L 22- 108B	9-29-22	1	a, b, c	0900	4		Signature
Analyses:		2	a, b, c	0918	2		Date 9-29-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0930	3		Time 1115
P K Na Mg Ca SAR		4	a, b, c	0942	2	Depths:	
		5	a, b, c	0952	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1010	4	b =6-18"	
Preservative: Ice		7	a, b, c	1025	5	c =18-30"	

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Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- P13 A-	10-4-22	1	a, b, c	0900	2	Signature	
Analyses:		2	a, b, c	0910	4		Date 10-4-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0925	2		Time 1135
P K Na Mg Ca SAR		4	a, b, c	0937	4	Depths:	
		5	a, b, c	0952	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1005	2	b =6-18"	
Preservative: Ice		7	a, b, c	1100	1	c =18-30"	
L 22- 13C	10-6-22	1	a, b, c	0730	4	Signature	
Analyses:		2	a, b, c	0745	1		Date 10-6-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0800	3		Time 1000
P K Na Mg Ca SAR		4	a, b, c	0810	2	Depths:	
		5	a, b, c	0820	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0835	1	b =6-18"	
Preservative: Ice		7	a, b, c	5000	2	c =18-30"	
L 22- P13B	10-6-22	1	a, b, c	1015	3	Signature	
Analyses:		2	a, b, c	1020	2		Date 10-6-22
pH EC NO3-N NH4-N TKN		3	a, b, c	1028	5		Time 1145
P K Na Mg Ca SAR		4	a, b, c	1040	2	Depths:	
		5	a, b, c	1100	1	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1110	3	b =6-18"	
Preservative: Ice		7	a, b, c	1120	4	c =18-30"	

City of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- L35-C-		1	a, b, c	0915	1	Signature	
Analyses:		2	a, b, c	0900	4		Date 10-6-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0845	1		Time 1300
P K Na Mg Ca SAR		4	a, b, c	1010	2	Depths:	
		5	a, b, c	0930	2	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0830	2	b =6-18"	
Preservative: Ice		7	a, b, c	0945	3	c =18-30"	
L 22- L35C - DUP		1	a, b, c	0916	1	Signature	
Analyses:		2	a, b, c	0901	4		Date 10-6-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0847	1		Time 1300
P K Na Mg Ca SAR		4	a, b, c	1010	2	Depths:	
		5	a, b, c	0930	2	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0852	2	b =6-18"	
Preservative: Ice		7	a, b, c	0945	3	c =18-30"	
L 22-L35 B-		1	a, b, c	0800	2	Signature	
Analyses:		2	a, b, c	0815	1		Date 10-6-22
pH , EC NO3-N NH4-N TKN		3	a, b, c	0830	3		Time 1400
P K Na Mg Ca SAR		4	a, b, c	0845	2	Depths:	
		5	a, b, c	0900	5	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0920	3	b =6-18"	
Preservative: Ice		7	a, b, c	0940	2	c =18-30"	

City of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- P32A -	10-16-22	1	a, b, c	0730	3	Signature	
Analyses:		2	a, b, c	0745	4		Date 10-16-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0800	1		Time 0950
P K Na Mg Ca SAR		4	a, b, c	0815	5	Depths:	
		5	a, b, c	0830	2	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0845	2	b =6-18"	
Preservative: Ice		7	a, b, c	0900	2	c =18-30"	
L 22- 35A	10-20-22	1	a, b, c	[illegible]	2	Signature	
Analyses:		2	a, b, c	0815	1		Date 10-20-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0830	2		Time 1050
P K Na Mg Ca SAR		4	a, b, c	0845	4	Depths:	
		5	a, b, c	0900	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0920	2	b =6-18"	
Preservative: Ice		7	a, b, c	0940	1	c =18-30"	
L 22- 35A Dup	10-20-22	1	a, b, c	0815	2	Signature	
Analyses:		2	a, b, c	0830	1		Date 10-20-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0830	2		Time 1050
P K Na Mg Ca SAR		4	a, b, c	0845	4	Depths:	
		5	a, b, c	0910	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0930	2	b =6-18"	
Preservative: Ice		7	a, b, c	0952	1	c =18-30"	

City of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- L15A	~~10-26-22~~	1	a, b, c			Signature	
Analyses:		2	a, b, c				Date
pH EC NO3-N NH4-N TKN		3	a, b, c				Time
P K Na Mg Ca SAR		4	a, b, c			Depths:	
		5	a, b, c			a = 0-6"	
Container: HDPE Tube		6	a, b, c			b =6-18"	
Preservative: Ice		7	a, b, c			c =18-30"	
L 22- L15B	~~10-26-22~~	1	a, b, c			Signature	
Analyses:		2	a, b, c				Date
pH EC NO3-N NH4-N TKN		3	a, b, c				Time
P K Na Mg Ca SAR		4	a, b, c			Depths:	
		5	a, b, c			a = 0-6"	
Container: HDPE Tube		6	a, b, c			b =6-18"	
Preservative: Ice		7	a, b, c			c =18-30"	
L 22- L17A	10-26	1	a, b, c	942	1	Signature	
Analyses:		2	a, b, c	953	0		Date 10-26-22
pH EC NO3-N NH4-N TKN		3	a, b, c	1015	4		Time
P K Na Mg Ca SAR		4	a, b, c	1025	2	Depths:	
		5	a, b, c	1038	4	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1045	3	b =6-18"	
Preservative: Ice		7	a, b, c	1100	1	c =18-30"	

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Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- P17B1	10-26	1	a, b, c	1125	1	Signature	
Analyses:		2	a, b, c		2		Date 10 26
pH EC NO3-N NH4-N TKN		3	a, b, c	1152	3		Time 1100
P K Na Mg Ca SAR		4	a, b, c	11[illegible]	4	Depths:	
		5	a, b, c	[illegible]	[illegible]	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1218	3	b =6-18"	
Preservative: Ice		7	a, b, c	1228	2	c =18-30"	
L 22- L18A		1	a, b, c	0903	2	Signature	
Analyses:		2	a, b, c	0930	1		Date 11-8
pH EC NO3-N NH4-N TKN		3	a, b, c	0939	3		Time 1115
P K Na Mg Ca SAR		4	a, b, c	0943	2	Depths:	
		5	a, b, c	0947	2	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0953	3	b =6-18"	
Preservative: Ice		7	a, b, c	1000	2	c =18-30"	
L 22- 19B		1	a, b, c	0900	3	Signature	
Analyses:		2	a, b, c	0930	2		Date 11-9
pH EC NO3-N NH4-N TKN		3	a, b, c	0952	3		Time
P K Na Mg Ca SAR		4	a, b, c	1020	2	Depths:	
		5	a, b, c	1050	2	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1115	2	b =6-18"	
Preservative: Ice		7	a, b, c	1125	2	c =18-30"	

City of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- L19B	11-13-22	1	a, b, c	0700	3 ft	Signature	
Analyses:		2	a, b, c	0730	2 ft		Date 11-13-22
pH EC NO3-N NH4-N TKN		3	a, b, c	0800	2 ft		Time
P K Na Mg Ca SAR		4	a, b, c	0830	1 ft	Depths:	
		5	a, b, c	0900	1 ft	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0930	2 ft	b =6-18"	
Preservative: Ice		7	a, b, c	1000	0 ft	c =18-30"	
L 22-		1	a, b, c			Signature	
Analyses:		2	a, b, c				Date
pH EC NO3-N NH4-N TKN		3	a, b, c				Time
P K Na Mg Ca SAR		4	a, b, c			Depths:	
		5	a, b, c			a = 0-6"	
Container: HDPE Tube		6	a, b, c			b =6-18"	
Preservative: Ice		7	a, b, c			c =18-30"	
L 22-		1	a, b, c			Signature	
Analyses:		2	a, b, c				Date
pH EC NO3-N NH4-N TKN		3	a, b, c				Time
P K Na Mg Ca SAR		4	a, b, c			Depths:	
		5	a, b, c			a = 0-6"	
Container: HDPE Tube		6	a, b, c			b =6-18"	
Preservative: Ice		7	a, b, c			c =18-30"	

of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook - FY 2022-2023

LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22-20	12-6-22	1	a, b, c	1030	2	Signature	
Analyses:		2	a, b, c	1045	4		Date 12-6-22
pH EC NO3-N NH4-N TKN		3	a, b, c	1100	3		Time
P K Na Mg Ca SAR		4	a, b, c	1110	2	Depths:	
		5	a, b, c	1115	4	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1125	0	b =6-18"	
Preservative: Ice		7	a, b, c	1138	3	c =18-30"	
L 22-20 Dup	12-6-22	1	a, b, c	1135	2	Signature	
Analyses:		2	a, b, c	1050	4		Date 12-6-22
pH EC NO3-N NH4-N TKN		3	a, b, c	1105	3		Time
P K Na Mg Ca SAR		4	a, b, c	1118	2	Depths:	
		5	a, b, c	1120	4	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1130	0	b =6-18"	
Preservative: Ice		7	a, b, c	1142	3	c =18-30"	
L 22-21	12-6-22	1	a, b, c	1150	2	Signature	
Analyses:		2	a, b, c	1159	4		Date 12-6-22
pH EC NO3-N NH4-N TKN		3	a, b, c	1210	1		Time
P K Na Mg Ca SAR		4	a, b, c	1216	2	Depths:	
		5	a, b, c	1222	4	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1238	2	b =6-18"	
Preservative: Ice		7	a, b, c	1212	3	c =18-30"	

of Lubbock/Sampling and Monitoring Department
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LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- L22 A	12-11	1	a, b, c	0700	3	Signature	
Analyses:		2	a, b, c	0715	2		Date 12-11
pH EC NO3-N NH4-N TKN		3	a, b, c	0735	3		Time 1350
P K Na Mg Ca SAR		4	a, b, c	0750	2	Depths:	
		5	a, b, c	0815	3	a = 0-6"	
Container: HDPE Tube		6	a, b, c	0830	1	b =6-18"	
Preservative: Ice		7	a, b, c	0850	2	c =18-30"	
L 22- L22 B	12-13	1	a, b, c	0930	1	Signature	
Analyses:		2	a, b, c	0950	3		Date
pH EC NO3-N NH4-N TKN		3	a, b, c	1005	2		Time
P K Na Mg Ca SAR		4	a, b, c	1015	2	Depths:	
		5	a, b, c	1028	4	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1037	2	b =6-18"	
Preservative: Ice		7	a, b, c	1101	2	c =18-30"	
L 22- L22 C	12-13	1	a, b, c	30	3	Signature	
Analyses:		2	a, b, c	1148	2		Date 12-13
pH EC NO3-N NH4-N TKN		3	a, b, c	1205	1		Time
P K Na Mg Ca SAR		4	a, b, c	1215	4	Depths:	
		5	a, b, c	1232	2	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1240	1	b =6-18"	
Preservative: Ice		7	a, b, c	1302	1	c =18-30"	

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LLAS Sample ID / Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L 22- 15 B	12-20-22	1	a, b, c	935	1ft	Signature	
Analyses:		2	a, b, c	942	2ft		Date 12-20-22
pH EC NO3-N NH4-N TKN		3	a, b, c	1006	4ft		Time 1200
P K Na Mg Ca SAR		4	a, b, c	1023	4ft	Depths:	
		5	a, b, c	1036	3ft	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1046	4ft	b =6-18"	
Preservative: Ice		7	a, b, c	1056	2ft	c =18-30"	
L 22- 15A	12-20-22	1	a, b, c	1315	1ft	Signature	
Analyses:		2	a, b, c	1330	4ft		Date ~~12-20-22~~ 12-20-2
pH EC NO3-N NH4-N TKN		3	a, b, c	1343	4ft		Time ~~1200~~ 1445
P K Na Mg Ca SAR		4	a, b, c	1354	1ft	Depths:	
		5	a, b, c	1404	1ft	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1412	3ft	b =6-18"	
Preservative: Ice		7	a, b, c	1428	2ft ~~4ft~~	c =18-30"	
L 22- 16B	12-21-22	1	a, b, c	1124	3ft	Signature	
Analyses:		2	a, b, c	1116	4ft		Date 12-21-22
pH EC NO3-N NH4-N TKN		3	a, b, c	1107	2ft		Time 1200
P K Na Mg Ca SAR		4	a, b, c	1100	2ft	Depths:	
		5	a, b, c	1052	2ft	a = 0-6"	
Container: HDPE Tube		6	a, b, c	1140	4ft	b =6-18"	
Preservative: Ice		7	a, b, c	1150	2ft	c =18-30"	

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
~~L14~~ L22-LD	L D	01/12/23	1	a, b, c	1537	2ft	Signature	
Analyses:			2	a, b, c	1546	3ft	Date	01/12/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1618	2ft	Time	1705
P K Na Mg Ca SAR			4	a, b, c	1552	4ft	Depths:	
			5	a, b, c	1558	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1613	1ft	b =6-18"	
Preservative: Ice			7	a, b, c	1605	2ft	c =18-30"	
~~L14~~ L22-LC	L C	01/13/23	1	a, b, c	1151	2ft	Signature	
Analyses:			2	a, b, c	1158	2ft	Date	01/13/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1138	1ft	Time	1305
P K Na Mg Ca SAR			4	a, b, c	1207	4ft	Depths:	
			5	a, b, c	1130	3ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1217	3ft	b =6-18"	
Preservative: Ice			7	a, b, c	1144	1ft	c =18-30"	
~~L14~~ L22-L23	L 23	01/17/23	1	a, b, c	0846	4ft	Signature	
Analyses:			2	a, b, c	0855	1ft	Date	01/17/23
pH EC NO3-N NH4-N TKN			3	a, b, c	0901	3ft	Time	1230
P K Na Mg Ca SAR			4	a, b, c	0908	2ft	Depths:	
			5	a, b, c	0912	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	0934	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	0940	4ft	c =18-30"	

1 resample a, b, c 1001 2ft

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
~~L14~~ L22-L16A	L L 6 A	12-21-22	1	a, b, c	1530	1ft	Signature	
Analyses:			2	a, b, c	1645	4ft		Date 12-21-22
pH EC NO3-N NH4-N TKN			3	a, b, c	1630	2ft		Time 1655
P K Na Mg Ca SAR			4	a, b, c	1602	4ft	Depths:	
			5	a, b, c	1615	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1554	4ft	b =6-18"	
Preservative: Ice			7	a, b, c	1549	4ft	c =18-30"	
L14 L22-09B	L 0 9 B	12-27-22	1	a, b, c	1016	2ft	Signature	
Analyses:			2	a, b, c	1001	2ft		Date 12-27-22
pH EC NO3-N NH4-N TKN			3	a, b, c	1010	4ft		Time 1105
P K Na Mg Ca SAR			4	a, b, c	1032	2ft	Depths:	
			5	a, b, c	1041	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	0940	1ft	b =6-18"	
Preservative: Ice			7	a, b, c	0952	2ft	c =18-30"	
L14 L22-09A	L 0 9 A	12-27-22	1	a, b, c	1405	4ft	Signature	
Analyses:			2	a, b, c	1440	4ft		Date 12-27-22
pH EC NO3-N NH4-N TKN			3	a, b, c	1432	4ft		Time 1630
P K Na Mg Ca SAR			4	a, b, c	1422	2ft	Depths:	
			5	a, b, c	1415	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1557	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	1607	4ft	c =18-30"	

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
~~L14~~ L22-L06A	L06A	12-28-22	1	a, b, c	1045	2ft	Signature	
Analyses:			2	a, b, c	1036	2ft		Date 12-28-22
pH EC NO3-N NH4-N TKN			3	a, b, c	1030	3ft		Time 1205
P K Na Mg Ca SAR			4	a, b, c	1024	4ft	Depths:	
			5	a, b, c	1013	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1006	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	0955	2ft	c =18-30"	
~~L14~~ L22-L06B	L06B	12-28-22	1	a, b, c	1055	4ft	Signature	
Analyses:			2	a, b, c	1102	3ft		Date 12-28-22
pH EC NO3-N NH4-N TKN			3	a, b, c	1108	2ft		Time 1205
P K Na Mg Ca SAR			4	a, b, c	1117	3ft	Depths:	
			5	a, b, c	1122	3ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1130	4ft	b =6-18"	
Preservative: Ice			7	a, b, c	1136	4ft	c =18-30"	
~~L14~~ L22-L07A	L07A	12-28-22	1	a, b, c	1445	4ft	Signature	
Analyses:			2	a, b, c	1455	3ft		Date 12-28-22
pH EC NO3-N NH4-N TKN			3	a, b, c	1505	2ft		Time 1600
P K Na Mg Ca SAR			4	a, b, c	151[illegible]	4ft	Depths:	
			5	a, b, c	1517	4ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1524	1ft	b =6-18"	
Preservative: Ice			7	a, b, c	1532	1ft	c =18-30"	

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
~~L14~~ L22-L07B	L 07B	01/03/23	1	a, b, c	0928	3ft	Signature	
Analyses:			2	a, b, c	0920	2ft		Date 01/03/23
pH EC NO3-N NH4-N TKN			3	a, b, c	0914	2ft		Time 1000
P K Na Mg Ca SAR			4	a, b, c	0908	2ft	Depths:	
			5	a, b, c	0902	4ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	0855	1ft	b =6-18"	
Preservative: Ice			7	a, b, c	0845	4ft	c =18-30"	
~~L14~~ L22-L03B	L 03B	01/03/23	1	a, b, c	1102	2ft	Signature	
Analyses:			2	a, b, c	1112	3ft		Date 01/03/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1120	4ft		Time 1215
P K Na Mg Ca SAR			4	a, b, c	1127	2ft	Depths:	
			5	a, b, c	1131	4ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1135	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	1142	1ft	c =18-30"	
~~L14~~ L22-L03A	L 03A	01/03/23	1	a, b, c	1427	4ft	Signature	
Analyses:			2	a, b, c	1435	2ft		Date 01/03/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1442	2ft		Time 1540
P K Na Mg Ca SAR			4	a, b, c	1447	2ft	Depths:	
			5	a, b, c	1455	3ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1502	4ft	b =6-18"	
Preservative: Ice			7	a, b, c	1507	2ft	c =18-30"	

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
~~L14~~ L22-L02A	L 0 2 A	01/04/23	1	a, b, c	0833	2ft	Signature	
Analyses:			2	a, b, c	0841	2ft		Date 01/04/23
pH EC NO3-N NH4-N TKN			3	a, b, c	0848	3ft		Time 1050
P K Na Mg Ca SAR			4	a, b, c	0855	4ft	Depths:	
			5	a, b, c	0903	3ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	0911	4ft	b =6-18"	
Preservative: Ice			7	a, b, c	0920	2ft	c =18-30"	
~~L14~~ L22-L02B	L 0 2 B	01/04/23	1	a, b, c	0929	42ft	Signature	
Analyses:			~~2~~ 3	a, b, c	0943	3ft		Date 01/04/23
pH EC NO3-N NH4-N TKN			~~3~~ 2	a, b, c	0937	2ft		Time 1050
P K Na Mg Ca SAR			4	a, b, c	0950	1ft	Depths:	
			5	a, b, c	0955	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1008	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	1011	1ft	c =18-30"	
~~L14~~ L22-L01A	L 0 1 A	01/04/23	1	a, b, c	1420	4ft	Signature	
Analyses:			2	a, b, c	1428	2ft		Date 01/04/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1434	4ft		Time 1635
P K Na Mg Ca SAR			4	a, b, c	1443	2ft	Depths:	
			5	a, b, c	1449	4ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1456	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	1500	2ft	c =18-30"	

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
~~L14~~ L22-L01B	L 0 1 B	01/04/23	1	a, b, c	1511	3ft		Signature
Analyses:			2	a, b, c	1520	3ft		Date 01/04/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1530	4ft		Time 1635
P K Na Mg Ca SAR			4	a, b, c	1553	1ft	Depths:	
			5	a, b, c	1600	3ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1537	4ft	b =6-18"	
Preservative: Ice			7	a, b, c	1545	2ft	c =18-30"	
~~L14~~ L22-AA	L A A	01/09/23	1	a, b, c	0855	3ft		Signature
Analyses:			2	a, b, c	0920	2ft		Date 01/09/23
pH EC NO3-N NH4-N TKN			3	a, b, c	0932	2ft		Time 1230
P K Na Mg Ca SAR			4	a, b, c	0926	2ft	Depths:	
			5	a, b, c	0950	3ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	0932	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	0937	2ft	c =18-30"	
~~L14~~ L22-AB	L A B	01/09/23	1	a, b, c	1021	1ft		Signature
Analyses:			2	a, b, c	1131	3ft		Date 01/09/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1015	2ft		Time 1230
P K Na Mg Ca SAR			4	a, b, c	1140	2ft	Depths:	
			5	a, b, c	0950	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1116	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	1121	3ft	c =18-30"	

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
~~L14~~ L22-LB	LB	01/09/23	1	a, b, c	~~1440~~ 1555	± 2ft	Signature	
Analyses:			~~2~~ 3	a, b, c	1521	2 ft	Date	01/09/23
pH EC NO3-N NH4-N TKN			~~3~~ 2	a, b, c	1513	3 ft	Time	1600
P K Na Mg Ca SAR			4	a, b, c	1458	2ft	Depths:	
			5	a, b, c	1440	1ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1451	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	1446	1ft	c =18-30"	
~~L14~~ L22-LEA	LEA	01/12/23	1	a, b, c	1008	2 ft	Signature	
Analyses:			2	a, b, c	1037	2ft	Date	01/12/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1030	2ft	Time	1245
P K Na Mg Ca SAR			4	a, b, c	1054	4ft	Depths:	
			5	a, b, c	1043	3ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1048	3ft	b =6-18"	
Preservative: Ice			7	a, b, c	1103	2ft	c =18-30"	
~~L14~~ L22-LEB	LEB	01/12/23	1	a, b, c	1137	2ft	Signature	
Analyses:			2	a, b, c	1142	3ft	Date	01/12/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1158	2ft	Time	1245
P K Na Mg Ca SAR			4	a, b, c	~~1132~~ 1100	2ft	Depths:	
			5	a, b, c	1123	1ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1114	3ft	b =6-18"	
Preservative: Ice			7	a, b, c	1109	2ft	c =18-30"	

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L1A22 - L24A	L24A	01/17/23	1	a, b, c	0950 1013	2 ft	Signature	
Analyses:			2	a, b, c	1020	2 ft	Date	01/17/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1027	4 ft	Time	1230
P K Na Mg Ca SAR			4	a, b, c	1033	2 ft	Depths:	
			5	a, b, c	1038	4 ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1044	4 ft	b =6-18"	
Preservative: Ice			7	a, b, c	1050	1 ft	c =18-30"	
L1A22 - L24B	L24B	01/17/23	1	a, b, c	1143	1 ft	Signature	
Analyses:			2	a, b, c	1134	2 ft	Date	01/17/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1150	2 ft	Time	1230
P K Na Mg Ca SAR			4	a, b, c	1159	4 ft	Depths:	
			5	a, b, c	1127	3 ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1120	2 ft	b =6-18"	
Preservative: Ice			7	a, b, c	1110	4 ft	c =18-30"	
L1A22-L25B	L25B	01/18/23	1	a, b, c	1000	2 ft	Signature	
Analyses:			2	a, b, c	[illegible]	2 ft	Date	01/18/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1045	4 ft	Time	1225
P K Na Mg Ca SAR			4	a, b, c	1039	2 ft	Depths:	
			5	a, b, c	1008	4 ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1020	2 ft	b =6-18"	
Preservative: Ice			7	a, b, c	1030	3 ft	c =18-30"	

24B 1 2 and may need to be resampled

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L1422-L25A	L25A	01/18/23	1	a, b, c	1101	4ft		Signature
Analyses:			2	a, b, c	1110	2ft		Date 01/18/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1115	3ft		Time 1225
P K Na Mg Ca SAR			4	a, b, c	1146	1ft	Depths:	
			5	a, b, c	1120	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1131	4ft	b =6-18"	
Preservative: Ice			7	a, b, c	1134	1ft	c =18-30"	
L1422-L24B	L24B	01/18/23	1	a, b, c	1525	2ft		Signature
Analyses: (resample)			2	a, b, c	1538	3ft		Date 01/18/23
pH EC NO3-N NH4-N TKN			3	a, b, c				Time 1640
P K Na Mg Ca SAR			4	a, b, c			Depths:	
			5	a, b, c	1545	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c			b =6-18"	
Preservative: Ice			7	a, b, c			c =18-30"	
L1422-L26	L26	01/19/23	1	a, b, c	1000	2ft		Signature
Analyses:			2	a, b, c	1022	3ft		Date 01/19/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1027	1ft		Time 1135
P K Na Mg Ca SAR			4	a, b, c	1034	2ft	Depths:	
			5	a, b, c	1047	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1040	1ft	b =6-18"	
Preservative: Ice			7	a, b, c	1015	1ft	c =18-30"	

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LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L22 L27	L27	01/19/23	1	a, b, c	1541	3ft	Signature	
Analyses:			2	a, b, c	1535	2ft		Date 01/19/23
pH EC NO3-N NH4-N TKN			3	a, b, c	1527	2ft		Time 1640
P K Na Mg Ca SAR			4	a, b, c	1511	4ft	Depths:	
			5	a, b, c	1505	2ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1518	2ft	b =6-18"	
Preservative: Ice			7	a, b, c	1551	1ft	c =18-30"	
L22 L10	L10	01/23/23	1	a, b, c	1003	2ft	Signature	
Analyses:			2	a, b, c	0936	2ft		Date 01/23/23
pH EC NO3-N NH4-N TKN			3	a, b, c	0940	3ft		Time 1130
P K Na Mg Ca SAR			4	a, b, c	0927	1ft	Depths:	
			5	a, b, c	1011	3ft	a = 0-6"	
Container: HDPE Tube			6	a, b, c	0946	1ft	b =6-18"	
Preservative: Ice			7	a, b, c	0949	4ft	c =18-30"	
L22 LFA	LFA	1-29	1	a, b, c	0805	3	Signature	
Analyses:			2	a, b, c	0816	2		Date 1-29-23
pH EC NO3-N NH4-N TKN			3	a, b, c	0819	1		Time 1415
P K Na Mg Ca SAR			4	a, b, c	0827	1	Depths:	
			5	a, b, c	0833	3	a = 0-6"	
Container: HDPE Tube			6	a, b, c	0845	2	b =6-18"	
Preservative: Ice			7	a, b, c	0852	2	c =18-30"	

City of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook FY2022-2023

LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L22-LFB	LFB	1-29	1	a, b, c	0910	3	Signature	
Analyses:			2	a, b, c	0917	2		Date 1/29/23
pH EC NO3-N NH4-N TKN			3	a, b, c	0923	1		Time 1415
P K Na Mg Ca SAR			4	a, b, c	0933	2	Depths:	
			5	a, b, c	0941	1	a = 0-6"	
Container: HDPE Tube			6	a, b, c	0948	2	b =6-18"	
Preservative: Ice			7	a, b, c	0954	0	c =18-30"	
L22 LGA	L	1-29	1	a, b, c	1030	2	Signature	
Analyses:			2	a, b, c	1038	2		Date 1-29-23
pH EC NO3-N NH4-N TKN			3	a, b, c	1044	2		Time 1415
P K Na Mg Ca SAR			4	a, b, c	1052	4	Depths:	
			5	a, b, c	1058	3	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1108	2	b =6-18"	
Preservative: Ice			7	a, b, c	1113	1	c =18-30"	
L22 LGB	L	1-29	1	a, b, c	1125	1	Signature	
Analyses:			2	a, b, c	1129	3		Date 1-29-23
pH EC NO3-N NH4-N TKN			3	a, b, c	1134	2		Time 1415
P K Na Mg Ca SAR			4	a, b, c	1147	1	Depths:	
			5	a, b, c	1154	2	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1205	3	b =6-18"	
Preservative: Ice			7	a, b, c	1215	3	c =18-30"	

City of Lubbock/Sampling and Monitoring Department
Soil Sampling Logbook FY2022-2023

LLAS Sample ID	Location	Date	Sub Sample	Depths	Time	Distance from Benchmark (feet)	Placed in Controlled Access Storage	
L22 LGC	L GC	1-29	1	a, b, c	1217	2	Signature	
Analyses:			2	a, b, c	1220	4		Date 1-29-23
pH EC NO3-N NH4-N TKN			3	a, b, c	1227	2		Time 1415
P K Na Mg Ca SAR			4	a, b, c	1234	2	Depths:	
			5	a, b, c	1242	2	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1251	2	b =6-18"	
Preservative: Ice			7	a, b, c	1259	3	c =18-30"	
L22 L24	L 24	1-29	1	a, b, c	1310	1	Signature	
Analyses:			2	a, b, c	1315	2		Date 1-29-23
pH EC NO3-N NH4-N TKN			3	a, b, c	1322	3		Time 1415
P K Na Mg Ca SAR			4	a, b, c	1329	3	Depths:	
			5	a, b, c	1350	2	a = 0-6"	
Container: HDPE Tube			6	a, b, c	1355	1	b =6-18"	
Preservative: Ice			7	a, b, c	1359	2	c =18-30"	
L22	L		1	a, b, c			Signature	
Analyses:			2	a, b, c				Date
pH EC NO3-N NH4-N TKN			3	a, b, c				Time
P K Na Mg Ca SAR			4	a, b, c			Depths:	
			5	a, b, c			a = 0-6"	
Container: HDPE Tube			6	a, b, c			b =6-18"	
Preservative: Ice			7	a, b, c			c =18-30"	

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22-104A	9-22	7	A	1300	Yes	
2	L22-104A	9-22	7	B		Yes	
3	L22-104A	9-22	7	C		Yes	
4	L22-104B	9-22	7	A	1300	Yes	
5	L22-104B	9-22	7	B		Yes	
6	L22-104B	9-22	7	C		Yes	
7	L22-105A	9-22	7	A	1120	Yes	
8	L22-105A	9-22	7	B		Yes	
9	L22-105A	9-22	7	C		Yes	
10	L21-105A DUP	9-22	7	A	1110	Yes	
11	L21-105A-DUP	9-22	7	B		Yes	
12	L21-105A-DUP	9-22	7	C		Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- L08 A	9-28	7	A	11:15	Yes	
2	L22- L08 A	9-28	7	B	11:15	Yes	
3	L22- L08 A	9-28	7	C	1115	Yes	
4	L22- L08B	9-28	7	A	12:02	Yes	
5	L22- L08B	9-28	7	B	12:03	Yes	
6	L22- L08B	9-28	7	C	12:03	Yes	
7	L22- L13A	10-4-22	7	A	1301	Yes	
8	L22- L13A	10-4-22	7	B	1304	Yes	
9	L22- L13A	10-4-22	7	C	1301	Yes	
10	L21- L13B	10-6-22	7	A	1300	Yes	
11	L21- L13B	10-6-22	7	B	1300	Yes	
12	L21- L13B	10-6-22	7	C	1300	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- L13C-	10-6-22	7	A	1330	Yes	
2	L22- L13C	10-6-22	7	B	1330	Yes	
3	L22- L13C	10-6-22	7	C	1330	Yes	
4	L22- L35C	10-13-22	7	A	1400	Yes	
5	L22- L35C	10-13-22	7	B	1400	Yes	
6	L22- L35C	10-13-22	7	C	1400	Yes	
7	L22- L35C DUP	10-13-22	7	A	1440	Yes	
8	L22- L35C DUP	10-13-22	7	B	1440	Yes	
9	L22- L35C DUP	10-13-22	7	C	1440	Yes	
10	L21- L35B.	10-14-22	7	A	1530	Yes	
11	L21- L35B	10-14-22	7	B	1530	Yes	
12	L21- L35B	10-14-22	7	C	1530	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- L32A - A	1018	7	A	1100	Yes	
2	L22- L32A - B	1018	7	B	1100	Yes	
3	L22- L32A - C	1018	7	C	1100	Yes	
4	L22- L35A - A	10-20-22	7	A	1115	Yes	
5	L22- L35A - B	10-20-22	7	B	1115	Yes	
6	L22- L35A - C	10-20-22	7	C	1115	Yes	
7	L22- L35A - Dup A	10-20-22	7	A	1200	Yes	
8	L22- L35A - Dup B	10-20-22	7	B	1200	Yes	
9	L22- L35A - Dup C	10-20-22	7	C	1200	Yes	
10	L21- L17A - A	10-26-22	7	A	1247	Yes	
11	L21- L17A - B	10-26-22	7	B	1247	Yes	
12	L21- L17A - C	10-26-22	7	C	1247	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- L17B	10-26	7	A	1320	Yes	
2	L22- L17B	10-26	7	B	1320	Yes	
3	L22- L17B	10-26	7	C	1320	Yes	
4	L22- L18 - A	11/10/22	7	A	0700	Yes	
5	L22- L18 - B	11/10/22	7	B	0700	Yes	
6	L22- L18 - C	11/10/22	7	C	0700	Yes	
7	L22- L19A - A	11/10/22	7	A	0730	Yes	
8	L22- L19A - B	11/10/22	7	B	0730	Yes	
9	L22- L19A - C	11/10/22	7	C	0730	Yes	
10	L21- L19B - A	11-15-22	7	A	1100	Yes	
11	L21- L19B - A	11-15-22	7	B	1100	Yes	
12	L21- L19B - C	11-15-22	7	C	1100	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- L20 A	12-6-22	7	A	1410	Yes	
2	L22- L20 B	12-6-22	7	B	1410	Yes	
3	L22- L20 C	12-6-22	7	C	1410	Yes	
4	L22- L20 DUP	12-6-22	7	A	1440	Yes	
5	L22- L20 DUP	12-6-22	7	B	1440	Yes	
6	L22- L20 DUP	12-6-22	7	C	1440	Yes	
7	L22- L21 A	12-6-22	7	A	1500	Yes	
8	L22- L21 B	12-6-22	7	B	1500	Yes	
9	L22- L21 C	12-6-22	7	C	1500	Yes	
10	L21- 22A A	12-15	7	A	0700	Yes	
11	L21- 22A B	12-15	7	B	0700	Yes	
12	L21- 22A C	12-15	7	C	0700	Yes	

Notes:

Shipped

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- 22B-A	12-15	7	A	0900	Yes	
2	L22- 22B-B	12-15	7	B	0900	Yes	
3	L22- 22B-C	12-15	7	C	0900	Yes	
4	L22- 22C-A	12-15	7	A	0930	Yes	
5	L22- 22C-B	12-15	7	B	0930	Yes	
6	L22- 22C-C	12-15	7	C	0930	Yes	
7	L22- 115B-A	12-20	7	A	1200	Yes	
8	L22- 115B-B	12-20	7	B	1200	Yes	
9	L22- 115B-C	1200	7	C	1200	Yes	
10	L22- LISA-A	12-20-22 ~~2:40~~	7	A	2:40	Yes	
11	L22- LISA-B	12-20-22 ~~2:40~~	7	B	2:40	Yes	
12	L22- LISA-C	12-20-22 ~~2:40~~	7	C	2:40	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

		LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
Box 1	1	L22-L16 B-A	12-22-22	7	A	0900	Yes	
	2	L22- L16B-B	"	7	B	"	Yes	
	3	L22- L16B-C	"	7	C	"	Yes	
	4	L22- L16A-A	12-22-22	7	A	1115	Yes	
	5	L22- L16A-B	"	7	B	"	Yes	
	6	L22- L16A-C	"	7	C	"	Yes	
	7	L22- L09B-A	12-27-22	7	A	1111	Yes	
	8	L22- L09B-B	"	7	B	"	Yes	
	9	L22- L09B-C	"	7	C	"	Yes	
	10	L21- L09A-A	12-27-22	7	A	1635	Yes	
	11	L21- L09A-B	"	7	B	"	Yes	
	12	L21- L09A-C	"	7	C	"	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

		LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
	1	L22- L06A-A	12/28/22	7	A	1610	Yes	
	2	L22- L06A-B	"	7	B	"	Yes	
	3	L22- L06A-C	"	7	C	"	Yes	
	4	L22- L06B-A	12/28/22	7	A	1625	Yes	
	5	L22- L06B-B	"	7	B	"	Yes	
Box 2	6	L22- L06B-C	"	7	C	"	Yes	
	7	L22- L07A-A	12/28/22	7	A	1640	Yes	
	8	L22- L07A-B	"	7	B	"	Yes	
Box 2	9	L22- L07A-C	"	7	C	"	Yes	
	10	L22- L07B-A	01/03/23	7	A	1000	Yes	
	11	L22- L07B-B	"	7	B	"	Yes	
	12	L22- L07B-C	"	7	C	"	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- L03B - A	01/03/23	7	A	1545	Yes	
2	L22- L03B - B	"	7	B	"	Yes	
3	L22- L03B - C	"	7	C	"	Yes	
4	L22- L03A - A	01/03/23	7	A	1602	Yes	
5	L22- L03A - B	"	7	B	"	Yes	
6	L22- L03A - C	"	7	C	"	Yes	
7	L22- L02A - A	01/04/23	7	A	~~1602~~ 1100	Yes	
8	L22- L02A - B	"	7	B	"	Yes	
9	L22- L02A - C	"	7	C	"	Yes	
10	L22 L02B - A	01/04/23	7	A	1115	Yes	
11	L22 L02B - B	"	7	B	"	Yes	
12	L22 L02B - C	"	7	C	"	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

		LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
	1	L22- ~~L01~~ L01A – A	01/05/23	7	A	0850	Yes	
	2	L22- L01A – B	"	7	B	"	Yes	
	3	L22- L01A – C	"	7	C	"	Yes	
	4	L22- L01B – A	01/05/23	7	A	0915	Yes	
	5	L22- L01B – B	"	7	B	"	Yes	
	6	L22- L01B – C	"	7	C	"	Yes	
	7	L22- LAA – A	01/09/23	7	A	~~1330~~ 1350	Yes	
Snipped	8	L22- LAA – B	"	7	B	"	Yes	
	9	L22- LAA – C	"	7	C	"	Yes	
	10	L22- LAB – A	01/09/23	7	A	1350	Yes	
Bad	11	L22- LAB – B	"	7	B	"	Yes	
	12	L22- LAB – C	"	7	C	"	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- LB-A	01/09/23	7	A	1825	Yes	
2	L22- LB-B	"	7	B	"	Yes	
3	L22- LB-C	"	7	C	"	Yes	
4	L22- LEA-A	01/12/23	7	A	1350	Yes	
5	L22- LEA-B	"	7	B	"	Yes	
6	L22- LEA-C	"	7	C	"	Yes	
7	L22- LEB-A	01/12/23	7	A	1420	Yes	
8	L22- LEB-B	"	7	B	"	Yes	
9	L22- LEB-C	"	7	C	"	Yes	
10	~~L21-~~ L22-LD-A	01/12/23	7	A	1710	Yes	
11	~~L21-~~ L22-LD-B	"	7	B	"	Yes	
12	~~L21-~~ L22-LD-C	"	7	C	"	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- LC - A	01/13/23	7	A	1700	Yes	
2	L22- LC - B	"	7	B	"	Yes	
3	L22- LC - C	"	7	C	"	Yes	
4	L22- L23 - A	01/17/23	7	A	1330	Yes	
5	L22- L23 - B	"	7	B	"	Yes	
6	L22- L23 - C	"	7	C	"	Yes	
7	L22- L24A - A	01/17/23	7	A	1400	Yes	
8	L22- L24A - B	"	7	B	"	Yes	
9	L22- L24A - C	"	7	C	"	Yes	
10	L22- L25A - A	01/18/23	7	A	1330	Yes	
11	L22- L25A - B	"	7	B	"	Yes	
12	L22- L25A - C	"	7	C	"	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- L25B - A	01/18/23	7	A	1400	Yes	
2	L22- L25B - B	"	7	B	"	Yes	
3	L22- L25B - C	"	7	C	"	Yes	
4	L22- L26 - A	01/19/23	7	A	1145	Yes	
5	L22- L26 - B	"	7	B	"	Yes	
6	L22- L26 - C	"	7	C	"	Yes	
7	L22- L27 - A	01/19/23	7	A	1645	Yes	
8	L22- L27 - B	"	7	B	"	Yes	
9	L22- L27 - C	"	7	C	"	Yes	
10	L22- L10 - A	01/23/23	7	A	1330	Yes	
11	L22- L10 - B	"	7	B	"	Yes	
12	L22- L10 - C	"	7	C	"	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- L24 A	1-30-	7	A	1100	Yes	
2	L22- L24 B	1-30	7	B	1100	Yes	
3	L22- L24 C	1-30	7	C	1100	Yes	
4	L22- LFA-A	1-30	7	A	1130	Yes	
5	L22- LFA-B	1-30	7	B	1130	Yes	
6	L22- LFA-C	1-30	7	C	1130	Yes	
7	L22- LFB-A	1-30	7	A	1220	Yes	
8	L22- LFB-B	1-30	7	B	1220	Yes	
9	L22- LFB-C	1-30	7	C	1220	Yes	
10	L21- LGA-A	1-30	7	A	1250	Yes	
11	L21- LGA-B	1-30	7	B	1250	Yes	
12	L21- LGA-C	1-30	7	C	1250	Yes	

Notes:

City of Lubbock/Sampling and Monitoring Department
Soil Sample Composite Logbook FY 2022-2023

	LLAS Sample ID / Location	Date	# of Sub Samples	Depth	Time	Duplicate Prepared	Composited and Placed in Controlled Access Refrigerated Storage (Signature)
1	L22- LGB-B	1-30	7	A	1259	Yes	
2	L22- LGB-B	1-30	7	B	1259	Yes	
3	L22- LGB-C	1-30	7	C	1259	Yes	
4	L22 LGC-A	1-30	7	A	1340	Yes	
5	L22 LGC-B	1-30	7	B	1340	Yes	
6	L22- LGC-C	1-30	7	C	1340	Yes	
7	L22-		7	A		Yes	
8	L22-		7	B		Yes	
9	L22-		7	C		Yes	
10	L21-		7	A		Yes	
11	L21-		7	B		Yes	
12	L21-		7	C		Yes	

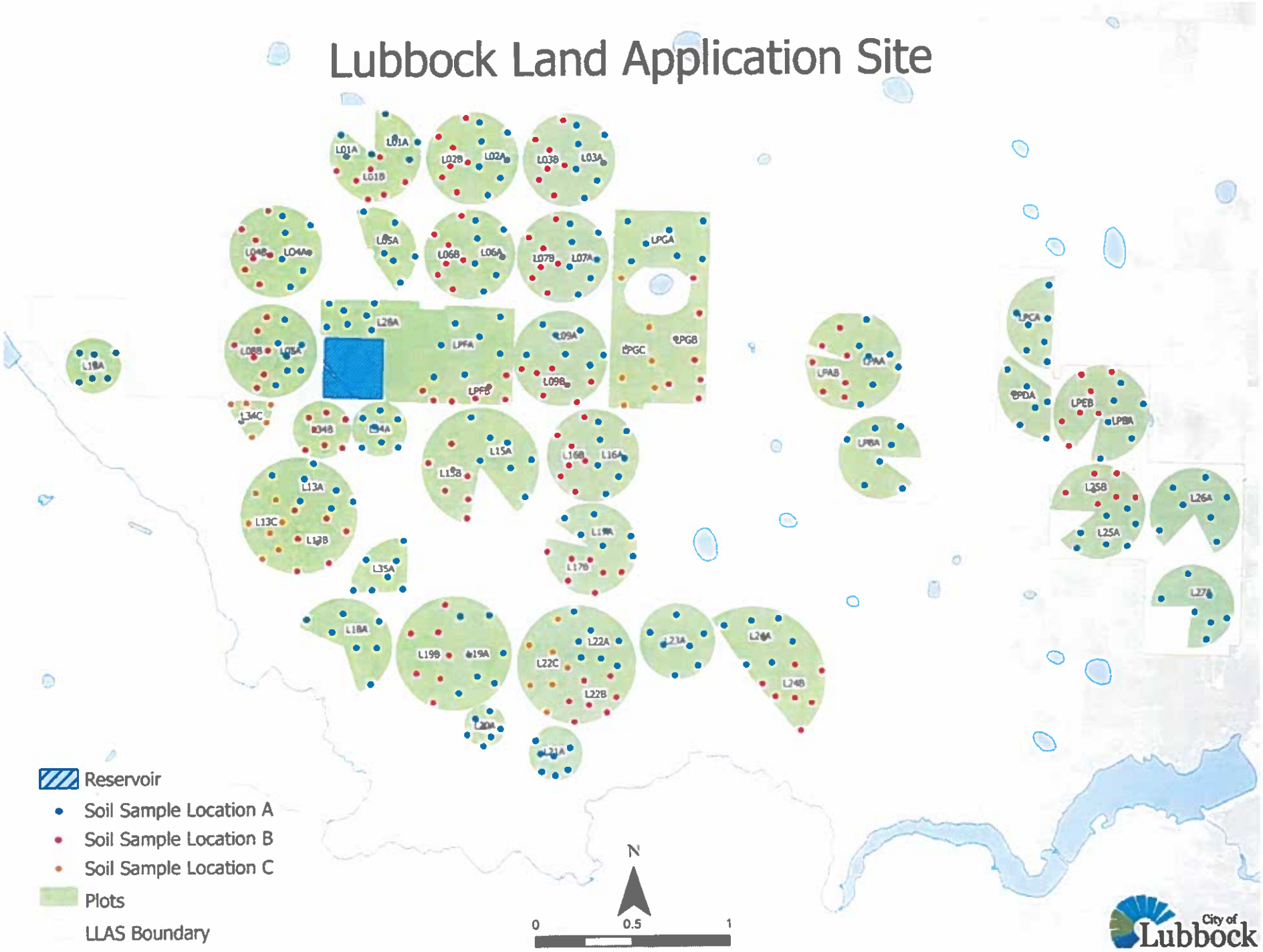
Notes:

Section C

Soil Sample

Location Map

Lubbock Land Application Site



Section D

Soil Sample

Collection and Processing

Procedures

Soil Sampling, Processing, and Shipping:

Equipment

1. Hydraulic sampling machine, currently Giddings 15-TS Model GSRTS, tractor mounted
2. Sampling tube, 1.75 inches or larger
3. Sampling tube bit and attachments
4. Sampling tube brush
5. Screwdriver
6. Wyle Soil Mill
7. ASTM 0.375 inch mesh soil sieves, one sieve per depth zone
8. Mixing pans, one pan per depth zone
9. GPS unit, currently Garmin Nuvi 750
10. Plastic sample bags and labels
11. Sampling and Compositing Logbook

Sample Locations

1. Background: Each field is subdivided into approximately 80 acre or less sampling areas. Within each of these sampling areas, seven (7) soil sampling locations are identified. Samples to 30" depth from each of these seven locations are collected and subdivided into 0 – 6" (A), 6 – 18" (B), and 18 – 30" (C), depth zones. The seven subsamples from each depth zone are mixed into a composite sample, which is shipped to the analysis laboratory for analysis.
2. In the office/lab, download the sample location waypoints to the GPS unit.
3. In the field, select waypoint for navigation.
4. Move tractor to selected point, within 10 feet of waypoint according to GPS unit.
5. Record sequential sample ID, field location, date, time, and waypoint distance in Soil Sampling Field Logbook.
6. Repeat steps 3 through 5 for each subsample location.

Sample Collection

1. Position sampling machine for use.
2. Insert plastic liner in sampling tube and attach sampling tube.
3. Use sampling machine to push sampling tube into soil to the 30" mark (or other designated depth).
4. Remove tube from soil, removing excess soil from outside of tube.
5. Remove plastic sleeve from sampling tube, label the sample and depths, and place end caps on the plastic sleeve with a red cap on the top end of the sample and a black cap on the bottom of the sample.
6. Place the sample in an ice chest with ice packs.

7. Repeat sample collection steps 1 through 6 at each of the seven subsample locations.
8. After sampling, place cores in controlled access, refrigerated storage and sign, date, and time the logbook sheet.

Sample Processing

1. Remove the seven subsample cores from the controlled access, refrigerated storage.
2. Segment the core into the 0 – 6" (A), 6 – 18" (B), and 18 – 30" (C) depth zones (or other designated depth zones), placing depth zone cores into the respective depth zone mixing pans/sieves.
3. Break up each core by hand or with the Wyle soil mill so that all soil will pass the 0.375" sieve, discard rocks larger than the sieve openings.
4. After the 7th subsample is segmented and passed through the sieve and all soil material is mixed in each depth zone pan, collect two (2) split samples from each depth zone. Each sample should be approximately 2/3 of a quart and collected in a plastic, quart sized bag. Each bag should be labeled with preprinted adhesive labels. The sample that will be shipped to the laboratory should be double bagged, with both bags being labeled.
5. Record the logbook information for each sample. Please note that the samples are coded with a unique number system for each year, and the Id given to the lab is not the plot information.
6. Place bagged samples in refrigerated, controlled access storage and sign, date, and time the logbook entry.

Shipment

1. The samples are carefully placed into an ice chest with icepacks and shipped by UPS to Midwest Laboratory.
2. The chain of custody is signed, dated, and timed. Samples shall remain in an ice chest with ice packs or refrigerated until receipt by the laboratory, where they will be air dried, processed, and analyzed.

Section E

Soil Sample

Chains of Custody

13 1

40706242 – 40706254

Chain of Custody and Analysis Request

Box 1 of 3

Page 1 of 3

Number of Samples 12

Send Results to.	Donny Carrasco
(806) 775-2621	PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

D.P #1

ID: L04 A-C

	Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	None	pH 2:1 (w/w)	E.C. 2:1 (w/w) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
1			x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- L04A-A	9-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- L04A-B	9-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- L04A-C	9-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- L04B-A	9-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- L04B-B	9-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- L04B-C	9-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- L05A-A	9-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- L05A-B	9-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- L05A-C	9-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- L05A-A DUP	9-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- L05A-B DUP	9-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- L05A-C DUP	9-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22-		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22-		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Bus Hunt	Date 11-7-22	Time: 1130am
Shipped UPS/ARS Tracking # 12635 7839 0995 5298		
Received By: AD	Date. 11/14/22	Time:

LLAS Shipping

16 1

40706257 – 40706272

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Box 2 of 3

Page 2 of 3

Number of Samples 15

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457 VOK
Account#	
Grower	LLAS

Dup #1

	Sample ID	Composite Data	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	None	pH 2:1 (v/v) (SM4500-H+)	E.C. 2:1 (v/v) mmho/cm (SM 2510B)	Nitrate - Nitrogen 1 N KCL Extract (E 300.0)	Ammonia-Nitrogen (SM4500-NH3 B,C)	TKN (E 351.3)	Phosphorus - P Mehlich III (S 6010B)	Potassium - K Plant Available (S 6010B)	Sodium - Na Plant Available (S 6010B)	Magnesium - Mg Plant Available (S 6010B)	Calcium - Ca Plant Available (S 6010B)	SAR (USDA 60)	Lab Sample ID
1	L22-L08AA	9-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22-L08A-B	9-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22-L08A-C	9-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22-L08B-A	9-29-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22-L08B-B	9-29-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22-L08B-C	9-29-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22-L13A-A	10-4-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22-L13A-B	10-4-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22-L13A-C	10-4-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22-L13B-A	10-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22-L13B-B	10-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22-L13B-C	10-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22-L13C-A	10-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22-L13C-B	10-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22-L13C-C	10-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Rusty Hunt		Date: 11-7-22	Time: 1130
Shipped UPS/ARS Tracking # 1Z635 783 90 9820 9103			
Received By: AD 11/14/22		Date:	Time:

LLAS Shipping

16 1

40706223 – 40706238

City of Lubbock Sampling

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

WOK

Box 3 of 3

Page 3 of 3

Number of Samples 15

Dup #4

	Sample ID	Composite Date	Type - Composite	Zip Lock Bag	Matrix - Soil	Ice	None	SM4500-H+ pH 2:1 (v/v)	SM 2510B E.C. 2:1 (v/v) mmho/cm	E 300.0 Nitrate - Nitrogen 1 N KCL Extract	SM4500-NH3 B,C Ammonia-Nitrogen	E 351.3 TKN	S 6010B Phosphorus - P Mehlich III	S 6010B Potassium - K Plant Available	S 6010B Sodium - Na Plant Available	S 6010B Magnesium - Mg Plant Available	S 6010B Calcium - Ca Plant Available	USDA 60 SAR	Work Order # / Lab Sample ID
1	L22- L35C-A	10-13-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- L35C-B	10-13-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- L35C-C	10-13-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- L3C-A-DUP	10-13-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- L35C-B-DUP	10-13-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- L35C-C-DUP	10-13-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- L35B-A	10-14-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- L35B-B	10-14-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- L35B-C	10-14-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- L32AA	10-18-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- L32A-B	10-18-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- L32AC	10-18-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- L35A-A	10-20-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22- L35A-B	10-20-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22- L35A-C	10-20-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Rus Hunt Date: 11-7-22 Time: 1130

Shipped UPS/ARS Tracking # 1263578390982B [redacted] 2514 [illegible]

Received By: [illegible] Date: 11/14/22 Time:

LLAS Shipping

Drop-Off Package Receipt: 1 of 1

THIS IS NOT A SHIPPING LABEL. PLEASE SAVE FOR YOUR RECORDS.

DROP-OFF LOCATION
UPS CC LUBBOCK TX
515 E 44TH ST
LUBBOCK TX 79404

DROP-OFF DATE TIME
Tue 8 Nov 2022 11 40 AM

ESTIMATED PICKUP DATE
UPS Tue 8 Nov 2022 3pkgs

CUSTOMER
Not Provided
ID Type Not Provided

TOTAL PACKAGES 3pkgs

TRACKING NUMBER	CARRIER & SERVICE	WEIGHT
1Z6357839098709103	UPS Ground	50 00 lb
1Z6357639099555296	UPS Ground	50 00 lb
1Z6357639096282514	UPS Ground	50 00 lb

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16 1

,971
41122957 – 41122973

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Denny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 1 of 4

Page 1 of 4

Number of Samples 15

DUP 1

	Sample ID	Composite Date	Type - Composite	Zip Lot Bag	Metro - Soil	Ice	None	pH 2:1 (v/v) SM4500-H+	E.C. 2:1 (v/v) SM 2510B mmho/cm	Nitrate - Nitrogen 1 N KCL Extract E 300.0	Ammonia-Nitrogen SM4500-NH3 B.C	TKN E 351.3	Phosphorus - P Mehlich III S 6010B	Potassium - K Plant Available S 6010B	Sodium - Na Plant Available S 6010B	Magnesium - Mg Plant Available S 6010B	Calcium - Ca Plant Available S 6010B	SAR USDA 60	Lab Sample ID
1	L22-L22-B-A	12-15	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- L22-B-B	12-15	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- L22-B C	12-15	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- L22-C-A	12-15	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- L22C-B	12-15	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- L22C-C	12-15	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- L15B-A	12-20	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- L15B-B	12-20	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- L15B-C	12-20	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- L15A-A	12-20	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- L15A-B	12-20	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- L15A-C	12-20	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- L16B-A	12-22-	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22- L16B-B	12-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22- L16BC	12-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: [signature] Date: 1-21-22 Time: 12:15

Shipped UPS/ARS Tracking #

Received By: DM 1/26/2023 Date: Time:

LLAS Shipping

16

16 1

41122939 – 41122954

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 2 of 4

Page 2 of 4

Number of Samples _____

DUP 1

	Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	None	SM4500-H+ pH 2:1 (v/v)	SM 2510B E.C. 2:1 (v/v) mmho/cm	E 300.0 Nitrate - Nitrogen 1 N KCL Extract	SM4500-NH3 B,C Ammonia-Nitrogen	E 351.3 TKN	S 6010B Phosphorus - P Mehlich III	S 6010B Potassium - K Plant Available	S 6010B Sodium - Na Plant Available	S 6010B Magnesium - Mg Plant Available	S 6010B Calcium - Ca Plant Available	USDA 60 SAR	Lab Sample ID
1	L22- L16A-A	12-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- L16A-B	12-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- L16A-C	12-22-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- L09B-A	12-27-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- L09B-B	12-27-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- L09B-C	12-27-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- L09A-A	12-27-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- L09A-B	12-27-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- L09A-C	12-27-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- L06A-A	12-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- L06A-B	12-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- L06A-C	12-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- L06B-A	12-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22- L06B-B	12-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22- L06B-C	12-28-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: [signature] Date: 1-23-23 Time: 12:15

Shipped UPS/ARS Tracking #

Received By: [signature] 112612023 Date: Time:

LLAS Shipping

16

16 1

,932
41122920 – 41122936

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 2 of 4

Page 3 of 4

Number of Samples 15

	Sample Info							Analysis Required											Work Order #
								SM4500-H+	SM 2510B	E 300.0	SM4500-NHD B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
	Sample ID	Composite Date	Type - Composite	Zip Lot Bag	Means - Soil	Ice	None	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
1	L22- L07B-A	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- L07B-B	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- L07B-C	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- L07A-A	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- L07A-B	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- L07A-C	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- L03B-A	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- L03B-B	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- L03B-C	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- L03A-A	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- L03A-B	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- L03A-C	1-3-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- L02A-A	1-4-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22- L02A-B	1-4-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22- L02A-C	1-4-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: [signature]	Date: 1-23-23	Time
Shipped UPS/ARS Tracking #		
Received By: DW 1/26/2023	Date:	Time:

LLAS Shipping

16

16 1

41122902 – 41122917

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2821	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 9 of 7

Page 4 of 4

Number of Samples 15

	Sample ID	Composite Date	Type - Composite	Zip Lock Bag	Marble - Soil	Ice	None	pH 2:1 (v/v)	E.C. 2:1 (v/v)	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
			Sample Info					SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B.C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	Work Order #
1	L22 L02B-A	1-4-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- L02B-B	1-4-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- L02B-C	1-4-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- L01B-A	1-5-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- L01B-B	1-5-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- L01B-C	1-5-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- L01A-A	1-5-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- L01A-B	1-5-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- L01A-C	1-5-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- LAA-A	1-9-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- LAA-B	1-9-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- LAA-C	1-9-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- LAB-A	1-9-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22- LaB-B	1-9-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22- LaB-C	1-9-23	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

DUP

Shipped By: Rus Hunt	Date: 1-23-23	Time: 12:15
Shipped UPS/ARS Tracking #		
Received By: [signature] 1/24/2023	Date:	Time:

LLAS Shipping

16

Drop-Off Package Receipt: 1 of 1

THIS IS NOT A SHIPPING LABEL. PLEASE SAVE FOR YOUR RECORDS.

DROP-OFF LOCATION:
UPS CC LUBBOCK TX
515 E 44TH ST
LUBBOCK TX 79404

DROP-OFF DATE TIME
Mon 23 Jan 2023 12 30 PM

ESTIMATED PICKUP DATE
UPS Mon 23 Jan 2023 4pkgs

CUSTOMER
Not Provided
ID Type Not Provided

TOTAL PACKAGES 4pkgs

TRACKING/REFERENCE	CARRIER & SERVICE	WEIGHT
1Z6357839098070445	UPS Ground	50 00 lb aw
1Z6357839096626232	UPS Ground	50 00 lb aw
1Z6357839099049620	UPS Ground	50 00 lb aw
1Z6357839097084612	UPS Ground	50 00 lb aw

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[illegible]

[illegible]

[illegible]

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 1 of 2

Page 1 of 2

Number of Samples 15

	Sample ID	Composite Date	Type - Composite	Zip Lot Bag	Mason - Soil	Ice	Note	pH 2:1 (v/v) SM4500-H+	E.C. 2:1 (v/v) mmho/cm SM 2510B	Nitrate - Nitrogen 1 N KCL Extract E 300.0	Ammonia-Nitrogen SM4500-NH3 B,C	TKN E 351.3	Phosphorus - P Mehlich III S 6010B	Potassium - K Plant Available S 6010B	Sodium - Na Plant Available S 6010B	Magnesium - Mg Plant Available S 6010B	Calcium - Ca Plant Available S 6010B	SAR USDA 60	Lab Sample ID
1	L22-L35 A-A-DUP	10-20-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22-L35-A-B-DUP	10-20-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22-L35-A-C-DUP	10-20-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22-L17A-A	10-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22-L17AB	10-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22-L17A-C	10-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22-L17B-A	10-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22-L17B-B	10-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22-L17B-C	10-26-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22-L18A	11-10-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22-L18B	11-10-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22-L18C	11-10-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22-L19A-A	11-10-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22-L19A-B	11-10-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22-L19AC	11-10-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Work Order #

Shipped By: Rus Hunt

Date: 12-29

Time:

Shipped UPS/ARS Tracking #

16

Received By: AN 11/04/2023

LLAS Shipping

16 1

41079966 – 41079981

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2821	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 2 of 2

Page 2 of 2

Number of Samples 15

	Sample Info							Analysis Required											Work Order #
								SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
	Sample ID , DUP	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Ice	Notes	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia - Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
1	L22-L19B-A	11-15-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22-L19-B-B	11-15-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22-L19B-C	11-15-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22-L20-A	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22-L20-B	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22-L20-C	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22-L20-A DUP	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22-L20-B DUP	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22-L20-C-DUP	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22-L21-A	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22-L21-B	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22-L21-C	12-6-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22-22A-A	12-15-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22-22A-B	12-15-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22-22A-C	12-15-22	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Rus Hunt Date: 12-29 Time: 1100

Shipped UPS/ARS Tracking #

16

Received By:

LLAS Shipping

AW 1/04/2023

16 1

.950

41079947 – 41079963

Drop-Off Package Receipt: 1

THIS IS NOT A SHIPPING LABEL. PLEASE SAVE FOR YOUR RECORD.

DROP-OFF LOCATION
UPS CC LUBBOCK TX
515 E 44TH ST
LUBBOCK TX 79404

DROP-OFF DATE/TIME
Thu 29 Dec 2022 12 38 PM

ESTIMATED PICKUP DATE
UPS Thu 29 Dec 2022 2pkgs

CUSTOMER:
Not Provided
ID Type: Not Provided

TOTAL PACKAGES 2pkgs

TRACKING/REFERENCE	CARRIER & SERVICE	WEIGHT
1Z6357039096070556	UPS Ground	34 00 lb
1Z6357039097554746	UPS Ground	34 00 lb

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[illegible]

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 1 of 4

Page 1 of 4

Number of Samples 15

16 1

41133315 – 41133330

DUP

	Sample ID	Composite Date	Type - Composite	Zip Lot Bags	Mama - Seal	Ice	Name	pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia - Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
			Sample Info					Analysis Required											Work Order #
								SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	
1	L22-LB-A	1-9	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- LB-B	1-9	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- LB-C	1-9	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- LEA-A	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- LEA-B	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- LEA-C	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- LEB-A	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- LEB-B	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- LEB-C	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- LD-A	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- LD-B	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- LD-C	1-12	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- LC-A	1-13	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22- LC-B	1-13	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22- LC-C	1-13	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: [signature]	Date: 2-1-23	Time: 1400
Shipped UPS/ARS Tracking #		
Received By: AW 2/1/23	Date:	Time:

LLAS Shipping

(16)

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 2 of 4

Page 2 of 4

Number of Samples 15

16 1

,308

41133296 – 41133312

	Sample ID	Composite Date	Type - Composite	Zip Loc Bag	Matrix - Soil	Jar	Nitric	pH 2.1 (v/v) SM4500-H+	E.C. 2:1 (v/v) SM2510B	Nitrate - Nitrogen 1 N KCL Extract E300.0	Ammonia-Nitrogen SM4500-NH3 B,C	TKN E351.3	Phosphorus - P Mehlich III S 6010B	Potassium - K Plant Available S 6010B	Sodium - Na Plant Available S 6010B	Magnesium - Mg Plant Available S 6010B	Calcium - Ca Plant Available S 6010B	SAR USDA 60	Lab Sample ID
1	L22-L23-A	1-13	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- L23-B	1-13	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- L23-C	1-13	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- L24A-A	1-17	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- L24A-B	1-17	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- L24A-C	1-17	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- L25A-A	1-18	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- L25A-B	1-18	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- L25A-C	1-18	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- L25B-A	1-18	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- L25B-B	1-18	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- L25B-C	1-18	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- L26 A	1-19	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22- L26 B	1-19	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22- L26 C	1-19	x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: Rusthurst Date: 2-1-23 Time: 1400

Shipped UPS/ARS Tracking #

Received By: [signature] Date Time:

LLAS Shipping

2/7/2023

16

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

Box 3 of 4

Page 3 of 4

Number of Samples 15

16 1

41133333 – 41133349

	Sample ID	Composite Date	Type - Composite	Zip Lock Bag	Matrix - Soil	Ice	None	SM4500-H+	SM 2510B	E 300.0	SM4500-NH3 B,C	E 351.3	S 6010B	S 6010B	S 6010B	S 6010B	S 6010B	USDA 60	Work Order #
								pH 2:1 (v/v)	E.C. 2:1 (v/v) mmho/cm	Nitrate - Nitrogen 1 N KCL Extract	Ammonia-Nitrogen	TKN	Phosphorus - P Mehlich III	Potassium - K Plant Available	Sodium - Na Plant Available	Magnesium - Mg Plant Available	Calcium - Ca Plant Available	SAR	Lab Sample ID
1	DUP L22-L27-A		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- L27-B		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- L27-C		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- L10-A		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- L10-B		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- L10-C		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- L24 A		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- L24 B		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- L24 C		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22- LFA-A		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22- LFA-B		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22- LFA-C		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22- LFB-A		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22- LFB-B		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22- LFB-C		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: [signature]	Date: 2-1-23	Time: 1000
Shipped UPS/ARS Tracking #		
Received By: [signature]	Date:	Time:

LLAS Shipping

2/1/23

(16)

City of Lubbock Sampling and Monitoring

Chain of Custody and Analysis Request

Box 4 of 4

Page 4 of 4

Number of Samples 9

Send Results to: (806) 775-2621	Donny Carrasco PO Box 2000 Lubbock, TX 79457
Account#	
Grower	LLAS

10 1

41133352 – 41133361

DKD 1

	Sample ID	Composite Date	Sample Info: Type - Composite	Zip Lac Bag	Matrix - Soil	Ice	None	Analysis Required: SM4500-H+ pH 2:1 (v/v)	SM 2510B E.C. 2:1 (v/v) mmho/cm	E 300.0 Nitrate - Nitrogen 1 N KCL Extract	SM4500-NH3 B,C Ammonia-Nitrogen	E 351.3 TKN	S 6010B Phosphorus - P Mehlich III	S 6010B Potassium - K Plant Available	S 6010B Sodium - Na Plant Available	S 6010B Magnesium - Mg Plant Available	S 6010B Calcium - Ca Plant Available	USDA 60 SAR	Work Order # / Lab Sample ID
1	L22 LGA-A		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
2	L22- LGA-D		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
3	L22- LGA-E		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
4	L22- LGB-A		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
5	L22- LGB-D		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
6	L22- LGB-E		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
7	L22- LGC-A		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
8	L22- LGC-D		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
9	L22- LGC-E		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
10	L22-		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
11	L22-		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
12	L22-		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
13	L22-		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
14	L22-		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	
15	L22-		x	x	x	x		x	x	x	x	x	x	x	x	x	x	x	

Shipped By: [illegible] Date: 2-1-23 Time: 1400

Shipped UPS/ARS Tracking #

Received By: [illegible] 2/1/23 Date Time.

LLAS Shipping

10

Drop-Off Package Receipt: 1 of 1

THIS IS NOT A SHIPPING LABEL. PLEASE SAVE FOR YOUR RECORDS.

DROP-OFF LOCATION
UPS CC LUBBOCK TX
515 E 44TH ST
LUBBOCK TX 79404

DROP-OFF DATE TIME
Wed 1 Feb 2023 1 23 PM

ESTIMATED PICKUP DATE
UPS Wed 1 Feb 2023 4pkgs

CUSTOMER
Not Provided
ID Type Not Provided

TOTAL PACKAGES 4pkgs

TRACKING REFERENCE	CARRIER & SERVICE	WEIGHT
1Z6357839032476312	UPS Ground	50 00 lb aw
1Z6357839091585329	UPS Ground	50 00 lb aw
1Z6357839097756475	UPS Ground	50 00 lb aw
1Z6357839093671304	UPS Ground	50 00 lb aw

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USD 01 004.

Section F

Laboratory Procedures

Provided by

Midwest Laboratories

Midwest Laboratories®

Analysis of Nitrate/Nitrite by Automated Cadmium Reduction (EPA 353.2)

Scope/ Application: This procedure is applicable to analysis of nitrate/nitrite nitrogen in surface, ground, waste, and well water, and aqueous extracts of solid materials such as soils or plants. The applicable range is 0.2 to 20 mg/L NO_3/NO_2-N. The range may be extended with sample dilution.

Purpose: To determine the nitrate/nitrite-N concentration in samples by segmented flow analysis (SFA) instrumentation and a cadmium reduction coil.

Summary of Test Method: A sample is passed through a copperized cadmium coil to reduce nitrate to nitrite. The nitrite that was originally present plus reduced nitrate is determined by diazotizing with sulfanilamide dihydrochloride to form a highly colored azo dye which is measured colorimetrically.

References: EPA 353.2 – Nitrogen, Nitrate-Nitrite (Colorimetric, Automated, Cadmium Reduction)

"Nitrate+Nitrite Nitrogen in Soil Extracts" (Perstorp Analytical, 2/94)

Definitions: **SFA** - Segmented Flow Analyzer. An instrument that uses a gas (nitrogen or oxygen) to separate liquid flows and pumps the gas to force liquid through the system.

MDL - Method Detection Limit- Lowest possible concentration that can be reasonably quantitated by method or instrument. Also referred to as the limit of detection or LOD.

SRS - Secondary Resource Standard- A standard whose primary standard is a different original material than the primary standard of calibrants.

MS/MSD - Matrix Spike/Matrix Spike Duplication- Sample fortified with known concentration and known volume of analyte of interest.

OTCR – Open Tubular Cadmium Rector – also called Cadmium Coil

LCR – Linear Calibration Range – a concentration range over which the instrument response is linear using a blank and at least 3 standards. LCR must be carried out every 6 months.

LCS – Laboratory Control Sample – Known or certified value used to monitor accuracy

Batch - set of samples that are extracted and analyzed as a set and the acceptance of the batch is based on a review of the Quality Control samples analyzed in conjunction with the set of samples. For this Procedure, a batch consists of twenty (20) samples or fewer.

Method Modifications:

1. **MWL uses Sodium Hydroxide to adjust the pH of the ammonium chloride-EDTA solution. Section 7.9 of EPA 353.2 specifies the use of Ammonium Hydroxide.**
2. **MDL procedures for EPA 353.2 state that an MDL must be run every 6 months. However, the current EPA Method Update Rule from 2017 specifies a different MDL procedure with data collected and compiled over the course of the year.**

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3. Section 7.10 of EPA 353.2 states that the Stock SRS 1000 mg/L Nitrate Nitrogen solution must be preserved with Chloroform. MWL uses Sulfuric Acid because that is the preservative that is used on all of the rest of the samples and controls.
4. Section 7.13 of EPA 353.2 states that the Working 20 ppm Nitrite solution is unstable and must be prepared as required. MWL makes the solution and is good for one month or until the coil efficiency is reduced to below 75%.
5. Section 11.1 of EPA 353.2 states that the sample pH must be adjusted to 5-9 before putting on the instrument. MWL is not adjusting the pH and the samples are preserved to <2 (per the reference method).

Sample Preservation & Storage: Aqueous samples should be preserved with sulfuric acid to pH <2 S.U. and refrigerated to 0-6°C. If preserved, regulatory sample holding time is 28 days and 48 hours if not. Clients are alerted to the presence and hazards of sulfuric acid and instructions are provided on the safe handling of sulfuric acid. The normal volume required is 250 mL and can be submitted in either a glass or Nalgene container. Nalgene is the preferred container. Original samples are retained for at least thirty (30) days after the final report is generated. When samples are finally disposed, they are placed into a solid waste dumpster that is removed by a licensed waste disposal company with final disposal in a licensed municipal landfill.

Reagents: **Brij-35 (21% Solution):** Purchased. Degraded surfactants reduce cadmium reduction efficiency, so never use expired or visibly contaminated Brij-35. Suspended mold can appear as a grayish haze.

NO_3 Buffer (ammonium chloride – EDTA solution): 340g Ammonium chloride, 0.4g Ethylenediaminetetraacetic acid (also known as Edetate Disodium or EDTA), 0.04g $CuSO_4$, and 50 mL of 40% w/v NaOH diluted and dissolved in 4L of DI water. Filter and degas prior to use. An EDTA/$CuSO_4$ solution can be made by weighing 2g EDTA and 0.2g $CuSO_4$ and dissolving in 250mL. Use 50mL of this solution per 4L. Solution is good for 1 month at room temperature.

NO_3 Color Reagent: 100mL H_3PO_4, 40g Sulfanilamide, and 2g N-1-Napthylethylenediamine Dihidrochloride (NED) diluted and dissolved in 1L of DI water. Filter and degas prior to use.

Stock Nitrate Solution 1000 mg/L: Purchased.

Stock SRS 1000 mg/L Nitrate Nitrogen (1L): Dry granular KNO_3. Dissolve 7.218 grams dry KNO_3 in approximately 900 mL deionized water in a 1000 mL volumetric flask. Dilute the solution to 1000 mL with deionized water. Preserve with 1 mL sulfuric acid. Keep refrigerated and remake after 3 months. This stock standard may be purchased.

Stock 1000 mg/L Nitrite Nitrogen (1 L): Dry KNO_2 in an oven. Dissolve 6.072 grams dry KNO_2 in approximately 900 mL deionized water in a 1000 mL volumetric flask. Dilute the solution to 1000 mL with deionized water. Preserve the stock with 2 mL chloroform. Keep refrigerated and remake after 6 months.

Working Standards: Into four 1000 mL volumetric flasks, pipette 1 mL, 5 mL, 10 mL and 20 mL of the stock nitrate solution to make 1 ppm, 5 ppm, 10 ppm and 20 ppm

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working standards. Preserve each with 1 mL of concentrated sulfuric acid, fill to volume with deionized water and mix. To make the 0.2 ppm standard, pipette 10 mL of 20 ppm standard into a 1 L flask, preserve, fill to volume with DI water, and mix. Good for the lesser of six (6) months at room temperature or the expiration date of the stock standard.

Reagent Sand: Used for blank and LCS when testing solids.

2M KCl: Dissolve 149.1g KCl per 1L of DI water. Additionally, 2M KCl can be acquired from the nitrate station in the Soils department.

Working 20 ppm Nitrite (500 mL): Pipette 10 mL stock 1000 ppm NO_2 into a 500 mL volumetric flask. Dilute with deionized water. This solution will serve to measure the efficiency of the cadmium column. Good for one (1) month at room temperature.

100 ppm Spike Solution: 10 mL of stock SRS 1000 ppm nitrate N solution. Dilute to 100 mL. Good for 2 weeks at room temperature.

Safety: Cadmium is considered a hazardous metal. Use gloves and safety glasses while handling cadmium coils during copperization technique. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

Instruments: Autosampler – Model 3360 or equivalent

O.I. Analytical Flow Solution System (III or IV) FIA Lab or equivalent
- Detector
- Pump
- Supercartridge

Apparatus: 2 mL plastic vials

Whatman 4 Filter Paper

Filter and syringe

Various pipettes (Class A)

Computer and Winflow 4.2 software or equivalent

1000-5000 µL Nichipet Ex autopipet or equivalent

Balance sensitive to at least 0.01 g

Interferences: One known interference is caused by colored samples because it is a colorimetric procedure. Highly colored samples must be filtered and diluted, if necessary. Samples with suspended solids greater than 10 microns should be filtered or they may clog the autosampler needle. Iron and copper and other metals in high concentration, also are known interferences.

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Calibration/Standardization:

1. All balances must be checked for proper verification daily by weighing at least three (3) different weights: 2 g, 10 g, and 50 g. All data is recorded. If these weights are not within appropriate acceptable range, the balance should not be used.

2. Daily autopipette calibrations must be performed prior to use. Set the autopipette to the amount desired for analysis. Dispense DI water (in duplicate) onto calibrated balance and record weight. Adjust autopipette as needed if weight values are not within acceptable ranges (± 2%). All data is recorded.

3. LCR – A linear curve must be performed for any instrument running the analysis using NO_3-N Stock Solution every six (6) months.

   a. A series of three (3) standards at different ranges (including a blank) should be run according to procedure section. Data is recorded and a copy is forwarded to the Technical Applications Scientist.

   b. Using a validated spreadsheet, enter the results to create a standard curve. Correlation value must be ≥ 0.995.

Procedure:

Preparing the Instrument:

1. Check to see if the autosampler is turned on.

2. Verify that the nitrate/nitrite supercartridge is attached to the pump tubing.

3. Attach the pump tubing to the appropriate reagent bottles (2 buffer bottles and 1 color reagent bottle).

4. Secure the platens into place and tighten them on the tubing, if necessary. When the platens are in place, there should be a click.

5. Check to make sure the nitrogen pillow is full, and the valve is open. Begin the reagent flow by pressing RUN button on the pump dispenser. Allow the reagents to flow for at least five (5) minutes.

6. **After the reagents have flowed through, pinch off the exit tube for approximately 10 seconds to get rid of any air bubbles in the OTCR.**

   NOTE: The nitrogen (or other inert gas) must be of high quality and the tubing airtight so no oxygen from the air passes through the OTCR during use.

7. The OTCR must be prepared for use. It is stored looped against itself using a jumper. Unscrew one of the nuts on the jumper and quickly push approximately 3 mL of DI water through the

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OTCR using a syringe, knocking the old copper-cadmium complex out of the column. Be careful to not allow any air into the OTCR at any time.

NOTE: To activate a new OTCR or to restore an older OTCR's performance, first use DI water to knock out the old copper-cadmium complex. Using a new syringe, draw 5 mL of 0.5N HCl and push through the coil, followed immediately by 5 mL of DI water. Do not leave the acid in the coil for more than a few seconds. Next, push 5 mL of 2% cupric sulfate through the coil and allow to sit for 10 minutes. Rinse with DI water.

8. Replace the jumper on the supercartridge with the activated OTCR. Allow the reagents to flow through the coil until a stable baseline is achieved. If the OTCR is being used for the first time, put the sample line in 20 ppm nitrate standard and condition for 10 minutes. Reattach the sample line to the probe.

9. In the Winflow program, the baseline may be monitored by pressing the "play" button on the left side of the analysis window. Any baseline with a total range of 500 uAU or less is considered stable.

Preparing Samples:

1. Sludges and environmental soil nitrates usually need to be analyzed on a dry weight basis. Dry the sludges in an oven overnight. Grind the sludges with a mortar and pestle. Weigh 5 ± 0.05 g of sample and extract with 25 mL 2N KCl. Shake vigorously for approximately 5 minutes and filter through pre-folded paper filters into medicine cups.

NOTE: **The manner in which solid/sludge samples were prepared needs to be noted:**

- **"DryWt" indicates the sample was run and reported on a dry weight basis.**
- **"AsR" indicates the sample was reported on an as received basis.**
- **"Foods" indicates the sample was extracted by the foods department and reported as received (usually at 20X dilution and reported to MDL).**
- **"Rd" indicates the sample was run dry but reported on an as received basis by multiplying the dilution factor by the percent solids (expressed as a decimal). For example, 5 g of sample with 16.0% percent solid value extracted with 25 mL 2N KCl has a dilution factor of 25/5 x 0.16 = 0.80.**

2. Line up samples to be analyzed. Determine the appropriate dilutions using history, physical appearance, or nitrate test strips when unsure.

NOTE: High salt content (2N KCl, seawater, etc.) suppresses the color response of nitrate strips, resulting in false low readings.

3. **If samples have debris or visible suspended solids, filter using filter paper before pouring in the sample cups. Notate on the batch sheet that samples were filtered. A separate filtered LCS and blank must also be added to the run.**

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4. Pour samples into a 2 mL sample cup and place them in a 90-count sample tray, along with QC samples. They very last sample cup should be a CCB blank, which is DI water.

5. Calibrants are located separately as 10 tube slots on the autosampler.

   Tube 1 is DI water used in blank checks and washes
   Tube 2 is 0.2 ppm nitrate standard
   Tube 3 is 1 ppm nitrate standard
   Tube 4 is 5 ppm nitrate standard
   Tube 5 is 10 ppm nitrate standard.
   Tube 6 is 20 ppm nitrate standard. These sample tubes are used to create the standard curve. The correlation coefficient of the standard calibration should be 0.9990 or better.
   Tube 7 is 20 ppm nitrite standard which serves as a check of the cadmium coil efficiency.

Running Samples:

1. After initially starting the Winflow program from the START menu, the sample table can be prepared by clicking on "Sample Table" button. Copy the first 17 rows from any previous run to a new sample table. These rows include the standard curve as well as the calibration checks.

2. Type in sample numbers in the order that they will be analyzed, including QC samples. Make sure the sample cup numbers are consecutive and appropriate for the autosampler. The sample trays each begin with 101, 201, 301, and end with 190, 290, 390. Enter the appropriate dilution factors for each sample into the sample table.

3. All the samples are of type "U" for unknown. Insert five (5) additional lines for the check calibrant and washes after every ten (10) sample cups.

1	W	U	1	1	1
1	W	RB	1	1	1
4	CCV-STD3	CCV	1	1	1
5	CCV-STD4	CCV	1	1	1
1	W	U	1	1	1

   The RB is the baseline check. The CCV is two (2) calibration check standards: (Tube 4) 5 ppm and (Tube 5) 10 ppm. At the end of the run, add the above five (5) lines plus an RB line.

4. Save the sample table in the "file" menu. The standard procedure for naming environmental nitrate runs is according to the date followed by the letter "w." For example, a nitrate run analyzed on May 8, 2011 would be named "110508w."
5. Click the "Collect Data" button and select the saved sample table and method (i.e. water method) to be analyzed.

6. Start the baseline by clicking the "play" button the Winflow menu. Once a stable baseline is achieved, click on the "fast forward" button (the one with 2 arrows pointing right) to start the autosampler and the run.

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7. When the run is complete, maximize the results table and print using the "file" menu.

Shutting Down Instrument:

1. Remove the OTCR from the supercartridge, reconnecting all jumper screws.
2. Flush the OTCR with DI water using a syringe.
3. Remove reagent lines from reagent bottles and attached to DI water container. Flush the system with deionized water until all the Brij is out of the lines.
4. Release the platens. If the pressure on the platens is not released, the pump tubing will experience premature flattening and cracking resulting in poor reagent flow through the system.

Calculation(s):

$$\text{Cadmium Column Efficiency} = \frac{NO_3^- \text{ concentration}}{NO_2^- \text{ concentration}} \times 100$$

The Cadmium Column efficiency must be 75% or better. If the efficiency is not 75% or better, recopperize the column.

Method calculation is carried out by the Winflow program.

Method QC:

Quality Control Procedures:

1. The quality control of environmental nitrate/nitrite samples consists of one blank and one LCS per batch of 20 samples. A Matrix Spike/Matrix Spike Duplicate and CCV are analyzed every 10 samples, rounded up. Each run must also include a 5 ppm Secondary Resource Standard.
2. Solid samples are run in separate batches from aqueous samples and have their own quality control.
3. A CCV and blank are also run at the end of the run. **The CCV consists of calibration standards 4 and 5.**
4. **SRS:** The SRS consists of a purchased 1000 ppm nitrate standard diluted to 5 ppm. **An in-house 1000 ppm nitrate standard may also be used in place of a purchased standard by dissolving 7.218 g KNO_3 in 1 L of DI water and preserving with 1 mL of H_2SO_4.**
5. **Method Blank:**
   a. The water method blank consists of 2 mL DI water.

b. The solid method blank consists of 5 g of reagent sand. Fill to 25 mL volume with 2N KCl solution and extract as a solid client sample.

6. **LCS:**

a. The water LCS consists of 2 mL of 5 ppm NO_3-N.

b. The solid LCS consists of 1 mL of 100 ppm NO_3-N spike added to 5 g sand. Fill to 25 mL volume with 2N KCl solution and extract as a solid client sample.

7. **MS/MSD:**

a. The water MS/MSD consists of 2 mL of 100 ppm NO_3-N spike added to 50 mL sample and mixed, creating a 4-ppm spike level.

b. The solid MS/MSD consists of 1 mL of 100 ppm NO_3-N spike added to the sample. Fill to 25 mL volume with 2N KCl solution and extract.

Aqueous Matrix

QC Type	Method Performance Criteria	Out of Control Action
SRS	90-110% recovery	Entire run must be re-analyzed.
Method Blank	<0.2 ppm	Blank may be re-analyzed once. If re-analysis fails, the associated batch must be re-analyzed. Documented Out of Specification form must be initiated before continuing analysis.
LCS	90-110% recovery, or within control limits established during characterization	LCS may be re-analyzed. If re-analysis fails, the associated batch must be re-analyzed. Documented Out of Specification form must be initiated before continuing analysis.
MS	90-110% recovery	Sample and matrix spikes may be re-analyzed. If re-analysis fails, the sample is inspected for homogeneity and a notation of matrix effect is reported.
MSD	<10% RPD	One duplicated sample must be re-analyzed. The samples are checked for homogeneity and a notation is made on the final report. RPD failure does not fail the batch.
CCV	90-110% recovery	Data before and after the failing CCV must be rerun.

Solid Matrix

QC Type	Method Performance Criteria	Out of Control Action
SRS	90-110% recovery	Entire run must be re-analyzed.

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Method Blank	1.0 ppm (as a 5X dilution)	Blank may be re-analyzed once. If re-analysis fails, the associated batch must be re-analyzed. Documented Out of Specification form must be initiated before continuing analysis.
LCS	85-115% recovery, or within control limits established during characterization	LCS may be re-analyzed. If re-analysis fails, the associated batch must be re-analyzed. Documented Out of Specification form must be initiated before continuing analysis.
MS	80-120% recovery	Sample and matrix spikes may be re-analyzed. If re-analysis fails, the sample is inspected for homogeneity and a notation of matrix effect is reported.
MSD	<20% RPD	One duplicated sample must be re-analyzed. The samples are checked for homogeneity and a notation is made on the final report. RPD failure does not fail the batch.
CCV	90-110% recovery	Data before and after the failing CCV must be rerun.

MDL: An MDL is carried out according to QA 033 (Establishing Detection Limits) and is based on current EPA regulations regarding MDL studies.

Pollution Prevention: There are no pollutants produced in this procedure.

Waste Management: All remaining sterile soil and containers is placed in the municipal dumpster for disposal.

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Midwest Laboratories®

Ammoniacal Nitrogen in Soils

Scope/ Application: This method covers the determination of Ammoniacal Nitrogen (NH_3 as N) in soil samples. The applicable upper limit is 50 mg/kg NH_3 as N. The method range can be extended by manual or instrument dilution.

Purpose: To determine the Ammoniacal Nitrogen (NH_3 as N) of soil samples.

Summary of Test Method: Samples, reagents, and calibrants are loaded into the same rack and reagents reservoirs. Ammonia reacts with alkaline phenol and hypochlorite to form indophenol blue and the intensity of the color is measured. Results are automatically determined by linear regression.

References: SM 4500-NH_3-G – (mod) Nitrogen (Ammonia): Automated Phenate

SmartChem 200™ Method 210-200B

Definitions: **RBL** (Reagent Base Line) – Absorbance from the diluent and reagents.

WBL (Wash Base Line) – Absorbance from the DI water and cuvette.

CCV (Continuing calibration verification) – A check sample ran periodically to establish that the instrument is continuing to function properly.

CCB (Continuing calibration blank) – A blank ran periodically to establish that the instrument is continuing to function properly.

SRS (Secondary Resource Standards) – A standard whose primary standard is a different original material than the primary standard of the calibrants.

LCS – Laboratory Control Sample – Known or certified value used to monitor accuracy

Batch: set of samples that are extracted and analyzed as a set and the acceptance of the batch is based on a review of the Quality Control samples analyzed in conjunction with the set of samples. For this Procedure, a batch consists of twenty (20) samples or less.

REMS (RMS)- USDA acronym for restricted movement of soils. The USDA/MWL compliance agreement provides guidance for how the soil is treated to prevent spread of potential pathogens.

Technical Notes:

1. This procedure is amenable to low level samples.
2. It has been modified from SM 4500-NH_3-G to be carried out on a discrete analyzer.
3. This procedure may be performed on REMS samples, although special handling procedures may apply.

Sample Preservation & Storage: Sample preservation and storage for restricted samples (REMS) follows the USDA protocol. REMS samples are held only in an authorized hazardous material building, transported in a sealed container, and treated and disposed of in a manner following regulations.

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Reagents: **Reagents are ACS reagent grade or better**

Sodium phenolate (Alkaline phenol): Fill 100 mL Erlenmeyer flask half full with DI H_2O. Add 8 mL of 10 N (40%) NaOH and 8.3 g of phenol (C_6H_5OH). Dissolve and dilute to 100 mL in volumetric flask with DI water. Store in opaque bottle at room temperature and is good for two (2) weeks.

Sodium Hypochlorite Solution: Use a bleach source containing 8.3% available chlorine, such as Clorox™. Add a ratio of 5 parts DI : 3 parts bleach to a reagent bottle and swirl gently. Prepare fresh daily.

Disodium ethylenediamine-tetraacetate (EDTA): Dissolve 18.75 g of EDTA disodium salt dihydrate, $C_{10}H_{14}N_2Na_2O_8 \cdot 2H_2O$ and 5.16 mL of 40% NaOH in approximately 750 mL DI water. Fill to 1 L with DI water. Invert 5 times to mix. Good for six (6) months at room temperature.

Sodium Nitro ferricyanide (Sodium Nitroprusside): Dissolve 0.3 g $Na_2Fe(CN)_5NO \cdot 2H_2O$ in approximately 50 mL of DI H_2O in a 100 mL Erlenmeyer flask and fill to volume with DI water. Good for one (1) week at room temperature. Add 0.5 mL concentrated probe rinse solution.

2M KCl Diluent: Add 17kg KCl to 30 Gallons of DI water (done in soils department)

Probe Rinse Solution: Add 1.0 mL of concentrated Probe Rinse Solution to 2 L and fill to volume with DI water. Invert five (5) times to mix. Store at room temperature and is good for one (1) year.

Ammonia Stock Solution (1000 mg/L): Dissolve 3.819 g of anhydrous ammonium chloride, (NH_4Cl), dried at 105°C for four (4) hours, in reagent water, and dilute to volume in a 1 L volumetric flask. (1.0 mL = 1.0 mg NH_3-N. (1000 ppm). Good for six (6) months at room temperature. This can also be a purchased standard.

10 ppm NH_3 Soil Standard: Pipette 2.5mL of 1000ppm NH_3-N standard. Dilute to 250mL with KCl solution.

Cleaning Solution: 30 mL of concentrated cleaning solution in 2 L of DI water. Mix gently. Good for 15 days at room temperature.

Safety: To some people, bleach can cause nasal irritation. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

Instruments: Westco Smart Chem™ Discrete Wet Chemistry Analyzer or equivalent

Apparatus: Class A glassware: 5 mL pipette, 500 mL, and 1.000 L volumetric flask

Balance capable of accurately weighing to at least 0.0001 g

Interferences:

1. Calcium and magnesium ions may be present in concentration sufficient to cause precipitation problems during analysis. A 5% EDTA solution is used to prevent the precipitation of calcium and magnesium ions from river water and industrial waste.

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For seawater, a sodium potassium tartrate solution is used. It is not anticipated that Midwest will receive seawater samples.

2. Sample extract turbidity and color may interfere with this method. No turbid samples are run by this method. Sample color that absorbs in the photometric range will also interfere.
3. Cyanate, which may be encountered in certain industrial effluents, will hydrolyze to some extent even at the pH of 9.5 S. U. at which distillation is carried out.

Procedure:

1. Turn on Westco Smart Chem™ by power switch on the left side.

2. Fill reagent and diluent bottles.

   a. The diluent bottle is filled with 2M KCl diluent.

   b. Fill clean reagent bottles with the appropriate reagents for this method. When filling the disodium EDTA, nitroprusside, and hypochlorite reagent bottles, pour the solutions slowly to minimize foaming. Each bottle must be labeled with the source of the reagent (at minimum, the MWL Chemical Tracking number and expiration date).

   NOTE: Do not overfill reagent bottles. The proper fill point on reagent bottle is just below the shoulder.

3. On the computer, select the method to be used (NH_3S) and start method as follows for sample extracts from soils department:

   a. Go to sample entry.

   b. Double click on the desired method to be run, "NH_3S."

   c. Enter number of samples and press the green check mark or import an external run by pressing the file icon. Go to the AmmonCmd folder and select the Run plan.

   d. Enter the sample ID's and dilutions. (These may be imported from an electronic command file.)

   e. Review the Run Plan Sample ID List and click "Save."

   f. Enter the Run Plan description (i.e. NH_3) and click "OK."

   g. The instrument will ask 'Do you want to save run plan?", click 'Yes'.

   h. Instrument will ask if you want to 'Save sample ID's to an External file?'. Click 'Yes' if you typed up the plan manually or 'No' if plan was imported.

   i. Next it will ask 'Do you want to print run plan?'. Click 'Yes' to print or 'No' to go to System Monitor and select your plan from the plan list.

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j. Go to System Monitor.

k. Select and click on the Run Plan that was created.

l. Verify that the selected Run Plan is correct.

m. Load samples, standards, controls and empty cups as displayed in the System Monitor. **Note: Do not overfill sample cups. The proper fill point of a sample cup is within 3 mm of the lip.**

n. Check the probe rinse, DI water, and cleaning solution bottles and fill as necessary.

NOTE: When filling the probe rinse and cuvette wash reservoirs, pour the solutions slowly to minimize foaming. If the probe, DI water, and/or cuvette wash reservoirs require filling while a run is in progress, do not remove the cap or lift the siphon tube above the liquid surface. Insert a long stem funnel through the open port in the reservoir cap and fill the container slowly with the respective solution to minimize foaming.

o. Click "Start" in the System Monitor to display user selectable options before beginning analysis.

p. If a cuvette wash and/or WBL are required before the start of the analysis, then click on the appropriate box. It is recommended that a WBL be run at the start of each day.

   a. The RBL boxes should always have a check mark. If this is the first run of this method for the day, then check 'Calib.' to perform a calibration curve. If this is a subsequent test, uncheck 'Calib.'

q. Click the "Start" button to begin the analysis.

r. Check the correlation coefficient of the standard calibration. The correlation must be 0.9990 or better. If the correlation does not meet this requirement, recalibrate the instrument. (see Method Performance Criteria).

4. If the sample is a REMS sample, return remaining sample aliquots and any items used to sample or store extracts to soils receiving for heat treatment. All supplies that can't be heat treated need to be sanitized with 10% bleach for 30 minutes or quaternary ammonia products according to the manufacturer's label. All other samples and supplies may be disposed of regularly.

Calculation(s):

1. The programs will construct and display the calibration curve and calculate all samples results. When the dilutions are made, the dilution corrected results will be reported based on the dilution factors used in the results section of the report.

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2. Report results in mg NH_3-N/kg.

Method QC:

Quality Control Procedures:

1. Run one (1) 5 ppm CCV every 10 samples and one (1) CCB every 20 samples, and at the end of the run. The instrument is set up to do this automatically. The CCB is taken from one of the Blank Bottle Checks to make sure that department KCl matches the KCl the samples were extracted from.

2. Check samples will be included in the run, at the discretion of the soils department.

Method Performance Criteria:

1. Blanks and CCBs should be less than 0.10 mg/L.

2. CCV recovery must be between 90-110%.

3. Check sample recovery is established by the Soils department. These values can change when a new batch of check soil is brought into use.

4. Only those results (adjusted for dilution factor) under the highest calibration standards are reportable. Results above the highest standard are diluted and reanalyzed.

Out of Control Data:

1. If a CCV or CCB fails, data before and after the failing CCV, to the closest passing CCV on each side, is invalid and must be rerun.

   a. If CCB fails (runs high or low), check to see if a new bucket of KCl was made in the soil lab.

2. If the check sample does not meet expected values, the data reviewer will be contacted.

3. In the event of an instrument caused QC failure, stop analysis, investigate, determine the cause of the failure, and correct it. All samples since the last acceptable QC sample must be reanalyzed. If samples cannot be reanalyzed, the report to the client must reflect the QC failure.

MDL: An MDL study is not required for this procedure.

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Pollution Prevention: Due to the potential exposure of untreated regulated samples (REMS) to the environment, a comprehensive cleaning/disinfection protocol must be followed. This protocol includes sterilizing or heat treating all sample materials, such as sample scoops, balance plates, beakers, etc., after contact with REMS samples or extracts. In the laboratory, floors, walls, and work areas are amenable to washing with disinfectants such as bleach. If a sample is spilled or dropped, sweep the sample into a hard pan and then heat treat the sample. Clean any area that the spilled sample touched using 10% bleach. This may possibly include walls, floors, and bench tops. Bleach requires saturation of the surface being treated for a minimum period of 30 minutes. 70% ethanol and disinfectants containing quaternary ammonium compounds currently have no time limit associated with their use. Discard the bleach solution into the laboratory wastewater system. Since the material is not volatile or airborne, treatment or disinfecting of ceiling areas or HVAC ducts is not needed.

Purchase chemicals in limited amounts so they do not expire.

Waste Management: Non-REMS aqueous wastes and all instrument outflows (which are bleach treated) are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge. Non-REMS solid wastes can be discarded in the municipal dumpster.

All REMS waste is disposed of in a designated, sealed bin. The waste is then heated in accordance with RC 028 to destroy any potentially regulated organisms. Once it has been treated, the waste can be discarded in the municipal dumpster.

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Analysis of Aqueous Extracts by ICP-AES

Scope/ Application: Inductively coupled plasma-atomic emission spectrometry (ICP-AES) determines trace elements, including metals, in solution. This method is applicable to Al, B, Ca, Cu, Fe, K, Mg, Mn, Mo, Na, P, and Zn. This analysis procedure is primarily intended for (but not limited to) aqueous extracts of samples provided by various departments.

Purpose: This is a procedure for the analysis of various extractions and preparations from various departments.

Summary of Test Method: Samples are solubilized, digested, extracted, or diluted using appropriate sample preparation procedures prior to analysis.

This method measures multiple element levels by use of characteristic emission spectra. Sample aerosol is created by a nebulizer and transported by the nebulizing gas to a radio frequency argon plasma. The element specific spectra are produced by interaction of the plasma with the sample. The spectra of the sample are separated by a grating spectrometer that provides the line spectra to photon detection devices. The intensity of individual wavelengths and their surrounding spectra are determined. Background levels are removed allowing calculation of the specific wavelength intensity which is proportioned to the amount of emitting element present.

References: EPA 6010B – Inductively Coupled Plasma-Atomic Emission Spectrometry

Definitions:

ICP-AES: Inductively Coupled Plasma-Atomic Emission Spectrometry

HNO_3: Nitric Acid

ICV: Initial Calibration Verification

CCV: Continuing Calibration Verification

ICB: Initial Calibration Blank

CCB: Continuing Calibration Blank

Water: All references to water in the method refer to DI (deionized) water or better. All water will be interference free.

Relative Percent Difference: Measurement of precision between two (2) values and calculated as: {[X1-X2]/[(X1+X2)/2]} *100

LCS: Laboratory Control Sample – Known, certified, or characterized value used to monitor accuracy

Batch: set of samples that are extracted and analyzed as a set. The acceptance of the batch is based on a review of the Quality Control samples analyzed in conjunction with the set of samples. A batch consists of all samples between two calibration events.

Technical Notes: Inductively coupled plasma-atomic emission spectrometry (ICP-AES) determines trace elements, including metals, in solution.

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Sample Preservation & Storage: There is no sample storage or preservation required because this procedure is an analytical procedure. Sample storage requirements are found in the sample preparation procedure.

Reagents: **Reagent or trace metals grade chemicals shall be used in all tests.** Unless otherwise indicated, it is intended that all reagents shall conform to the specifications of the Committee on Analytical Reagents of the American Chemical Society, where such specifications are available. Other grades may be used, provided it is first ascertained that the reagent is sufficiently high purity to permit its use without lessening the accuracy of the determination. If the purity is in question, analyze the reagent for contamination.

Nitric Acid (concentrated), HNO_3, - Store at ambient conditions for up to three (3) years.

Water – All references to water in this method refer to water unless otherwise specified. Water will be interference free.

Standard stock solutions may be purchased, from an approved vendor, or may be prepared from ultra-high purity grade chemicals or metals (99.99% pure or greater).

X-17 purchased custom multi-element standard that includes 5000ppm Ca, 2000ppm K, Mg, P, 500ppm Na, S, and 100ppm Al, B, Cu, Fe, Mn, Mo, Sn, Sr, Zn.

X-16 purchased custom multi-element standard that includes 4000ppm Ca, 2000ppm K, P, 1000ppm Mg, Na, 500ppm S, and 50ppm Al, B, Cu, Fe, Mn, Mo, Zn.

1% Water Tray STD is made by diluting X-17 stock solution 1:20 with water and HNO_3 to create a 1% HNO_3 standard. Typically, this is accomplished by:

a) 1.0L class A volumetric flask
b) Add approximately 50mL water
c) Add 10mL HNO_3, Swirl to mix
d) Add 50mL X-17 stock solution
e) Bring to a final volume of 1.0L with water and invert to mix.
*Varying amounts of standard can be made if the above ratios are retained.

Waters Check is made by diluting X-16 stock solution 1:40 with water and HNO_3 to create a 1% HNO_3 check. Typically, this is accomplished by:

a) 2.0L class A volumetric flask
b) Add approximately 100mL water
c) Add 20mL HNO_3, swirl to mix
d) Add 50mL X-16 stock solution
e) Bring to a final volume of 2.0L with water and invert to mix.
*Varying amount of check can be made if the above ratios are retained.

Waters QC BLK is made by diluting HNO_3 with water. Typically, this is accomplished by:

a) 2.0L class A volumetric flask
b) Add approximately 100mL water

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c) Add 20mL HNO_3, swirl to mix
d) Bring to a final volume of 2.0L with water and invert to mix.
*Varying amount of blank can be made if the above ratios are retained.

Safety: Inorganic acids are highly corrosive and must be handled carefully. A face shield is required when handling concentrated acids. All acid additions are carried out in the hood and technicians/analysts are to wear gloves, protective eyewear, and a face shield. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheet (SDS) for chemicals/reagents used in the method.

Instruments: Thermo Scientific 6000, 7000, or Pro series ICP or equivalent
Cetac Autosampler or equivalent
Cetac ASXpress or equivalent (optional)

Apparatus: Argon gas supply – high purity (>99.998%)
Class A volumetric flasks of suitable precision and accuracy
Class A volumetric pipettes or suitable precision and accuracy
Autosampler rack(s) and corresponding plastic test tubes

Interferences: Spectral interferences are caused by background emission from continuous or recombination phenomena, stray light from the line emission of high concentration elements, overlap of a spectral line from another element, or unresolved overlap of molecular band spectra

Procedure:

1. Samples are prepared by appropriate sample preparation procedures.

2. Fill out Routine Instrument Maintenance Log (located at \\File\Metals\Maintenance Logs\Routine Instrument Maintenance) according to ME 088. It is the analyst's discretion for cleaning and replacing of the consumable and glass parts.

3. Turn plasma on. The instrument should be thermally stable before beginning analysis. Typically, at least 30 minutes of operation is allowed prior to calibration.

4. Open the appropriate method, ME092_YYYY-MM-DD, where YYYY is the year, MM is the month, and DD is the date of creation for that database.

5. Create the autosampler table and give a unique name to the sequence (analytical) batch; typically, the date as YYYY-MM-DD is used to do this. The autosampler for some sample types can be "Imported from Delimited Text File," when adding the sequence.

6. Calibrate the instrument. The calibration lines are created using a blank and one standard. Below is a list of the standards and their associated elements and concentration.

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Table 1:

Standards	Analyte Level (ppm)
Standard Blank	< MDL, all calibrated elements
High Standard	5 ppm - Al, B, Cu, Fe, Mn, Mo, Zn 25 ppm – S, Na 100 ppm – K, Mg, P 250ppm - Ca

1. Verify the calibration by running an ICB and an ICV. The list of their associated elements and concentrations are as follows:

Table 2:

Checks	Analyte Level (ppm)
ICB/CCB - QC Blank	<MDL, all calibrated elements
ICV/CCV - WCK	1.25ppm - Al, B, Cu, Fe, Mn, Mo, Zn 12.5ppm - S 25ppm – Mg, Na 50ppm – K, P 100ppm - Ca

See below for the Wavelength Table listing for the wavelengths used in this method.

Table 3:

Al	308.215
B	249.678
Ca	315.887
Cu	324.754
Fe	259.940
K	766.490
Mg	383.826
Mn	257.610
Mo	202.030
Na	589.592
P	178.284
S	182.034
Zn	213.856

2. Review data for acceptance of instrument checks and preparation batch QC.

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Calculation(s): Sample weights, volumes, final volumes, and dilution factors are entered during the creation of the autosampler sequence.

Method QC:

Quality Control Procedures:

1. GME
    a. There is no associated QC.
2. SAR
    a. There is no associated QC.
3. Haney
    a. At least one blank per batch
    b. At least one LCS per batch
4. Water Soluble Soil
    a. At least one reagent blank per batch
    b. At least one method blank per batch
    c. At least one soil check every 40 samples
5. Mehlich
    a. At least one reagent blank per batch
    b. At least one method blank per batch
    c. At least one duplicate per batch
    d. At least one soil check every 40 samples
6. Available Phosphorus
    a. At least one blank per batch
    b. At least one LCS per batch
    c. At least one duplicate per batch
7. CEC
    a. At least one blank per 20 samples
    b. At least one LCS per 20 samples
    c. At least one duplicate per every 10 samples

Method Performance Criteria:

1. ICB and CCB levels must be within two (2) times the reporting limit.
2. ICV levels must be within 10% of the true value.
3. CCV levels must be within 15% of the true value.
4. Sample prep blank
    a. Water Soluble Soil:
        i. Method blank Less than detection limit
        ii. Reagent blank Less than detection limit
    b. Mehlich
        i. Less than detection limit
    c. Available Phosphorus
        i. Less than detection limit
    d. CEC

i. Less than detection limit (0.1 meq/100g)

e. Haney

i. Less than detection limit

5. Sample LCS/Extraction(digest) check

a. Water Soluble Soil:

i. Between upper and lower control limits as determined by the most recent LCS characterization

b. Mehlich

i. Between upper and lower control limits as determined by the most recent LCS characterization

c. Available Phosphorus

i. Between upper and lower control limits as determined by the most recent LCS characterization

d. CEC

i. Between upper and lower control limits as determined by the most recent LCS characterization

e. Haney

i. Between upper and lower control limits as determined by the most recent LCS characterization

6. Sample duplication

a. Water Soluble Soil

i. Less than 20% RPD

b. Mehlich

i. Less than 20% RPD

c. Available Phosphorus

i. Less than 10% RPD

1. For indirect extraction, if the sample result is less than 1%, the RPD is not calculated.

d. CEC

i. Less than 10% RPD

Out of Control Data:

1. If the ICB or ICV fails for individual elements, it is the analyst's discretion to determine if recalibration is needed or if the run can continue. For analyte(s) that fail, re-analysis is needed if analyte(s) are to be reported.

2. CCV failure(s) require re-analysis of samples back to the last acceptable calibration verification (CCV or ICV) for reported elements. If the CCV has been exceeded high and there are non-detects in the batch, those non-detects can be reported. If the CCV is exceeded low, samples that exceed the maximum regulatory level may be reported.

3. CCB failure(s) require re-analysis of samples back to the last acceptable CCB. For reported analytes, if the blank is less than 1/10 of the concentration of the determined reporting limit of interest and no sample is within 10% of the action limit, samples need not be re-analyzed.

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4. If the QC failure is an unacceptable sample preparation (%RPD exceeds limit), the sample will be observed to determine if the sample is homogenous. The sample and duplicate can be re-ground to obtain a homogenous matrix and the sample re-analyzed. The batch may not be failed if the precision is outside the acceptable range.

5. If the batch QC has recovery levels of the LCS/Extraction Check outside acceptable ranges, the affected LCS/Extraction check may be re-analyzed. If on the second analysis, the LCS/Extraction Check is still outside the acceptable range, then all samples within the batch that require the analyte(s) falling outside acceptable range must be re-digested and re-analyzed. LCS/Extraction Check failure is noted in the control chart for each analyte that fails.

6. If indigenous method digest blank level (unmultiplied) is above 2.2 times the MRL and greater than 1/5 the indigenous sample level, re-analysis may be performed. If method digest blank fails upon re-analysis, re-digest is needed. Samples with analytes below the determined reporting limit need not be re-analyzed/re-digested.

MDL: This procedure is not amenable to MDL studies.

Pollution Prevention: Order reagents in limited quantities so they do not expire. The method uses few chemicals.

Waste Management: Aqueous wastes are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge.

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Determination of Soil pH

Scope/ Application:	This method is applicable to all types of soil.
Purpose:	This procedure describes an accepted method to determine the pH of a soil sample.
Summary of Test Method:	Scoop 10 g (1:1) or 5 g (1:2) of sample into a pH tray and add 10 mL of DI water. Let sit for 10-30 minutes. Read pH tray on pH instruments.
References:	Recommended Chemical Soil Test Procedures for the North Central Region. Revised 2015. NCR-13. SO 047 – pH Meter Calibration
Definitions:	pH – negative log of the hydronium ion concentration
Technical Notes:	N/A
Sample Preservation & Storage:	Samples are stored at room temperature and retained for a minimum of ten (10) days after analysis. The remainder is disposed into the municipal landfill dumpster.
Reagents:	pH Buffer 4.00 ± 0.01 at 25 °C pH Buffer 5.00 ± 0.01 at 25 °C pH Buffer 6.00 ± 0.01 at 25 °C pH Buffer 7.00 ± 0.01 at 25 °C Electrode Filling Solution, Potassium Chloride, 4 Molar, saturated with Silver Chloride
Safety:	Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.
Instruments:	Denver Model 215 pH meter or equivalent Thermo Scientific Orion 9165BNWP Combination Sure-Flow pH Electrode
Apparatus:	pH tray – one (1) tray contains 40 vessels NCR-13, 10 g scoop Repipette dispenser, calibrated to 10 mL Thermo Scientific MaxQ 2000 Benchtop Orbital Shaker Velmex VXM-2 Stepping Motor Controller

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Velmex BiSlide MN10-0100-L01-21

Velmex BiSlide MN10-0500-E04-31

Interference: N/A

pH 1:1 Procedure:

1. Check probes and calibrate pH meters prior to analysis (reference SO 047).
2. Add 10 g of sample into the designated pH tray.
3. Add 10 mL of DI water using the repipette dispenser.
4. Allow the samples to sit for 10-30 minutes.
5. Place the pH tray on the orbital shaker and scan the bar code.

pH 1:2 Procedure:

1. Check probes and calibrate pH meters prior to analysis (reference SO 047).
2. Add 5 g of sample into the designated pH tray.
3. Add 10 mL of DI water using the repipette dispenser.
4. Allow the samples to sit for 10-30 minutes.
5. Place the pH tray on the orbital shaker and scan the bar code.

Calculation(s): N/A

Method QC:

Quality Control Procedures:

1. Calibrate pH meters daily within the acceptable range of pH buffer 4.00 and pH buffer 7.00, and run a pH check tray with two known values (reference SO 047).
2. One (1) table check every 40 samples or one (1) per pH tray.
3. One (1) bottle check approximately every 300 samples or one (1) per day.
4. Check pH buffer 4.00 and pH buffer 7.00 every two pH trays read.

Method Performance Criteria:

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1. pH of check tray must be within ± 0.25 of the two known values.

2. pH of 4.00 and 7.00 buffers must be within ± 0.10 of the known values.

3. pH of the table check must be within the established acceptable range and will be highlighted green for passing or red for failing on the pH program.

Out of Control Data:

1. In the event of an instrument-caused QC failure, stop analysis and determine the cause of the failure and repair the instrument. All samples since the previous acceptable QC sample must be re-analyzed.

MDL: An MDL study is not required for this procedure.

Pollution Prevention: No pollution is produced in this method.

Waste Management: Aqueous wastes are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge.

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Soil Nitrate and Ammonia Extraction Procedure

Scope/ Application: This method is applicable for all types of soil. It may be used for untreated regulated samples known as restricted movement soils (RMS). RMS samples apply to all soil samples originating from select foreign countries and U.S. counties, excluding portions of Canada regulated for soil movements, regulated state, and/or county that require analysis.

Purpose: This procedure describes an accepted method for extracting nitrate and ammonia in soil samples. For RMS specific samples, this procedure describes an accepted method for extracting ammonia while meeting the regulated soil compliance protocol as required by the USDA/APHIS regarding foreign imports.

Summary of Test Method: Scoop 2.5 g of sample into rack and add 12.5 mL of 2.0 M KCl solution. Shake for 15 minutes and filter. Re-filter if extract is cloudy. Pour extract into test tube block and give to Wet Chemistry North for analysis.

References: Recommended Chemical Soil Test Procedures for the North Central Region. Revised 2015. NCR-13.

RC 028 – Handling Permitted Imported and Regulated Soils

EN 004 – Analysis of Nitrate/Nitrite by Automated Cadmium Reduction

EN 118 – Ammoniacal Nitrogen in Soils

USDA/APHIS Instructions for Soil Compliance Agreements

USDA/APHIS Instructions for PPQ 525 Permits

USDA/APHIS Instructions for PPQ 526 Permits

Definitions: **LCS** – Laboratory Control

USDA – The United States Department of Agriculture

APHIS – Animal and Plant Health Inspection Service

RMS – USDA acronym for restricted movement of soils. The USDA/MWL compliance agreement provides guidance for how the soil is treated to prevent spread of potential pathogens.

Technical Notes: When handling RMS samples, properly disinfect or remove and dispose items (e.g., gloves) to help prevent contamination.

When transferring RMS samples, there will be use of primary and secondary containment.

Sample Preservation & Storage: Samples are retained for a minimum of 10 days after analysis and the remainder is discarded into the municipal landfill dumpster. Sample preservation and storage for restricted samples (RMS) follows the USDA protocol. RMS samples are treated and disposed of in a manner following regulations.

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Reagents: **2.0 M Potassium Chloride (KCl) Solution**: Dissolve 17.0 kg KCl of reagent grade in approximately 115 L of deionized water. Store at ambient temperature and is good for one (1) year.

Nitrate Stock Solution (30ppm): Add 30mL of Nitrate Standard (1000ppm) in 1 L of 2.0 M KCl solution. Store at ambient temperature and is good for six (6) months.

1.0 M Potassium Chloride (KCl) Solution: Measure 1 part 2.0 M KCl Solution to 1 part deionized water and mix. For example, measure 1000 mL 2.0 M KCl into a volumetric flask and transfer to a clean, 4 L glass bottle. Measure 1000 mL of deionized water in the volumetric flask and transfer to the same 4 L glass bottle and mix.

10% Bleach – Mix 1 part bleach to 9 parts deionized water

Safety: Use gloves and wear safety glasses. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

Instruments: N/A

Apparatus: NCR-13, 2.5g scoop

Repipette dispenser, calibrated to 12.5 mL.

Reciprocating mechanical shaker, capable of 160-200 oscillations per minute.

Extraction vessels and associated filtration vessel

Whatman No. 42 or equivalent highly retentive filter paper

Interferences: There are no known interferences

2.0 M KCl Procedure:

1. Add 2.5 g of sample that is indicated on the Nitrate and/or Ammonia scoopsheet(s) into designated extraction vessel.
2. Add 2.5 mL of 30 ppm Nitrate Stock to the second duplicated sample (8th position) and the second blank (10th position) on the last duplicated rack.
3. Add 12.5 mL of 2.0 M KCl extraction solution using the repipette dispenser.
4. Place extraction vessel(s) on reciprocating mechanical shaker for 15 minutes.
5. Filter extract(s). Re-filter if extract is cloudy.
6. Pour sample(s) through manifold into test tube block.
7. Deliver to Wet Chemistry North for analysis.

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1.0 M KCl Procedure:

1. Add 2.5 g of sample that is indicated on the Lubbock Nitrate scoopsheet(s) into designated extraction vessels.
2. Add 12.5 mL of 1.0 M KCl extraction solution using the repipette dispenser.
3. Place extraction vessel(s) on reciprocating mechanical shaker for 15 minutes.
4. Filter extract(s). Re-filter if extract is cloudy.
5. Pour sample(s) through manifold into test tube block.
6. Deliver to Wet Chemistry North for analysis.

RMS Procedure:

1. Place the empty RMS rack next to the regulated soil samples in the metal tray on the RMS table.
2. Add 2.5 g of sample into the extraction vessel using the RMS soil scoop and dowel.
3. Place parafilm/lid over sample(s) and set in secondary container to transfer the cart back to Soils.
4. Add 12.5 mL of 2.0 M KCl extraction solution using the repipette dispenser.
5. Properly cover samples with individual caps or a plastic bag.
6. Place RMS rack(s) on reciprocating mechanical shaker for 15 minutes.
7. Filter extract(s) into medicine cup(s). Re-filter if extract is cloudy.
8. Pour sample(s) from medicine cup(s) into disposable test tube(s).
9. Place parafilm over test tube(s) and place in secondary container to transfer to Wet Chemistry North for analysis.
10. All non-disposable items that encounter RMS soil will be disinfected with 10% bleach for 20 minutes. All disposable items (e.g., filters, medicine cups, parafilm, gloves) will be placed on the RMS table in Soils Receiving to be heat-treated before disposal.

Calculation(s): N/A

Method QC:

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Quality Control Procedures:

1. Each day there will be 17 duplicate samples, one (1) duplicate spike, one (1) blank, and one (1) blank spike.

2. One set of bottle checks will be run at least once per 300 samples (approximately).

3. An LCS will be run every 40 samples.

Method Performance Criteria:

1. There is no data collected with this procedure. This is an extraction procedure.

Out of Control Data:

1. There is no data collected with this procedure. This is an extraction procedure.

MDL: This procedure is not amenable to MDL studies.

Pollution Prevention: Due to the potential exposure of untreated regulated samples to the environment, a comprehensive cleaning/disinfection protocol must be followed. This protocol includes sterilizing or heat treating all sample materials, such as sample scoops, balance plates, beakers, etc., after contact with RMS samples or extracts. In the laboratory, floors, walls, and work areas are amenable to washing with disinfectants such as bleach. If a sample is spilled or dropped, sweep the sample into a hard pan and then heat treat the sample. Clean any area that the spilled sample touched using 10% bleach. This may possibly include walls, floors, and bench tops. Bleach requires saturation of the surface being treated for a minimum period of 20 minutes. Other options are 70% ethanol immersed for at least 30 minutes and disinfectants containing quaternary ammonium compounds per manufacturer's specifications. Discard the bleach solution into the laboratory wastewater system. Since the material is not volatile or airborne, treatment or disinfecting of ceiling areas or HVAC ducts is not needed.

Waste Management: All RMS waste is disposed of in a designated, sealed bin/bag. The waste is then heated in accordance with RC 028 to destroy any potentially regulated organisms. Once it has been treated, the waste can be discarded in the municipal dumpster.

All remaining sterile soil is placed in the municipal dumpster for disposal.

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Determination of Soil EC

Scope/ Application:	This method is applicable to all types of soil.
Purpose:	This procedure describes an accepted method to determine soluble salts by measuring the electrical conductivity of a soil sample.
Summary of Test Method:	Scoop 10 g (1:1) or 5 g (1:2) of soil into a soluble salts rack and add 10 mL of DI water. Shake for 15 minutes. Read EC on Conductivity Meter.
References:	Recommended Chemical Soil Test Procedures for the North Central Region. Revised 2015. NCR-13. SO 049 – EC Meter Calibration
Definitions:	**Electrical Conductivity (EC)** – a measurement of a solution's ability to conduct an electrical current **Siemens per meter (S/m)** – SI unit of electrical conductivity
Technical Notes:	N/A
Sample Preservation & Storage:	Samples are stored at room temperature and retained for a minimum of ten (10) days after analysis. The remainder is disposed into the municipal landfill dumpster.
Reagents:	DI water Conductivity Standard, 1000 µS/cm at 25°C (495 ppm TDS as NaCl)
Safety:	Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.
Instruments:	Thermo Scientific Orion 150 Conductivity Meter Thermo Scientific Orion DuraProbe 4-Electrode Conductivity Probe (013005MD)
Apparatus:	Soluble Salts Rack – one (1) rack contains 20-dram vials NCR-13, 10.0 g scoop Repipette dispenser, calibrated to 10.0 mL Reciprocating mechanical shaker, capable of 160-200 oscillations per minute
Interference:	N/A

EC 1:1 Procedure:

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1. Add 10 g of sample into the designated soluble salts rack.
2. Add 10 mL DI water using the repipette dispenser.
3. Shake the sample for 15 minutes.
3. Verify the EC meter using the 1000 µS/cm conductivity standard.
4. Read the conductivity of the suspension.
5. Rinse the EC probe with DI water in between samples.

EC 1:2 Procedure:

1. Add 5 g of sample into the designated soluble salts rack.
2. Add 10 mL DI water using the repipette dispenser.
3. Shake the sample for 15 minutes.
3. Verify the EC meter using the 1000 µS/cm conductivity standard.
4. Read the conductivity of the suspension.
5. Rinse the EC probe with DI water in between samples.

Calculation(s): N/A

Method QC:

Quality Control Procedures:

1. Verify EC meter daily within the acceptable range of the conductivity standard.
2. One (1) table check every 39 samples.
3. One (1) bottle check approximately every 250 samples.

Method Performance Criteria:

1. Conductivity standard must be within ± 50 µS/cm of 1000 µS/cm (950 µS/cm -1050 µS/cm).
2. EC of the table check must be within the established acceptable range.
3. EC of the bottle check must be within the established acceptable range.

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Out of Control Data:

1. If the conductivity standard is reading out of range, contact laboratory supervisor to calibrate the EC Meter.

2. In the event of an instrument-caused QC failure, stop analysis and determine the cause of the failure and repair the instrument. All samples since the previous acceptable QC sample must be re-analyzed.

MDL: An MDL study is not required for this procedure.

Pollution Prevention: No pollution produced in this method.

Waste Management: Aqueous wastes are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge.

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Mehlich III ICP-AES Extraction

Scope/ Application: This method is applicable to all types of soils.

Purpose: This procedure describes an accepted method to determine levels of Al, B, Ca, Cu, Fe, K, Mg, Mn, Mo, Na, P, S, Zn in a soil sample.

Summary of Test Method: Scoop 2 g of sample into rack and add 20 mL of Mehlich III solution. Shake for five (5) minutes and filter. Re-filter if the filtrate is cloudy. Pour extract into test tube block and give to Metals for analysis.

References: Recommended Chemical Soil Test Procedures for the North Central Region. Revised 2015. NCR-13.

ME 092 – Analysis of Aqueous Extracts by ICP-AES

Definitions: **EDTA:** Ethylenediaminetetraacetic Acid

ICP-AES: Inductively Coupled Plasma-Atomic Emission Spectrometry

LCS: Laboratory Control Sample

Technical Notes: N/A

Sample Preservation & Storage: Samples are stored at room temperature and retained for a minimum of ten (10) days after analysis. The remainder is disposed into the municipal landfill dumpster.

Reagents: Mehlich III, Part A Concentrate: Water, Ammonium Fluoride, and EDTA.

Mehlich III, Part B Concentrate: Water, Ammonium Nitrate, Acetic Acid, and Nitric Acid.

Mehlich III Solution (0.2 N CH_3COOH, 0.25 M NH_4NO_3, 0.015 M NH_4F, 0.013 N HNO_3, 0.001 M EDTA): Fill cylindrical tank to about 1/3 full of DI water. Start mixer and add Mehlich III, Part A Concentrate. Continuously add water and mix solution while adding in Mehlich III, Part B Concentrate. Bring to approximately 50 L final volume. After the solution has mixed for about 20 minutes, check the pH of the solution. The pH should be within 2.5 ± 0.05. If needed, adjust the pH with Nitric Acid or Ammonium Hydroxide.

Safety: Use gloves and wear safety glasses. Normal safety practices and equipment are to be followed when carrying out the method. It is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

Instruments: N/A

Apparatus: NCR-13, 2.0 g scoop

Repipette dispenser, calibrated to 20 mL

Reciprocating mechanical shaker, capable of 160-200 oscillations per minute

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Mehlich Rack – one (1) rack contains 10 dram vials

Whatman No. 42 or equivalent highly retentive filter paper

Interference: N/A

Procedure:

1. Add 2 g of sample that is indicated on the Mehlich ICP scoopsheet(s) into designated extraction vessel.
2. Add 20 mL of Mehlich III solution using the repipette dispenser.
3. Place extraction vessel(s) on reciprocating shaker for 5 minutes.
4. Filter extract(s). Re-filter if extract is cloudy.
5. Transfer sample(s) to test tube block.
6. Deliver samples to Metals for analysis.

Calculation(s): N/A

Method QC:

Quality Control Procedures:

1. Each batch will be run with a reagent blank, method blank, and a duplicate.
2. One (1) LCS per batch or every 30 samples.

Method Performance Criteria:

1. There is no data collected with this procedure. This is an extraction procedure.

Out of Control Data:

1. There is no data collected with this procedure. This is an extraction procedure.

MDL: An MDL study is not required for this procedure.

Pollution Prevention: No pollution produced in this method.

Waste Management: No waste produced in this method.

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Determination of Total Kjeldahl Nitrogen (TKN)

Scope/ Application: This method covers the determination of Total Kjeldahl Nitrogen in manures, sludges, composts, biosolids, filters, food products and other solid or semisolid sample types.

Purpose: To provide direction and information for sample preparation and analyses following a validated method for Total Kjeldahl Nitrogen.

Summary of Test Method: Sample is digested with a copper catalyst and sulfuric acid for approximately 90 minutes at 400 ± 20°C in a digestion block. It is then distilled into Boric Acid receiving solution and titrated with 0.25N H_2SO_4 (sulfuric acid). Results are reported as % or ppm nitrogen.

References: International Association of Official Analytic Chemists (AOAC) 2001.11: Protein (Crude) in Animal Feed, Forage (Plant Tissue), Grain, and Oilseeds - Block Digestion Method Using Copper Catalyst and Steam Distillation into Boric Acid

FO DOC 12 Ankom Protein Determination Procedure-SDF/TDF,IDF

Definitions: **Organic Nitrogen** - Forms of nitrogen that includes proteins, amino acids, amines, nitrogenous bases, and urea. For calculation purposes, organic nitrogen is measured by subtracting the ammonia nitrogen from the TKN.

TKN - Total Kjeldahl Nitrogen

LCS – Laboratory Control Sample – Known or certified value used to monitor accuracy

SRS- Secondary Resource Standard-A standard whose primary standard is a different original material than the primary standard of the calibrants.

Batch - samples that are extracted and analyzed as a set. The acceptance of the batch is based on a review of the Quality Control samples analyzed in conjunction with the set of samples. For this Procedure, a batch consists of up to twenty (20) samples, four (4) of which are QC samples.

Technical Notes: N/A

Sample Preservation & Storage: Samples are not kept cool until they are retained. There are no regulatory requirements for sample preservation, containers, or holding times. Original samples are retained for at least thirty (30) days after the final report is generated. When samples are finally disposed, they are placed into a solid waste dumpster that is removed by a licensed waste disposal company with final disposal in a licensed municipal landfill.

Reagents: **ALL REAGENTS ARE ACS REAGENT GRADE OR BETTER**

Ammonium Chloride (NH_4Cl) Stock Solution: (1000 ppm) (SRS) - 1 mL = 1 mg NH_3·N. Dissolve 3.819 g NH_4Cl in deionized water and bring to volume in a 1 L volumetric flask. Preserve with 1 mL H_2SO_4. Good for six (6) months or until the most imminent expiration date of a parent chemical(s), whichever occurs first. Store at room temperature.

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Catalyst: Alfie Packer TT-57 ProPac™ tablets or equivalent. Store at room temperature for up to five (5) years or the expiration date provided by the manufacturer, whichever occurs first.

Sulfuric Acid (H2SO4) Titrant: 0.02 N used for low level samples and 0.25 N used for high level samples. Store according to the conditions specified by the manufacturer. Reagent is good for three (3) years, or the expiration date specified by the manufacturer of the parent chemical(s), whichever occurs first.

40% Sodium Hydroxide (NaOH): Purchased certified lot. Store according to the conditions specified by the manufacturer. Reagent is good for three (3) years, or the expiration date specified by the manufacturer, whichever occurs first.

Boric Acid Buffer Receiving Solution: Add 0.40 g of Bromocresol Green, 0.40 g of Methyl Red, 400 g of Boric Acid, and 80 mL of 0.10 N NaOH to a 35 L of DI water. Dissolve reagents and fill to 40 L final volume with DI. Pour the solution into the receiving solution reservoir below the instrument. Reagent can be stored at ambient conditions and is good for one (1) year or until the most imminent expiration date of a parent chemical(s), whichever occurs first.

Concentrated Sulfuric Acid (H_2SO_4) – Purchased concentrated certified lot. Store according to the conditions specified by the manufacturer. Reagent is good for three (3) years or the expiration date specified by the manufacturer, whichever occurs first.

0.1 N Sodium Hydroxide (NaOH) Solution: Reagent can be stored at ambient conditions and is good for three (3) years or the expiration date specified by the manufacturer, whichever occurs first.

Diatomaceous Earth: Purchased blank. Store according to the conditions specified by the manufacturer. Good for five (5) years or until the expiration date specified by the manufacturer, whichever occurs first.

Safety: Sulfuric acid is caustic. Carry out digest in the hood with aspirator and scrubber connected. Normal safety practices and equipment are to be followed when carrying out the method. There are few reagents used in the method and it is the responsibility of the analyst to be aware of the information contained in the Safety Data Sheets (SDS) for chemicals/reagents used in the method.

SPECIAL NOTE: Use caution, when adding concentrated sulfuric acid to the samples. Samples with very high pH or solid lime samples may react violently and result in severe injury to the analyst.

Instruments: Foss Tecator Model# Kjeltec 8400 Auto-Distillation unit or equivalent

Apparatus: Tecator Digestor 2520 and Aspirator or equivalent

Digest Tubes – 250 mL (20 per rack)

Analytical balance sensitive to 0.001 g

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Interferences: The digestion process eliminates of most interference; however, samples with extremely high organic matter present may need sample size reduced to enable complete digestion.

Procedure:

1. Pre-heat digestion block at 400 ± 20°C.

2. Homogenize sample and weigh 0.5 to 10.0 g of sample into digestion tubes. Use less sample if TKN value is expected to be greater than 1%.

3. Add 1 ProPac tab to each digestion tube. **For all Foods samples subsequently analyzed by WC 048, add 2 Pro Pac tablets to each digestion tube.** Treat with antifoam.

4. Add 20 mL of concentrated H_2SO_4 into each digestion tube and place in pre-heated digestion block located in fume hood. **All Foods samples subsequently analyzed by WC 048, add 20 ml of concentrated H_2SO_4 into each digestion tube and place in pre-heated digestion block located in fume hood. For Foods samples coming from the FO 027 Dietary Fiber method, add 27 ml of concentrated H_2SO_4 into each digestion tube and place in pre-heated digestion block located in fume hood.**

   Safety Notice: If adding acid to lime samples or samples with pH >10, use extreme caution by diluting acid with DI and adding acid slowly.

5. Immediately set up vacuum system and place exhaust manifold and scrubber assembly on digestion tubes.

6. Digest samples for approximately 90 minutes.

7. Take samples out of digestion block and allow them to cool. Leave the exhaust manifold in place for at least 15 minutes.

8. Turn off exhaust for vacuum and remove exhaust manifold.

9. Allow samples to cool to room temperature. Add approximately 80 mL of DI water.

10. Place sample on blanked auto distillation unit and analyze using "Kjeldahl 3" program. This ensures the instrument will add a sufficient amount of sodium hydroxide to the sample. Record data in mg N/g.

11. When analysis is complete, pour contents of tube down sink. Run water to dilute.

    Digestion tube is extremely hot: use caution when handling.

Calculation(s): $$\% \text{ Nitrogen} = \frac{(\text{mg N/g})}{\text{Sample Weight (g)}}$$

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Method QC:

Quality Control Procedures:

1. Quality Control includes one (1) blank, one (1) LCS, one (1) duplicate, and one (1) SRS per batch.

Method Performance Criteria:

1. Recovery of LCS must be within ±3 standard deviations as determined by the most recent LCS characterization.

2. Recovery of SRS must fall within ± 10% of the established value.

3. Duplicate RPD must be less than 10%. RPD >10% is acceptable if sample results are within 10X the reporting limit.

4. Blank level must be less than method reporting limit of 0.005 % N.

5. Refer to procedure FO 075 for Quality Control Procedures, and Method Performance Criteria for all Food samples.

Out of Control Data:

1. In the event of an instrument-caused QC failure, stop analysis and determine the cause of the failure and repair the instrument. All, samples since the previous acceptable QC sample must be re-analyzed. If samples cannot be re-analyzed, the report to the client must reflect the QC failure and an Out of Specification (OOS) investigation must be completed.

2. If the sample duplicate is an unacceptable precision (% RPD exceeds control limits), the sample will be observed to determine if the sample is homogenous. The sample and duplicate can be re- ground to obtain a homogenous matrix and the sample re-analyzed. The batch will not be failed if the precision is outside the acceptable range.

3. If the batch QC has recovery levels of the Blank/LCS/SRS outside acceptable ranges, the affected QC will be re-analyzed. If on the second analysis, the QC is found to be acceptable, the batch QC is approved. If the re-analysis of the LCS is still outside the acceptable range, analysis is stopped, and the failed accuracy result communicated to the department supervisor. The cause for the failure is determined and corrected before subsequent analyses take place. All samples since the previous acceptable QC are re-analyzed unless it is not possible to reanalyze the samples. If it is not possible to re-run the samples, an OOS Checklist must also be completed to document the LCS failure.

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MDL:	This procedure is not amenable to MDL studies.
Pollution Prevention:	Pro-Pac tablets used to do not contain mercury. Nesslerization has been phased out.
Waste Management:	Digested samples can be emptied into the chemical drain when analysis is complete. Aqueous wastes are emptied into the laboratory wastewater system which empties into a neutralization tank. The neutralization tank, in turn, empties into the City of Omaha's wastewater system that empties into the municipal wastewater system where the water is treated prior to discharge.

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ATTACHMENT TR-16

Effluent Monitoring Data

LLAS

Date	30 day average Flow (MG)	BOD mg/l	TSS mg/l	pH	Chlorine Residual	Total Acres Irrigated
March 2023	5.55	48	34	7.63	n/a	1483
April 2023	6.37	36	19	7.71	n/a	1507
May 2023	5.50	37	39	7.69	n/a	1847
June 2023	3.53	67	90	7.90	n/a	645
July 2023	4.18	50	29	7.92	n/a	531
August 2023	3.38	59	29	7.92	n/a	205
September 2023	4.92	63	36	7.93	n/a	1516
October 2023	4.84	65	104	7.94	n/a	1621
November 2023	3.46	46	49	7.60	n/a	1429
December 2023	3.11	49	87	7.48	n/a	1410
January 2024	4.53	54	73	7.53	n/a	1524
February 2024	7.62	55	55	7.51	n/a	1790
March 2024	3.84	33	32	7.41	n/a	1524

HLAS

Date	30 day average Flow (MG)	BOD mg/l	TSS mg/l	pH	Chlorine Residual	Total Acres Irrigated
March 2023	4.24	48	36	7.63	n/a	1946
April 2023	4.06	34	18	7.71	n/a	2141
May 2023	3.50	35	38	7.69	n/a	2007
June 2023	4.00	67	94	7.90	n/a	1459
July 2023	3.15	50	29	7.92	n/a	2172
August 2023	4.02	59	29	7.92	n/a	2087
September 2023	4.59	63	36	7.93	n/a	872
October 2023	6.17	65	104	7.94	n/a	305
November 2023	6.07	46	49	7.60	n/a	1003
December 2023	5.12	49	87	7.48	n/a	1877
January 2024	5.60	54	73	7.53	n/a	1288
February 2024	4.90	55	55	7.51	n/a	1619
March 2024	5.14	33	33	7.41	n/a	2043

ATTACHMENT TR-17

Water Balance and Storage Volume Calculations

Water Balance, Nitrogen Balance and Storage Volume Calculations

The objective of the water balance model is to provide a tool for managing the land application of effluent at the Lubbock Land Application Site (LLAS) and the Hancock Land Application Site (HLAS). The water balance model is a series of Microsoft ® Excel spreadsheets that are linked together to form a comprehensive representation of the land application system at the LLAS and HLAS. The model is set up on a weekly basis in order to provide City of Lubbock (COL) personnel with timely recommendations for effluent applications.

Weekly data provides a clearer picture of the actual situation encountered on a day-to-day basis by those responsible for managing the system.
The water balance model is preferable for this situation because it performs a balance that accounts for both the water and nitrogen needs of the crops on a plot-by-plot basis on each of the 28 plots owned by COL (designated by numbers 1-35) at the LLAS, 7 plots owned by others (designated by letters A-G) and 22 plots owned by COL (designated by numbers 1-22) at the HLAS.

The water balance also accounts for climatic conditions that may prohibit land application events.

The water balance is organized into three tiers: Tier 1) Lubbock Southeast Water Reclamation Plant (SEWRP) (includes flow to the Lubbock and Hancock Reservoirs) Tier 2) Lubbock and Hancock Reservoirs (includes a summary of the reservoir levels and remaining storage volume available) and Tier 3) Individual Plots (includes nitrogen and water balances for each plot).

COL will continue to prepare annual cropping plans and weekly irrigation schedules that meet the requirements of the projected average daily flow of effluent for a given cropping year. COL will use any combination of the crops listed below as long as the leffluent is used efficiently and effectively.

Sample crop water and nitrogen requirements for several crops at the LLAS are listed in Table 1.

Table 1. Sample crop water and nitrogen requirements (LLAS Plot 1, based on historical data).

Crops	Leaching Requirement (in/ac/yr)	ET - Infiltrated Rainfall (in/ac/yr)	Water Requirement (in/ac/yr)	Nitrogen Requirement (lb/ac/yr)	Effluent Application (in/ac/yr)	Limiting Factor
Alfalfa	18.40	21.47	39.87	200	39.87	Water
Wheat or Triticale / Hay Grazer Rotation	31.61	42.82	74.43	220	39.28	Nitrogen
Ryegrass or San Jose Wheatgrass	18.39	21.45	39.84	140	26.50	Nitrogen
Sorghum / Wheat Rotation	33.98	33.79	67.77	190	38.85	Nitrogen
Corn / Wheat Rotation	77.68	47.64	125.32	320	60.00*	Physical Limit
Cotton / Wheat Rotation	25.65	33.50	59.15	190	36.52	Nitrogen

* The maximum target effluent application at the LLAS is 60 in/ac/yr due to physical limitations unrelated to the crops' ability to uptake water and nitrogen. However, applications in excess of 60 in/yr may be made if crop nitrogen and water requirements exceed 60 in/yr and ponding and runoff would not occur due to additional applications. Physical limitations include routine maintenance of pivots, management of plots, pivot mechanical failures and pivot flow rate limitations during peak demand periods.

The water requirement (leaching + evapotranspiration (ET) - infiltrated rainfall) and the nitrogen requirement are compared on a weekly basis and effluent applications are made according to the limiting factor. Table 1 shows that effluent applications to alfalfa on Plot 1 are limited by water (effluent application = water requirement) while effluent applications to all other crops except the corn/wheat rotation are limited by nitrogen (effluent application < water requirement). The corn/wheat rotation is limited by physical factors unrelated to the crops' ability to uptake water and nitrogen. These factors include routine maintenance of pivots, management of plots, pivot mechanical failures, and pivot flow rate limitations during peak demand periods.

The primary method of application at the LLAS is center pivot irrigation on approximately 2,600 acres of land owned by the City of Lubbock. The LLAS has approximately 900 acres of permitted land owned by others bringing the total permitted acreage at the LLAS to approximately 3,500 acres. There is additional acreage (pivot corners) available for row irrigation. If the additional acreage is brought on-line, the flow to the LLAS may need to be increased. In order to increase the efficiency of this operation, subsurface irrigation via drip irrigation may be used to replace row irrigation. Manufacturer information related to drip irrigation has been provided with this attachment.

Typical crop water and nitrogen requirements for several crops at the HLAS are listed in Table 2.

Table 2. Sample crop water and nitrogen requirements (HLAS Plot 1, based on historical data).

Crops	Leaching Requirement (in/ac/yr)	ET - Infiltrated Rainfall (in/ac/yr)	Water Requirement (in/ac/yr)	Nitrogen Requirement (lb/ac/yr)	Effluent Application (in/ac/yr)	Limiting Factor
Alfalfa	21.85	21.47	43.32	200	43.32	Water
Wheat or Triticale / Hay Grazer Rotation	37.51	42.82	80.33	220	60.00*	Physical Limit
Ryegrass or San Jose Wheatgrass	21.84	21.45	43.29	140	43.29	Water
Sorghum / Wheat Rotation	43.04	33.79	76.83	190	60.00*	Physical Limit
Corn / Wheat Rotation	113.53	47.64	161.17	320	60.00*	Physical Limit
Cotton / Wheat Rotation	30.84	33.50	64.34	190	60.00*	Physical Limit

* The maximum target effluent application at the HLAS is 60 in/ac/yr. It is unlikely that applications in excess of 60 in/ac/yr could be made at the HLAS due to physical factors unrelated to the crops' ability to uptake water and nitrogen. However, applications in excess of 60 in/yr may be made if crop nitrogen and water requirements exceed 60 in/yr and ponding and runoff would not occur due to additional applications. Physical limitations include routine maintenance of pivots, management of plots, pivot mechanical failures, pivot flow rate limitations during peak demand periods and infiltration rate limitations.

Table 2 shows that effluent applications to alfalfa, ryegrass and wheatgrass on Plot 1 are limited by water (effluent application = water requirement) while effluent applications to all other crops are limited by physical factors unrelated to the crops' ability to uptake water or nitrogen (effluent application < water requirement). These factors include routine maintenance of pivots, management of plots, pivot mechanical failures, pivot flow rate limitations during peak demand periods, and infiltration rate limitations.

When applying the crop water requirements listed in Tables 1 and 2, the irrigation efficiency will be considered because no irrigation system is 100% efficient. For example, the target effluent application for a wheat/haygrazer rotation on LLAS Plot 1 is 39.28 in/ac/yr (Table 1). Since center-pivot irrigation has an efficiency of 85%, the amount that would be required to be pumped to the pivot is 46.2 in/ac/yr (39.28 in/ac/yr ÷ 0.85). The water requirements and nitrogen requirements will vary from year to year due to climatic factors, residual soil nitrogen, effluent nitrogen, effluent electrical conductivity, harvesting methods, crop yields, etc. Application rates will, therefore, be based on the water balance model.

The primary method of application at the HLAS is center pivot irrigation on approximately 2,178 acres. The HLAS also has approximately 1,100 acres of land available for row irrigation. If the additional acreage is brought on-line, the flow to the HLAS may need to be increased. In order to increase the efficiency of this operation, subsurface irrigation via drip irrigation may be used to replace row irrigation. Manufacturer information related to drip irrigation has been provided with this attachment.

1.0 Data Utilized

Data is collected on a daily basis by COL personnel. Data entry and transmittal is accomplished via an electronic data spreadsheet that is updated each week by COL.

1.1 Effluent Application Data

Actual daily effluent application data is measured by COL. A sample portion of the effluent application data entry spreadsheet is provided as Table 3. Application events are entered on the day they are completed. All data sheets and water balance model spreadsheets presented are examples that contain realistic data but may not contain representative data. Ideal effluent application rates are computed based on weekly crop water and nitrogen requirements according to the water balance model.

1.2 Weather Data

Daily rainfall data is obtained from on-site rain gauges at the LLAS and HLAS. Daily potential evapotranspiration (PET) data is obtained from the Texas Agricultural Experiment Station (TAES) in Lubbock (http://amarillo2.tamu.edu/nppet/data/new/lubbock/dailyfax/) for the Lubbock weather station. The Slaton weather station has been used in the past to obtain HLAS PET data. However, the Slaton weather station is no longer operational. If this station becomes operational in the future, COL will utilize the data for the HLAS. Historic average lake evaporation data was obtained from the Texas Water Development Board (TWDB).

1.3 Crop Data

The crop portion of the model contains the following parameters: crop species, crop nitrogen requirement, crop growth curves and crop coefficients to determine crop evapotranspiration (ET), and the crop salinity tolerance (i.e. maximum EC) to determine the leaching requirement. Cropping scenarios are obtained from COL and incorporated into the model. The crop nitrogen requirement and small grain and row crop growth curves were obtained from various TAES publications. Grass and alfalfa growth curves were obtained from an OSU Extension publication (as recommended by Mr. Leon New, TAES-Amarillo, TX). Crop coefficients for sorghum, wheat, corn and cotton were obtained from TAES data for the Texas High Plains. Crop coefficients for grasses and alfalfa were obtained from Food and Agriculture Organization (FAO) 56-Crop Evapotranspiration as recommended by Dr. Terry Howell (USDA-ARS-Conservation & Production Research Laboratory-Bushland, TX).

Table 3. Example Portion of Effluent Application Data Sheet

Date	Day	Lubbock Land Application Plots									
		1	2	3	4	5	6	7	8	9	10
10/1/2017	1										
10/2/2017	2										
10/3/2017	3										
10/4/2017	4										
10/5/2017	5										
10/6/2017	6										
10/7/2017	7										
10/8/2017	8										
10/9/2017	9										
10/10/2017	10										
10/11/2017	11										
10/12/2017	12										
10/13/2017	13	1,945,200			1,684,500				1,868,400		
10/14/2017	14										
10/15/2017	15										
10/16/2017	16										
10/17/2017	17										
10/18/2017	18										
10/19/2017	19								2,763,900		
10/20/2017	20					873,500	1,104,500				1,071,500
10/21/2017	21										
10/22/2017	22										
10/23/2017	23		2,428,600	2,627,300						3,139,300	
10/24/2017	24										
10/25/2017	25	2,056,300					1,557,700				894,400
10/26/2017	26										
10/27/2017	27		1,919,300		2,209,700	788,300					
10/28/2017	28										
10/29/2017	29										
10/30/2017	30										
10/31/2017	31										

1.4 Effluent Samples

Effluent samples are collected by COL on a weekly basis. Effluent analysis data (TKN, NH_3-N, NO_3-N, Electrical Conductivity) from the Lubbock and Hancock Reservoirs are utilized to determine the amount of plant available nitrogen (PAN) in the effluent. PAN is calculated using Equation 1, included below. The electrical conductivity data are used to calculate the leaching requirement. A sample portion of the effluent analyses data entry spreadsheet is provided as Table 4.

Equation 1: Plant Available Nitrogen (PAN)
Source: USEPA, 1983. Process Design Manual-Land Application of Municipal Sludge.

$$PAN\ (ppm) = MR \times (TKN - NH_3\text{-}N) + (1 - VR) \times NH_3\text{-}N + NO_3\text{-}N$$

Where, TKN, NH_3-N, NO_3-N units are ppm
MR (Mineralization Rate) = 0.2
VR (Volatilization Rate) = 0.4

1.5 Soils Data

Soil samples are collected by COL on an annual basis. The results of the analyses are used to calculate the residual soil nitrogen. Each soil type is classified in a particular hydrologic soil group (LLAS: Lubbock County Soil Survey; HLAS: Lynn County Geographic Soils Information). The hydrologic soil group designation is used in the determination of runoff.

1.6 Pumping Data and Reservoir Level Data

Daily volumes of effluent pumped from the SEWRP to the Lubbock and Hancock Reservoirs are measured by COL. Daily liquid levels for the Lubbock and Hancock Reservoirs are also measured by COL. A sample portion of the pumping data entry spreadsheet is included as Table 5. A sample portion of the reservoir level data entry spreadsheet is included as Table 6.

Table 4. Example Portion of Effluent Analyses Data Sheet

Date	Hancock Summary (Average)						Lubbock Reservoir					
	EC (microS/cm)	TKN (ppm)	NH3-N (ppm)	NO3-N (ppm)	PAN (ppm)	PAN (lb/gal)	EC (microS/cm)	TKN (ppm)	NH3-N (ppm)	NO3-N (ppm)	PAN (ppm)	PAN (lb/gal)
10/1/2017	1870	3.46	1.02	0.30	1.40	1.17E-05	1765	3.86	0.64	9.42	10.45	8.72E-05
10/2/2017	1870	3.46	1.02	0.30	1.40	1.17E-05	1765	3.86	0.64	9.42	10.45	8.72E-05
10/3/2017	1870	3.46	1.02	0.30	1.40	1.17E-05	1765	3.86	0.64	9.42	10.45	8.72E-05
10/4/2017	1876	2.13	0.42	3.37	3.97	3.31E-05	1686	1.61	0.73	5.01	5.62	4.70E-05
10/5/2017	1876	2.13	0.42	3.37	3.97	3.31E-05	1686	1.61	0.73	5.01	5.62	4.70E-05
10/6/2017	1876	2.13	0.42	3.37	3.97	3.31E-05	1686	1.61	0.73	5.01	5.62	4.70E-05
10/7/2017	1876	2.13	0.42	3.37	3.97	3.31E-05	1686	1.61	0.73	5.01	5.62	4.70E-05
10/8/2017	1876	2.13	0.42	3.37	3.97	3.31E-05	1686	1.61	0.73	5.01	5.62	4.70E-05
10/9/2017	1876	2.13	0.42	3.37	3.97	3.31E-05	1686	1.61	0.73	5.01	5.62	4.70E-05
10/10/2017	1876	2.13	0.37	3.37	3.94	3.29E-05	1686	1.61	0.73	5.01	5.62	4.70E-05
10/11/2017	1831	2.58	0.27	3.23	3.85	3.22E-05	1796	1.29	0.58	4.43	4.92	4.11E-05
10/12/2017	1831	2.58	0.27	3.23	3.85	3.22E-05	1796	1.29	0.58	4.43	4.92	4.11E-05
10/13/2017	1831	2.58	0.27	3.23	3.85	3.22E-05	1796	1.29	0.58	4.43	4.92	4.11E-05
10/14/2017	1831	2.58	0.27	3.23	3.85	3.22E-05	1796	1.29	0.58	4.43	4.92	4.11E-05
10/15/2017	1831	2.58	0.27	3.23	3.85	3.22E-05	1796	1.29	0.58	4.43	4.92	4.11E-05
10/16/2017	1831	2.58	0.26	3.23	3.85	3.22E-05	1796	1.29	0.58	4.43	4.92	4.11E-05
10/17/2017	1831	2.58	0.26	3.23	3.85	3.22E-05	1796	1.29	0.58	4.43	4.92	4.11E-05
10/18/2017	1876	2.87	0.49	4.58	5.35	4.47E-05	1779	1.45	0.35	9.86	10.29	8.59E-05
10/19/2017	1876	2.87	0.49	4.58	5.35	4.47E-05	1779	1.45	0.35	9.86	10.29	8.59E-05
10/20/2017	1876	2.87	0.49	4.58	5.35	4.47E-05	1779	1.45	0.35	9.86	10.29	8.59E-05
10/21/2017	1876	2.87	0.49	4.58	5.35	4.47E-05	1779	1.45	0.35	9.86	10.29	8.59E-05
10/22/2017	1876	2.87	0.49	4.58	5.35	4.47E-05	1779	1.45	0.35	9.86	10.29	8.59E-05
10/23/2017	1876	2.87	0.50	4.58	5.35	4.47E-05	1779	1.45	0.35	9.86	10.29	8.59E-05
10/24/2017	1876	2.87	0.50	4.58	5.35	4.47E-05	1779	1.45	0.35	9.86	10.29	8.59E-05
10/25/2017	1886	2.73	0.79	4.27	5.13	4.28E-05	1818	1.77	0.59	10.80	11.39	9.51E-05
10/26/2017	1886	2.73	0.79	4.27	5.13	4.28E-05	1818	1.77	0.59	10.80	11.39	9.51E-05
10/27/2017	1886	2.73	0.79	4.27	5.13	4.28E-05	1818	1.77	0.59	10.80	11.39	9.51E-05
10/28/2017	1886	2.73	0.79	4.27	5.13	4.28E-05	1818	1.77	0.59	10.80	11.39	9.51E-05
10/29/2017	1886	2.73	0.79	4.27	5.13	4.28E-05	1818	1.77	0.59	10.80	11.39	9.51E-05
10/30/2017	1886	2.73	0.79	4.27	5.13	4.29E-05	1818	1.77	0.59	10.80	11.39	9.51E-05
10/31/2017	1886	2.73	0.79	4.27	5.13	4.29E-05	1818	1.77	0.59	10.80	11.39	9.51E-05

Table 5. Example Portion of Pumping Data Sheet

Date	Day	Flow Data					
		Xcel Energy (gal)	Discharge (gal)	Discharge 007 (gal)	LLAS (gal)	HLAS (gal)	WWTP Outflow (gal)
10/1/2017	1	0	4,890,000	5,450,000	5,210,000	4,940,000	20,490,000
10/2/2017	2	0	5,210,000	5,240,000	4,920,000	5,500,000	20,870,000
10/3/2017	3	630,000	4,530,000	6,140,000	6,410,000	6,190,000	23,900,000
10/4/2017	4	1,850,000	2,350,000	4,740,000	5,580,000	6,200,000	20,720,000
10/5/2017	5	1,410,000	3,160,000	5,250,000	5,320,000	5,580,000	20,720,000
10/6/2017	6	1,800,000	2,970,000	6,190,000	5,560,000	4,820,000	21,340,000
10/7/2017	7	1,150,000	3,850,000	5,840,000	5,330,000	4,180,000	20,350,000
10/8/2017	8	1,210,000	3,830,000	4,850,000	5,350,000	4,180,000	19,420,000
10/9/2017	9	1,190,000	3,280,000	5,720,000	5,720,000	4,560,000	20,470,000
10/10/2017	10	0	4,200,000	5,660,000	5,020,000	4,780,000	19,660,000
10/11/2017	11	0	5,490,000	4,560,000	5,670,000	4,490,000	20,210,000
10/12/2017	12	1,380,000	4,110,000	4,930,000	5,450,000	4,090,000	19,960,000
10/13/2017	13	1,320,000	4,130,000	4,360,000	5,770,000	4,950,000	20,530,000
10/14/2017	14	0	5,950,000	5,020,000	4,960,000	4,990,000	20,920,000
10/15/2017	15	0	5,490,000	4,950,000	5,270,000	4,890,000	20,600,000
10/16/2017	16	0	4,910,000	6,520,000	4,850,000	4,820,000	21,100,000
10/17/2017	17	0	5,170,000	5,590,000	5,090,000	4,590,000	20,440,000
10/18/2017	18	0	5,390,000	5,500,000	5,260,000	4,600,000	20,750,000
10/19/2017	19	0	5,700,000	4,630,000	5,940,000	4,830,000	21,100,000
10/20/2017	20	0	5,470,000	5,080,000	5,560,000	4,770,000	20,880,000
10/21/2017	21	0	5,440,000	5,590,000	5,340,000	4,860,000	21,230,000
10/22/2017	22	0	4,520,000	4,870,000	5,400,000	4,720,000	19,510,000
10/23/2017	23	1,300,000	2,210,000	5,900,000	6,050,000	4,540,000	20,000,000
10/24/2017	24	230,000	3,740,000	5,010,000	5,660,000	4,410,000	19,050,000
10/25/2017	25	790,000	3,890,000	5,120,000	4,940,000	4,180,000	18,920,000
10/26/2017	26	0	5,570,000	4,620,000	5,860,000	4,310,000	20,360,000
10/27/2017	27	0	5,160,000	4,920,000	5,220,000	4,890,000	20,190,000
10/28/2017	28	0	5,350,000	6,000,000	4,610,000	4,780,000	20,740,000
10/29/2017	29	0	5,320,000	5,230,000	4,460,000	4,910,000	19,920,000
10/30/2017	30	0	5,940,000	4,950,000	4,670,000	5,390,000	20,950,000
10/31/2017	31	0	5,850,000	5,070,000	4,730,000	4,450,000	20,100,000

Table 6. Example Portion of Reservoir Liquid Level Data Sheet

Date	Day	LLAS Reservoir Liquid Levels and Volumes			HLAS Reservoir 1 Liquid Levels and Volumes		
		Liquid Level (ft)	Volume in Reservoir (gal)	Remaining Storage Volume (gal)	Liquid Level (ft)	Volume in Reservoir (gal)	Remaining Storage Volume (gal)
10/1/2017	1	14	140,415,881	260,114,956	6	143,723,664	243,570,732
10/2/2017	2	14.5	146,549,219	253,981,618	6	143,723,664	243,570,732
10/3/2017	3	14.5	146,549,219	253,981,618	6	143,723,664	243,570,732
10/4/2017	4	15	152,718,671	247,812,166	6	143,723,664	243,570,732
10/5/2017	5	15.5	158,924,434	241,606,403	6	143,723,664	243,570,732
10/6/2017	6	15.5	158,924,434	241,606,403	6	143,723,664	243,570,732
10/7/2017	7	16	165,166,705	235,364,132	6	143,723,664	243,570,732
10/8/2017	8	16.5	171,445,680	229,085,157	6	143,723,664	243,570,732
10/9/2017	9	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/10/2017	10	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/11/2017	11	17.5	184,114,530	216,416,307	6	143,723,664	243,570,732
10/12/2017	12	17.5	184,114,530	216,416,307	6	143,723,664	243,570,732
10/13/2017	13	17.5	184,114,530	216,416,307	6	143,723,664	243,570,732
10/14/2017	14	17.5	184,114,530	216,416,307	6	143,723,664	243,570,732
10/15/2017	15	17.5	184,114,530	216,416,307	6	143,723,664	243,570,732
10/16/2017	16	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/17/2017	17	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/18/2017	18	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/19/2017	19	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/20/2017	20	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/21/2017	21	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/22/2017	22	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/23/2017	23	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/24/2017	24	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/25/2017	25	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/26/2017	26	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/27/2017	27	16.5	171,445,680	229,085,157	6	143,723,664	243,570,732
10/28/2017	28	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/29/2017	29	17	177,761,556	222,769,281	6	143,723,664	243,570,732
10/30/2017	30	17.5	184,114,530	216,416,307	6	143,723,664	243,570,732
10/31/2017	31	18	190,504,799	210,026,038	6	143,723,664	243,570,732

2.0 Description of Water Balance Model

The data described in the preceding section is utilized to create a three-tiered water balance model detailing effluent flow from the SEWRP to the Lubbock and Hancock Reservoirs, and from the reservoirs to the individual plots.

2.1 Tier 3 (Plots)

The model is organized at the foundational level by plot. Rainfall, soil type and crop type drive the calculations for runoff, ET, leaching, effluent needed in the root zone and nitrogen requirement. Runoff, ET, leaching requirement, and nitrogen requirement are calculated by crop type. A sample crop spreadsheet is included as Table 7 for wheat and triticale. Equations used to calculate runoff (Equation 2), ET (Equation 3), and leaching (Equation 4) are included below.

Equation 2: Runoff Method--SCS Runoff Curve Number Method (TCEQ Method)
Source: Urban Hydrology for Small Watersheds, USDA-NRCS TR-55, June 1986.

$$Q = \frac{(P-I_a)^2}{(P-I_a) + S}$$

*If P < 1.6 in., Q = 0 for Hydrologic Soil Group (HSG) B planted in pasture
*If P < 1.0 in., Q = 0 for HSG C planted in pasture
*If P < 0.9 in., Q = 0 for HSG B planted in small grain
*If P < 0.8 in., Q = 0 for HSG B planted in row crops
*If P < 0.6 in., Q = 0 for HSG C planted in row crops or small grain

Where,
Q = runoff (in)
P = rainfall (in)
S = potential maximum retention after runoff begins
I_a = initial abstraction (in.) *All loses before runoff begins.*

$$I_a = 0.2 \times S$$

$$S = 1000/CN - 10$$

Where, CN = curve number (function of crop and hydrologic soil group)

Equation 3: Evapotranspiration Method--Potential Evapotranspiration x Crop Coefficient
Source: Crop Evapotranspiration, FAO No. 56

$$ET = PET \times Kc$$

Where,
ET = Evapotranspiration (in)
PET = Potential Evapotranspiration (in)
Kc = Crop Coefficient (based on growth stage of specific crop species)

Table 7. ET, Runoff, Leaching Requirement, Nitrogen Requirement (Wheat and Triticale)

		Crop	Wheat & Triticale							
Year	Week	Rainfall	ET [1]	Runoff (HSG[2]: B)	Runoff (HSG[2]: C)	Leaching Requirement (HSG[2]: B)	Leaching Requirement (HSG[2]: C)	Nitrogen Requirement	kc[3]	kc(%)
2017	1	1.00	0.43	0.04	0.15	0.00	0.00	1.05	0.35	0.010526
2017	2	0.00	0.38	0.00	0.00	0.13	0.13	1.20	0.4	0.01203
2017	3	0.00	0.43	0.00	0.00	0.15	0.15	1.35	0.45	0.013534
2017	4	0.00	0.47	0.00	0.00	0.17	0.17	1.50	0.5	0.015038
2017	5	0.00	0.36	0.00	0.00	0.13	0.13	1.65	0.55	0.016541
2017	6	0.00	0.37	0.00	0.00	0.13	0.13	1.80	0.6	0.018045
2017	7	0.00	0.40	0.00	0.00	0.14	0.14	1.95	0.65	0.019549
2017	8	0.00	0.43	0.00	0.00	0.15	0.15	2.11	0.7	0.021053
2017	9	0.00	0.42	0.00	0.00	0.16	0.16	2.26	0.75	0.022556
2017	10	0.00	0.42	0.00	0.00	0.15	0.15	2.41	0.8	0.02406
2017	11	0.00	0.45	0.00	0.00	0.16	0.16	2.56	0.85	0.025564
2017	12	0.00	0.47	0.00	0.00	0.17	0.17	2.71	0.9	0.027068
2018	13	0.00	0.50	0.00	0.00	0.18	0.18	2.86	0.95	0.028571
2018	14	0.00	0.53	0.00	0.00	0.20	0.20	3.01	1	0.030075
2018	15	0.00	0.60	0.00	0.00	0.21	0.21	3.38	1.125	0.033835
2018	16	0.00	0.66	0.00	0.00	0.24	0.24	3.76	1.25	0.037594
2018	17	0.00	0.67	0.00	0.00	0.24	0.24	3.79	1.2607	0.037916
2018	18	0.00	0.79	0.00	0.00	0.30	0.30	3.82	1.2714	0.038238
2018	19	0.00	0.84	0.00	0.00	0.30	0.30	3.86	1.2821	0.038561
2018	20	0.00	0.85	0.00	0.00	0.30	0.30	3.89	1.2929	0.038883
2018	21	0.00	0.86	0.00	0.00	0.29	0.29	3.92	1.3036	0.039205
2018	22	0.00	1.18	0.00	0.00	0.42	0.42	3.95	1.3143	0.039527
2018	23	0.00	1.32	0.00	0.00	0.46	0.46	3.98	1.325	0.03985
2018	24	0.00	1.33	0.00	0.00	0.47	0.47	4.02	1.3357	0.040172
2018	25	0.00	1.34	0.00	0.00	0.49	0.49	4.05	1.3464	0.040494
2018	26	1.20	1.47	0.09	0.25	0.14	0.20	4.08	1.3571	0.040816
2018	27	0.00	1.76	0.00	0.00	0.55	0.55	4.11	1.3679	0.041139
2018	28	0.00	1.78	0.00	0.00	0.62	0.62	4.15	1.3786	0.041461
2018	29	0.00	1.79	0.00	0.00	0.70	0.70	4.18	1.3893	0.041783
2018	30	0.00	1.81	0.00	0.00	0.70	0.70	4.21	1.4	0.042105
2018	31	0.00	1.75	0.00	0.00	0.67	0.67	3.37	1.12	0.033684
2018	32	0.00	1.31	0.00	0.00	0.54	0.54	2.53	0.84	0.025263
2018	33	1.40	0.88	0.15	0.36	0.00	0.00	1.68	0.56	0.016842
2018	34	0.00	0.44	0.00	0.00	0.16	0.16	0.84	0.28	0.008421
2018	35	1.50	0.00	0.19	0.41	0.00	0.00	0.00	0	0
2018	36	0.20	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	37	0.60	0.00	0.00	0.02	0.00	0.00	0.00	0	0
2018	38	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	39	0.80	0.00	0.00	0.08	0.00	0.00	0.00	0	0
2018	40	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	42	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	44	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	45	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	46	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	47	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	48	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	49	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	51	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0
2018	52	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0	0

[1] When weekly PET data is not available, historical average PET is used.
[2] HSG = Hydrologic Soil Group (Used in calculating runoff)
[3] kc adapted from Small Grain Growth Curve from TAES L-5238 and kc values from Texas A&M High Plains Experiment Station.

Equation 4: Leaching Requirement Method--TCEQ Method
Source: TCEQ Chapter 309

$$L = \frac{Ce \times (ET - Ri)}{Cl - Ce}$$

Where,
L = Leaching Requirement (in)
Ce = Electrical Conductivity of Effluent (mmhos/cm @ 25°C)
ET = Evapotranspiration (in)
Ri = Infiltrated Rainfall (in) (Rainfall - Runoff)
Cl = Maximum Allowable Conductivity of Soil Solution (crop dependent)

Information from the crop spreadsheets is imported into the individual plot spreadsheets. A sample plot spreadsheet is provided as Table 8. Note that the current crop on HLAS Plot 7 is wheatgrass. Therefore, information from the wheatgrass crop spreadsheet is imported into the plot data sheet for the current year. Effluent needed in the root zone is then calculated according to the following equation:

Equation 5: Effluent Needed in Root Zone
Source: TCEQ Chapter 309

$$\text{Effluent Needed in Root Zone} = ET + L - Ri$$

Where,
ET = Evapotranspiration (in)
L = Leaching Requirement (in)
Ri = Infiltrated Rainfall (in) (Rainfall-Runoff)

If the effluent needed in the root zone is negative, a surplus of water is provided by infiltrated rainfall. If the effluent needed in the root zone is positive, effluent is needed in the amount indicated.

Actual effluent applications are imported from the effluent application worksheet of the reservoir spreadsheet (Table 9). The effluent applications are represented in gallons pumped from the reservoir in the effluent application worksheet but are converted to inches applied (assuming an irrigation efficiency of 85%) when displayed in the individual plot spreadsheets (See Equation 6 below). The irrigation efficiency is based on the type of irrigation (center-pivot).

Equation 6: Effluent Applied
Source: National Engineering Handbook, Part 652, Irrigation Guide (Table 6-4)

$$\text{Effluent Applied (in)} = \frac{\text{Volume pumped from Reservoir(s) (gal)} \times \text{I.E.}}{27{,}154\ \text{(gal/ac-in)} \times \text{field acreage}}$$

Where, I.E. = Irrigation Efficiency (0.85)

Table 8. Example Water Balance (Hancock Field 7)

Year	Week	Date	Crop	Rainfall	Runoff	Infiltrated Rainfall	ET	Required Leaching	Effluent Needed in Root Zone	Actual Effluent Applied	Ideal Effluent Applied	Actual Water Balance	Ideal Water Balance	Crop Nitrogen Required	Residual Soil N	Nitrogen Required	Actual Nitrogen Applied	Ideal Nitrogen Applied	Actual Nitrogen Balance	Ideal Nitrogen Balance
				(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(in)	(lb/ac)	(lb/ac)	(lb/ac)	(lb/ac)	(lb/ac)	(lb/ac)	(lb/ac)
2017	1	Oct 1-9	Wheatgrass	0.70	0.00	0.70	0.66	0.00	-0.04	0.00	0.00	0.04	0.04	1.20	0.36	0.84	0.00	0.00	-0.84	-0.84
2017	2	Oct 10-16	Wheatgrass	0.00	0.00	0.00	0.53	0.19	0.72	0.82	0.67	0.15	0.00	1.24	0.37	0.87	0.84	0.69	-0.87	-1.02
2017	3	Oct. 17-23	Wheatgrass	0.00	0.00	0.00	0.55	0.20	0.75	0.90	0.75	0.30	0.00	1.29	0.39	0.90	1.29	1.07	-0.48	-0.85
2017	4	Oct. 24-30	Wheatgrass	0.00	0.00	0.00	0.57	0.21	0.78	0.85	0.78	0.37	0.00	1.33	0.40	0.93	1.16	1.06	-0.25	-0.72
2017	5	Oct 31-Nov 6	Wheatgrass	0.00	0.00	0.00	0.39	0.15	0.54	0.79	0.54	0.62	0.00	1.33	0.40	0.93	2.03	1.39	0.85	-0.26
2017	6	Nov. 7-13	Wheatgrass	0.00	0.00	0.00	0.37	0.14	0.50	0.00	0.46	0.12	-0.04	1.33	0.40	0.93	0.00	1.19	-0.09	0.00
2017	7	Nov 14-20	Wheatgrass	0.00	0.00	0.00	0.37	0.14	0.50	0.00	0.49	-0.39	-0.05	1.33	0.40	0.93	0.00	0.93	-1.02	0.00
2017	8	Nov 21-27	Wheatgrass	0.00	0.00	0.00	0.35	0.14	0.48	0.00	0.43	-0.87	-0.10	1.26	0.38	0.88	0.00	0.88	-1.90	0.00
2017	9	Nov. 28-Dec. 4	Wheatgrass	0.00	0.00	0.00	0.30	0.11	0.41	0.47	0.28	-0.81	-0.23	1.18	0.36	0.83	1.40	0.83	-1.33	0.00
2017	10	Dec 5-11	Wheatgrass	0.00	0.00	0.00	0.26	0.10	0.36	0.00	0.27	-1.17	-0.33	1.11	0.33	0.78	0.00	0.78	-2.11	0.00
2017	11	Dec. 12-18	Wheatgrass	0.00	0.00	0.00	0.25	0.10	0.34	0.48	0.35	-1.04	-0.32	1.04	0.31	0.73	1.00	0.73	-1.84	0.00
2017	12	Dec. 19-25	Wheatgrass	0.00	0.00	0.00	0.23	0.09	0.32	0.00	0.31	-1.36	-0.33	0.96	0.29	0.67	0.00	0.67	-2.51	0.00
2018	13	Dec. 26-Jan. 1	Wheatgrass	0.00	0.00	0.00	0.21	0.09	0.30	0.00	0.30	-1.66	-0.33	0.89	0.27	0.62	0.00	0.62	-3.13	0.00
2018	14	Jan. 2-8	Wheatgrass	0.00	0.00	0.00	0.21	0.09	0.30	0.00	0.30	-1.96	-0.34	0.89	0.27	0.62	0.00	0.62	-3.75	0.00
2018	15	Jan 9-15	Wheatgrass	0.00	0.00	0.00	0.24	0.09	0.33	0.81	0.31	-1.49	-0.36	0.99	0.30	0.69	1.81	0.69	-2.64	0.00
2018	16	Jan 16-22	Wheatgrass	0.00	0.00	0.00	0.26	0.10	0.37	0.38	0.34	-1.47	-0.38	1.09	0.33	0.76	0.86	0.76	-2.54	0.00
2018	17	Jan 23-29	Wheatgrass	0.00	0.00	0.00	0.29	0.12	0.40	0.73	0.34	-1.15	-0.45	1.19	0.36	0.84	1.81	0.84	-1.57	0.00
2018	18	Jan. 30-Feb 5	Wheatgrass	0.00	0.00	0.00	0.36	0.14	0.50	0.86	0.38	-0.79	-0.57	1.30	0.39	0.91	2.06	0.91	-0.42	0.00
2018	19	Feb 6-12	Wheatgrass	0.00	0.00	0.00	0.41	0.16	0.57	0.00	0.45	-1.36	-0.70	1.40	0.42	0.98	0.00	0.98	-1.40	0.00
2018	20	Feb 13-19	Wheatgrass	0.00	0.00	0.00	0.44	0.17	0.61	0.34	0.50	-1.63	-0.81	1.50	0.45	1.05	0.72	1.05	-1.73	0.00
2018	21	Feb 20-26	Wheatgrass	0.00	0.00	0.00	0.47	0.18	0.65	0.00	0.64	-2.28	-0.83	1.60	0.48	1.12	0.00	1.12	-2.85	0.00
2018	22	Feb 27-Mar. 5	Wheatgrass	0.00	0.00	0.00	0.69	0.26	0.95	0.00	0.60	-3.24	-1.18	1.70	0.51	1.19	0.00	1.19	-4.04	0.00
2018	23	Mar. 6-12	Wheatgrass	0.00	0.00	0.00	0.81	0.31	1.12	0.44	0.72	-3.91	-1.57	1.80	0.54	1.26	0.78	1.26	-4.52	0.00
2018	24	Mar 13-19	Wheatgrass	0.00	0.00	0.00	0.85	0.25	1.10	0.77	0.76	-4.25	-1.92	1.91	0.57	1.33	1.34	1.33	-4.52	0.00
2018	25	Mar 20-26	Wheatgrass	0.00	0.00	0.00	0.90	0.35	1.25	0.84	0.80	-4.65	-2.37	2.01	0.60	1.41	1.48	1.41	-4.44	0.00
2018	26	Mar. 27-Apr 2	Wheatgrass	1.10	0.00	1.10	1.03	0.00	-0.07	0.00	0.84	-4.58	-1.46	2.11	0.63	1.48	0.00	1.48	-5.91	0.00
2018	27	Apr 3-9	Wheatgrass	0.00	0.00	0.00	1.23	0.39	1.61	0.00	1.01	-6.19	-2.06	2.11	0.63	1.48	0.00	1.48	-7.39	0.00
2018	28	Apr 10-16	Wheatgrass	0.00	0.00	0.00	1.23	0.51	1.73	0.15	1.47	-7.77	-2.32	2.11	0.63	1.48	0.15	1.48	-8.72	0.00
2018	29	Apr 17-23	Wheatgrass	0.00	0.00	0.00	1.23	0.47	1.70	0.00	1.76	-9.47	-2.26	2.11	0.63	1.48	0.00	1.48	-10.19	0.00
2018	30	Apr 24-30	Wheatgrass	0.00	0.00	0.00	1.23	0.52	1.74	0.51	1.72	-10.71	-2.29	2.11	0.63	1.48	0.44	1.48	-11.23	0.00
2018	31	May 1-7	Wheatgrass	0.00	0.00	0.00	1.49	0.60	2.09	0.41	1.77	-12.39	-2.61	2.11	0.63	1.48	0.34	1.48	-12.37	0.00
2018	32	May 8-14	Wheatgrass	0.00	0.00	0.00	1.39	0.66	2.05	0.00	1.51	-14.44	-3.15	1.97	0.59	1.38	0.00	1.38	-13.75	0.00
2018	33	May 15-21	Wheatgrass	1.50	0.00	1.50	1.30	0.00	-0.20	0.00	1.40	-14.24	-1.55	1.84	0.55	1.29	0.00	1.29	-15.03	0.00
2018	34	May 22-28	Wheatgrass	0.00	0.00	0.00	1.20	0.50	1.70	0.00	1.09	-15.94	-2.16	1.70	0.51	1.19	0.00	1.19	-16.23	0.00
2018	35	May 29-Jun 4	Wheatgrass	0.80	0.00	0.80	1.20	0.17	0.57	0.90	1.53	-15.62	-1.21	1.57	0.47	1.10	0.65	1.10	-16.68	0.00
2018	36	Jun. 5-11	Wheatgrass	0.00	0.00	0.00	1.16	0.51	1.67	0.93	1.78	-16.36	-1.10	1.43	0.43	1.00	0.52	1.00	-17.16	0.00
2018	37	Jun 12-18	Wheatgrass	0.60	0.00	0.60	1.05	0.20	0.65	0.00	1.61	-17.01	-0.14	1.30	0.39	0.91	0.00	0.91	-18.06	0.00
2018	38	Jun 19-25	Wheatgrass	0.00	0.00	0.00	0.94	0.41	1.35	0.00	1.44	-18.36	-0.05	1.16	0.35	0.81	0.00	0.81	-18.87	0.00
2018	39	Jun 26-Jul 2	Wheatgrass	2.50	0.20	2.30	0.82	0.00	-1.48	0.90	0.00	-15.98	1.44	1.02	0.31	0.72	0.51	0.00	-19.08	-0.72
2018	40	Jul 3-9	Wheatgrass	0.00	0.00	0.00	0.69	0.30	0.99	0.00	0.00	-16.97	0.44	0.89	0.27	0.62	0.00	0.00	-19.71	-1.34
2018	41	Jul 10-16	Wheatgrass	0.00	0.00	0.00	0.69	0.30	0.99	0.00	0.55	-17.96	0.00	0.89	0.27	0.62	0.00	0.31	-20.33	-1.65
2018	42	Jul 17-23	Wheatgrass	0.00	0.00	0.00	0.69	0.30	0.99	0.00	0.99	-18.95	0.00	0.89	0.27	0.62	0.00	0.56	-20.95	-1.72
2018	43	Jul 24-30	Wheatgrass	0.00	0.00	0.00	0.69	0.30	0.99	0.00	0.99	-19.94	0.00	0.89	0.27	0.62	0.00	0.56	-21.57	-1.78
2018	44	Jul 31-Aug 6	Wheatgrass	0.00	0.00	0.00	0.66	0.29	0.94	0.00	0.94	-20.89	0.00	0.89	0.27	0.62	0.00	0.53	-22.19	-1.87
2018	45	Aug 7-13	Wheatgrass	0.00	0.00	0.00	0.65	0.28	0.94	0.00	0.94	-21.82	0.00	0.89	0.27	0.62	0.00	0.53	-22.81	-1.97
2018	46	Aug 14-20	Wheatgrass	0.00	0.00	0.00	0.65	0.28	0.94	0.00	0.94	-22.76	0.00	0.89	0.27	0.62	0.00	0.53	-23.44	-2.06
2018	47	Aug 21-27	Wheatgrass	0.00	0.00	0.00	0.68	0.30	0.98	0.00	0.98	-23.74	0.00	0.93	0.28	0.65	0.00	0.55	-24.09	-2.16
2018	48	Aug 28-Sep 3	Wheatgrass	0.00	0.00	0.00	0.65	0.29	0.94	0.00	0.94	-24.68	0.00	0.98	0.29	0.68	0.00	0.53	-24.77	-2.32
2018	49	Sep 4-10	Wheatgrass	0.00	0.00	0.00	0.59	0.26	0.85	0.00	0.85	-25.53	0.00	1.02	0.31	0.71	0.00	0.48	-25.49	-2.55
2018	50	Sep 11-17	Wheatgrass	0.00	0.00	0.00	0.62	0.27	0.89	0.00	0.89	-26.42	0.00	1.07	0.32	0.75	0.00	0.50	-26.23	-2.80
2018	51	Sep 18-24	Wheatgrass	0.00	0.00	0.00	0.65	0.28	0.93	0.00	0.93	-27.35	0.00	1.11	0.33	0.78	0.00	0.52	-27.01	-3.05
2018	52	Sep 25-30	Wheatgrass	0.00	0.00	0.00	0.58	0.25	0.83	0.00	0.83	-28.18	0.00	1.15	0.35	0.81	0.00	0.47	-27.82	-3.40
			Total	7.20	0.20	7.00	35.93	12.54	41.47	13.28	41.47	-28.18	0.00	70.00	21.00	49.00	21.18	45.60	-27.82	-3.40

Table 9.
Example Effluent Applications Log

			Hancock Plots (Applications in Gallons)									
Year	Week	Date	H1	H2	H3	H4	H5	H6	H7	H8	H9	H10
2017	1	Oct. 1-9	0	0	0	0	0	0	0	0	0	0
2017	2	Oct. 10-16	1,534,700	0	2,953,100	2,701,000	2,763,600	0	2,183,000	1,120,000	3,373,500	2,821,400
2017	3	Oct. 17-23	1,621 100	698,900	3,355,900	2,837,800	2,778,500	2,487,700	2,401,000	1,288,000	0	2,758,300
2017	4	Oct. 24-30	1,056 500	0	2,964,100	1,590,900	2,655,100	2 411,800	2,249,000	979,000	3,338,600	2 843,600
2017	5	Oct. 31-Nov. 6	0	2,466,000	3,092,800	3,530,000	2,683,300	2,599,400	2,109,000	1,157,000	3,069,800	906,600
2017	6	Nov. 7-13	1,063,100	1,473 900	1,740,800	1,302,400	0	1,292,900	0	633,000	0	373,500
2017	7	Nov. 14-20	1,103,700	2,251,900	2,873,400	3,814,800	2,548,600	2,345,200	0	154,000	1,219,600	2,760,400
2017	8	Nov. 21-27	0	2,310,500	3,160,100	3,569,200	2,618,000	0	0	0	0	2 534,300
2017	9	Nov. 28-Dec. 4	0	2 199,400	1,404,200	3,568,900	2,052,200	2,529,600	1,263,000	0	3,420,800	2,163,100
2017	10	Dec. 5-11	0	0	0	0	0	0	0	0	0	0
2017	11	Dec. 12-18	0	2,558,800	0	0	0	1,315,200	1,265,000	0	0	1,277,500
2017	12	Dec. 19-25	0	0	0	0	0	0	0	0	0	0
2018	13	Dec. 26-Jan. 1	0	0	0	0	0	0	0	0	0	0
2018	14	Jan. 2-8	0	0	0	0	0	0	0	0	0	0
2018	15	Jan. 9-15	60,200	2,111,800	3,040,900	2,969,700	776,000	2,487,600	2,145,000	0	3,293,800	2,950,100
2018	16	Jan. 16-22	0	0	0	0	0	0	1,016,000	0	2,233 300	1 262,000
2018	17	Jan. 23-29	0	1,975,900	1,592,700	0	1,135,600	0	1,933,000	920,000	0	2,488,300
2018	18	Jan. 30-Feb. 5	556,000	1,980,100	0	1,943,300	0	0	2,298,000	1,164,000	1,529,900	2,283,300
2018	19	Feb 6-12	805,400	3,340,500	2,854,300	2,855,800	2,014,200	0	0	2,302,000	0	2,321,300
2018	20	Feb. 13-19	0	0	1,729,100	1,838,400	1,932,600	0	912,000	2,418,000	1,699,900	0
2018	21	Feb. 20-26	0	1,410,200	2,830,300	0	2,901,500	0	0	2,094,000	3,475,400	2,887,800
2018	22	Feb. 27-Mar. 5	0	2,849,200	1,797,600	2,947,700	2,258,200	0	0	2,481,000	0	1,229,400
2018	23	Mar. 6-12	784,700	2,867,700	0	3,133,800	0	2,500,200	1,176,000	2,325,000	1,614,900	1,782,200
2018	24	Mar. 13-19	981,900	1,705,100	3,518,400	1,028,100	481,200	1,991,200	2,037,000	2,508,000	3,001,800	0
2018	25	Mar. 20-26	1,720,300	0	0	3,197,600	1,374,900	2,550,500	2,237,000	1,431,000	0	2,979,400
2018	26	Mar 27-Apr. 2	0	2,026,700	2,054,400	0	0	730,300	0	0	2,420,200	0
2018	27	Apr 3-9	1,623,600	970,000	3,002,900	1,647,600	2,120,200	2,111,600	0	2,172,000	0	2,675,800
2018	28	Apr 10-16	1,473,200	2,517,400	1,454,300	1,887,400	0	0	401,000	1,806,000	0	1,338,700
2018	29	Apr. 17-23	889,700	0	0	0	2,420,900	2,383,800	0	2,162,000	3,070,000	0
2018	30	Apr 24-30	877,600	1,675,800	2,712,300	1,774,900	1,208,800	214,000	1,364,000	1,273,200	2,915 300	0
2018	31	May 1-7	0	2,956,900	0	2 016,100	2,369,200	1,428,500	1,080,000	1,419,000	2,704,100	0
2018	32	May 8-14	981,600	1,426,800	1,800,000	3,243,500	0	2,179,900	0	0	0	2,612,900
2018	33	May 15-21	0	2,935,100	0	2,367,600	0	0	0	0	1,513,100	0
2018	34	May 22-28	0	0	0	0	0	0	0	0	0	0
2018	35	May 29-Jun. 4	0	1,375,700	1,789,600	2,996,500	3,177,200	0	2,393,000	1,409,000	0	2,602,600
2018	36	Jun 5-11	0	2,783,000	1,488,800	1,926,900	0	2,139 900	2,468,800	0	2,760,000	0
2018	37	Jun. 12-18	0	1,434,800	3,027,200	2,961,400	2 491,400	0	0	1,125,000	1,578,200	1,431,600
2018	38	Jun. 19-25	0	0	3,407,500	3,023,000	0	2,371,900	0	0	3,452 600	0
2018	39	Jun. 26-Jul. 2	1,249,000	2,927,300	1,670,700	1,577,000	2,910,700	1,280,800	2,392,700	2,622,000	0	2,651,200
2018	40	Jul. 3-9	0	0	0	0	0	0	0	0	0	0
2018	41	Jul. 10-16	0	0	0	0	0	0	0	0	0	0
2018	42	Jul. 17-23	0	0	0	0	0	0	0	0	0	0
2018	43	Jul. 24-30	0	0	0	0	0	0	0	0	0	0
2018	44	Jul 31-Aug 6	0	0	0	0	0	0	0	0	0	0
2018	45	Aug. 7-13	0	0	0	0	0	0	0	0	0	0
2018	46	Aug 14-20	0	0	0	0	0	0	0	0	0	0
2018	47	Aug 21-27	0	0	0	0	0	0	0	0	0	0
2018	48	Aug 28-Sep 3	0	0	0	0	0	0	0	0	0	0
2018	49	Sep. 4-10	0	0	0	0	0	0	0	0	0	0
2018	50	Sep 11-17	0	0	0	0	0	0	0	0	0	0
2018	51	Sep. 18-24	0	0	0	0	0	0	0	0	0	0
2018	52	Sep 25-30	0	0	0	0	0	0	0	0	0	0

The Actual Water Balance is calculated based on the following equation:

Equation 7: Actual Water Balance

$$\text{Actual Water Balance}_T = \text{Actual Water Balance}_{T-1} + \text{Actual Effluent Applied}_T - \text{Effluent Needed in Root Zone}_T$$

Where, T = current week
T-1 = previous week

Positive numbers indicate a surplus of water is provided by a combination of infiltrated rainfall and effluent applications. Negative numbers indicate crop water deficits. Water deficits can occur on specific plots if applications are made based on the nitrogen requirement of the crop(s).

The methodology used to determine the crop water requirement preserves the framework of the TCEQ water balance and offers enhanced features such as higher resolution (weekly vs. monthly) and consideration of the water and nitrogen requirements of the crops on a plot-by-plot basis. As shown throughout this document, all of the features of the TCEQ water balance presented in TCEQ Chapter 309 are addressed by the new water balance currently being used by COL.

The crop nitrogen requirement is imported from the appropriate crop spreadsheet and the residual soil nitrogen is subtracted from the nitrogen requirement according to the results of the most recent soil test analyses for each plot. The equations used to calculate the residual soil nitrogen (Equation 8) and the nitrogen requirement (Equation 9) are presented below.

Equation 8: Residual Soil Nitrogen
Source: Brady, 1990. The Nature and Properties of Soils.

Residual Soil N (lb/ac) = 2 x NO_3-N concentration (ppm) per 6" of soil

Equation 9: Nitrogen Requirement

$$\text{N Req. (lb/wk)} = \text{N Req. (lb/yr)} \times kc/\Sigma kc - \text{Residual Soil N} \times kc/\Sigma kc$$

Where,
N. Req. (lb/wk) = Nitrogen Requirement (lb/ac) *per week basis*
N. Req. (lb/yr) = Nitrogen Requirement (lb/ac) *per year basis*
kc = Crop Coefficient for particular week
Σkc = Sum of crop coefficients for entire year
Residual Soil N = Available N in the root zone (lb/ac) *based on soil analysis*

The Actual Nitrogen Application in pounds/acre is calculated by multiplying the volume pumped from the reservoir by the PAN content of the effluent and dividing by the field acreage (See Equation 10 below).

Equation 10: Nitrogen Applied

$$\text{N Applied (lb/ac)} = \frac{\text{Volume pumped from Reservoir(s) (gal)} \times \text{PAN (lb/gal)}}{\text{field acreage}}$$

Where, $PAN = MR \times (TKN - NH_3\text{-}N) + (1 - VR) \times NH_3\text{-}N + NO_3\text{-}N$

MR = 0.2
VR = 0.4

The Actual Nitrogen Balance is calculated in the same way the Actual Water Balance is calculated:

Equation 11: Actual Nitrogen Balance

$$\text{Actual Nitrogen Balance}_T = \text{Actual Nitrogen Balance}_{T-1} + \text{Actual Nitrogen Applied}_T - \text{Nitrogen Required}_T$$

Where, T = current week
T-1 = previous week

Again, positive balances indicate a surplus of nitrogen is provided by the effluent applications and negative balances indicate crop nitrogen deficits. Crop nitrogen deficits may occur on specific plots if applications are made based on the water requirement of the crop(s).

The three possible outcomes for Ideal Effluent Applications are described below:

(1) Application Based on Water Needs: If the effluent needed based on the crop water needs is ≥minimum application rate (in/revolution) of the pivot (variable depending on plot) **and** the nitrogen requirement ≥ nitrogen that would be applied based on the crop water needs, then the ideal application is based on crop water needs.

(2) Application Based on Nitrogen Needs: If the effluent needed based on the crop water needs is ≥minimum application rate (in/revolution) of the pivot **and** the nitrogen requirement < nitrogen that would be applied based on crop water needs **and** the effluent needed based on crop nitrogen needs ≥minimum application rate (in/revolution) of the pivot, then the ideal application is based on crop nitrogen needs.

(3) No Application: If the effluent needed based on crop water needs **or** the effluent needed based on crop nitrogen needs < minimum application rate (in/revolution) of the pivot, no application is recommended by the water balance model. If the effluent needed in the root zone is negative (indicating more infiltrated rainfall than ET plus leaching requirement) for a particular week, then no application should be made.

An additional factor is introduced to the model in order to account for any carry over effects of rainfall events. Unlike the TCEQ model, weekly rainfall greater than crop water needs is accounted for by leaving it in the water balance equation. For instance, if 1.5 inches of infiltrated rainfall was received on a given week and only 1 inch of water was needed by the crop for that week, then the 0.5 inch surplus is carried over into the following week. Up to 4 inches of excess rainfall can be carried over into the following week. The limit of 4 inches is based on the root zone of the crops and the water holding capacity of the soil.

Several assumptions must be made at the plot level of the model in order for a balance to be calculated. One challenge to deal with is that of overlapping growing seasons. If two crops are grown on the same field and their growing seasons overlap (Ex. wheat & haygrazer), the effluent and nitrogen requirements are calculated based on the crop with the higher crop coefficient during the period of time when the growing seasons overlap. The water and nitrogen balances are set up to start over on October 1 of each year but may be adjusted to coincide with the cropping year as needed.

This portion of the water balance model allows the effluent applications to be evaluated in comparison to the amount of water and nitrogen needed by the crops at the plot level. The yearly N requirement of the crop should not be exceeded in any case based on the model. Effluent applications at the LLAS are limited primarily by the nitrogen requirement of the crop and secondarily by the water requirement of the crop. Effluent applications at the HLAS are limited primarily by the water requirement of the crop and secondarily by the nitrogen requirement due to the low nitrogen concentration in the effluent. For these reasons, the contribution of N to the groundwater at the LLAS and HLAS is minimized. Once the framework was laid at the plot level, the second tier could be developed. The second tier deals with the LLAS and HLAS Reservoirs and is described in Section 2.2.

2.2 Tier 2 (Reservoirs)

Rainfall, evaporation, inflow to the reservoir and effluent applications from the reservoir are the driving forces for Tier 2. Inflow data from the SEWRP, rainfall, and evaporation data are utilized to develop Tier 2. A sample Tier 2 spreadsheet is included as Table 10. The "Volumetric Contribution of Rainfall minus (-) Evaporation" is calculated based on the surface area of the reservoir and the difference between rainfall and evaporation over the course of a week. The "Volume of Effluent Applied" is calculated from the weekly effluent application data. The total volume of effluent pumped to each plot is summed on a weekly basis. The "Modeled Volume of Effluent in the Reservoir" is calculated according to the following equation:

Equation 12: Modeled Volume of Effluent in the Reservoirs

Modeled Volume of Effluent in the Reservoirs (gal) = Previous Volume + Inflow + Volumetric Contribution of Rainfall-Evaporation - Volume of Effluent Applied

The "Actual Volume of Effluent in Reservoir" is calculated based on the reservoir levels measured by COL. The actual reservoir level data will allow the model to be fine-tuned to more accurately predict the reservoir levels.

Table 10.
Sample Reservoir Water Balance (Lubbock Reservoir)

Year	Week	Inflow (gal)	Rainfall (in)	Evaporation (in)	Volumetric Contribution of Rainfall - Evaporation (gal)	Volume of Effluent Applied (gal)	Modeled Volume of Effluent in Reservoir (gal)	Measured Liquid Level (ft)	Actual Volume of Effluent in Reservoir (gal)	Storage Available (gal)	Storage Available (week)
2017	1	49,400,000	1.00	1.57	-755,415	0	189,060,467	17	177,761,556	192,625,265	3.90
2017	2	36,990,000	0.00	1.22	-1,622,425	20,062,600	204,365,442	17	177,761,556	192,625,265	4.46
2017	3	38,640,000	0.00	1.22	-1,622,425	31,877,100	209,505,917	17	177,761,556	192,625,265	4.62
2017	4	35,420,000	0.00	1.22	-1,622,425	18,977,300	224,326,192	17.5	184,114,530	186,272,291	4.64
2017	5	29,570,000	0.00	0.96	-1,274,934	15,990,200	236,631,058	18	190,504,799	179,882,022	4.73
2017	6	29,930,000	0.00	0.91	-1,217,019	19,487,700	245,856,339	18	190,504,799	179,882,022	4.91
2017	7	30,310,000	0.00	0.91	-1,217,019	36,433,000	238,516,321	16.5	171,445,680	198,941,141	5.56
2017	8	22,140,000	0.00	0.91	-1,217,019	15,180,300	244,259,002	16.5	171,445,680	198,941,141	5.84
2017	9	54,850,000	0.00	0.77	-1,019,466	47,705,900	250,383,635	17.5	184,114,530	186,272,291	5.12
2017	10	32,120,000	0.00	0.65	-871,302	46,323,400	235,308,933	19.5	209,901,342	160,485,479	4.47
2017	11	24,990,000	0.00	0.65	-871,302	36,806,300	222,621,331	20.5	223,022,452	147,364,369	4.22
2017	12	17,350,000	0.00	0.65	-871,302	25,234,900	213,865,129	20.5	223,022,452	147,364,369	4.40
2018	13	19,390,000	0.00	0.65	-861,860	0	232,393,269	22	242,993,173	127,393,648	3.93
2018	14	54,920,000	0.00	0.61	-805,203	28,499,700	258,008,366	22	242,993,173	127,393,648	3.75
2018	15	64,180,000	0.00	0.61	-805,203	55,778,300	265,604,862	19	203,398,009	166,988,812	4.64
2018	16	64,380,000	0.00	0.61	-805,203	30,299,600	298,880,059	18.5	196,932,560	173,454,261	4.59
2018	17	37,990,000	0.00	0.61	-805,203	69,662,100	266,402,756	15	152,718,671	217,668,150	5.76
2018	18	36,750,000	0.00	0.75	-995,130	26,098,600	276,059,025	15.5	158,924,434	211,462,387	5.60
2018	19	35,580,000	0.00	0.81	-1,071,101	2,280,800	308,287,125	17	177,761,556	192,625,265	5.12
2018	20	33,090,000	0.00	0.81	-1,071,101	15,572,600	324,733,424	17.5	184,114,530	186,272,291	4.98
2018	21	34,980,000	0.00	0.81	-1,071,101	0	358,642,323	19.5	209,901,342	160,485,479	4.30
2018	22	40,330,000	0.00	1.08	-1,430,567	41,733,200	355,808,556	18	190,504,799	179,882,022	4.81
2018	23	40,940,000	0.00	1.18	-1,574,353	71,519,300	323,654,903	15	152,718,671	217,668,150	5.79
2018	24	37,400,000	0.00	1.18	-1,574,353	29,512,700	329,967,851	14.5	146,549,219	223,837,602	5.96
2018	25	48,460,000	0.00	1.18	-1,574,353	23,097,400	353,756,098	15.5	158,924,434	211,462,387	5.56
2018	26	50,350,000	1.20	1.29	-115,086	12,967,500	391,023,511	18	190,504,799	179,882,022	4.67
2018	27	51,370,000	0.00	1.54	-2,055,272	42,908,400	397,429,840	18	190,504,799	179,882,022	4.62
2018	28	31,990,000	0.00	1.54	-2,055,272	33,477,100	393,887,468	16.5	171,445,680	198,941,141	5.14
2018	29	35,520,000	0.00	1.54	-2,055,272	0	427,352,196	18	190,504,799	179,882,022	4.66
2018	30	42,800,000	0.00	1.54	-2,055,272	27,049,600	441,047,325	18.5	196,932,560	173,454,261	4.48
2018	31	45,210,000	0.00	1.55	-2,058,076	23,013,100	461,186,149	19	203,398,009	166,988,812	4.29
2018	32	44,510,000	0.00	1.55	-2,058,076	44,504,800	459,133,273	18.5	196,932,560	173,454,261	4.43
2018	33	31,480,000	1.40	1.55	-195,292	40,997,000	449,420,981	17	177,761,556	192,625,265	4.95
2018	34	38,410,000	0.00	1.55	-2,058,076	35,906,400	449,866,505	15.5	158,924,434	211,462,387	5.44
2018	35	43,710,000	1.50	1.77	-356,905	47,930,400	445,289,200	13	128,256,762	242,130,059	6.21
2018	36	42,970,000	0.20	1.93	-2,307,635	22,180,800	463,770,766	13.5	134,318,461	236,068,360	6.03
2018	37	41,880,000	0.60	1.93	-1,775,411	26,374,900	477,500,455	13	128,256,762	242,130,059	6.18
2018	38	39,050,000	0.00	1.93	-2,573,747	33,500,700	480,476,009	12	116,239,738	254,147,083	6.48
2018	39	37,280,000	0.80	1.96	-1,543,950	33,943,900	482,268,158	10	92,625,680	277,761,141	7.10
2018	40	35,840,000	0.00	2.03	-2,695,028	31,150,500	484,262,630	8.5	75,276,432	295,110,389	7.55
2018	41	0	0.00	2.03	-2,695,028	0	481,567,603	0	-17,454,036	387,840,857	10.18
2018	42	0	0.00	2.03	-2,695,028	0	478,872,575	0	-17,454,036	387,840,857	10.43
2018	43	0	0.00	2.03	-2,695,028	0	476,177,547	0	-17,454,036	387,840,857	10.67
2018	44	0	0.00	1.83	-2,429,774	0	473,747,773	0	-17,454,036	387,840,857	10.92
2018	45	0	0.00	1.79	-2,385,565	0	471,362,207	0	-17,454,036	387,840,857	11.17
2018	46	0	0.00	1.79	-2,385,565	0	468,976,642	0	-17,454,036	387,840,857	11.42
2018	47	0	0.00	1.79	-2,385,565	0	466,591,077	0	-17,454,036	387,840,857	11.67
2018	48	0	0.00	1.67	-2,218,730	0	464,372,347	0	-17,454,036	387,840,857	11.91
2018	49	0	0.00	1.50	-1,996,284	0	462,376,063	0	-17,454,036	387,840,857	12.16
2018	50	0	0.00	1.50	-1,996,284	0	460,379,779	0	-17,454,036	387,840,857	12.41
2018	51	0	0.00	1.50	-1,996,284	0	458,383,496	0	-17,454,036	387,840,857	12.66
2018	52	0	0.00	1.29	-1,711,100	0	456,672,396	0	-17,454,036	387,840,857	12.91
	Total	1,562,470,000	6.70	68.46	-82,175,386	1,164,038,100					

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The "Storage Available (gal)" is the difference between the reservoir capacity and the actual volume of effluent in the reservoir. The reservoir capacity and surface area are displayed in Table 11.

Table 11. Summary of Pertinent Reservoir Attributes

Reservoir	Capacity (gal)[1]	Surface Area (ac)[1]
Lubbock	400,530,837	49
Hancock 1	387,294,396	85
Hancock 2	196,259,829	47
Hancock 3	195,184,681	41

[1] Capacity and surface area are calculated at the maximum liquid level.

For any given week, the "Storage Available (week)" column of Table 10 is equal to the "Actual Storage Available (gal)" column divided by the "Inflow (gal)" column. This calculation is an estimate of the number of weeks of storage available if the current week's inflow is received continuously and no effluent applications are made.

The model makes a determination on whether or not the ideal effluent application can be made based on the volume of effluent in the reservoirs. Ideal applications based on the effluent volume available in the reservoirs are shown in Table 12 under the "Volume of Effluent Applied" column. If the ideal volume of effluent applied is less than the volume of effluent in the reservoirs, then the ideal effluent application is made. If the ideal volume of effluent applied is greater than the volume of effluent in the reservoir(s), then the effluent application is limited to the volume of effluent in the reservoir(s). The reservoirs are maintained and modeled at a minimum level of 6 inches as stated in the previous permit.

Upon completion of the framework for the model at the reservoir level, the top level of the model could be developed. Tier 1 of the model summarizes the flow from the SEWRP and is presented in Section 2.3.

2.3 Tier 1 (SEWRP)

The SEWRP is modeled in Tier 1. Table 13 shows a sample portion of the spreadsheet used to track the outflow from the SEWRP to the Lubbock and Hancock Reservoirs.

Table 12. Example Reservoir Water Balance (Lubbock Reservoir) IDEAL CASE

Capacity = 400,530,837 gal

Year	Week	Date	Inflow (gal)	Rainfall (in)	Evaporation (in)	Volumetric Contribution of Rainfall - Evaporation (gal)	Ideal Volume of Effluent Applied (gal)	Four-Week Cumulative Carry Over (gal)	Volume of Effluent Applied (gal)	Ideal Volume of Effluent in Reservoir (gal)	Modeled Volume of Effluent in Reservoirs (gal)	Storage or Potential Discharge (gal)
2017	1	Oct. 1-9	49,400,000	1.00	1.57	-755,415	0	0	0	189,060,467	177,761,556	48,644,585
2017	2	Oct. 10-16	36,990,000	0.00	1.22	-1,622,425	0	0	0	224,428,042	213,129,131	35,367,575
2017	3	Oct. 17-23	38,640,000	0.00	1.22	-1,622,425	33,295,954	0	33,295,954	228,149,664	216,850,753	3,721,622
2017	4	Oct. 24-30	35,420,000	0.00	1.22	-1,622,425	18,528,164	0	18,528,164	243,419,074	232,120,164	15,269,411
2017	5	Oct. 31-Nov. 6	29,570,000	0.00	0.96	-1,274,934	20,348,196	0	20,348,196	251,365,945	240,067,034	7,946,870
2017	6	Nov. 7-13	29,930,000	0.00	0.91	-1,217,019	12,609,158	0	12,609,158	267,469,768	256,170,857	16,103,823
2017	7	Nov. 14-20	30,310,000	0.00	0.91	-1,217,019	23,666,260	0	23,666,260	272,896,489	261,597,578	5,426,721
2017	8	Nov. 21-27	22,140,000	0.00	0.91	-1,217,019	19,372,323	0	19,372,323	274,447,146	263,148,236	1,550,658
2017	9	Nov. 28-Dec. 4	54,850,000	0.00	0.77	-1,019,466	25,318,609	0	25,318,609	302,959,071	291,660,160	28,511,925
2017	10	Dec. 5-11	32,120,000	0.00	0.65	-871,302	25,257,111	0	25,257,111	308,950,658	297,651,747	5,991,586
2017	11	Dec. 12-18	24,990,000	0.00	0.65	-871,302	28,288,134	0	28,288,134	304,781,221	293,482,311	0
2017	12	Dec. 19-25	17,350,000	0.00	0.65	-871,302	31,826,366	0	31,826,366	289,433,553	278,134,642	0
2018	13	Dec. 26-Jan. 1	19,390,000	0.00	0.65	-861,860	34,463,385	0	34,463,385	273,498,308	262,199,398	0
2018	14	Jan. 2-8	54,920,000	0.00	0.61	-805,203	36,427,629	0	36,427,629	291,185,476	279,886,565	17,687,168
2018	15	Jan. 9-15	64,180,000	0.00	0.61	-805,203	44,760,260	0	44,760,260	309,800,013	298,501,102	18,614,537
2018	16	Jan. 16-22	64,380,000	0.00	0.61	-805,203	52,751,899	0	52,751,899	320,622,911	309,324,000	10,822,898
2018	17	Jan. 23-29	37,990,000	0.00	0.61	-805,203	49,354,958	0	49,354,958	308,452,749	297,153,838	0
2018	18	Jan. 30-Feb. 5	36,750,000	0.00	0.75	-995,130	51,991,048	0	51,991,048	292,216,571	280,917,660	0
2018	19	Feb. 6-12	35,580,000	0.00	0.81	-1,071,101	56,614,119	0	56,614,119	270,111,352	258,812,441	0
2018	20	Feb. 13-19	33,090,000	0.00	0.81	-1,071,101	53,962,604	0	53,962,604	248,167,647	236,868,736	0
2018	21	Feb. 20-26	34,980,000	0.00	0.81	-1,071,101	106,666,067	0	106,666,067	175,410,479	164,111,568	0
2018	22	Feb. 27-Mar. 5	40,330,000	0.00	1.08	-1,430,567	58,969,145	0	58,969,145	155,340,768	144,041,857	0
2018	23	Mar. 6-12	40,940,000	0.00	1.18	-1,574,353	56,173,486	0	56,173,486	138,532,929	127,234,018	0
2018	24	Mar. 13-19	37,400,000	0.00	1.18	-1,574,353	56,299,140	0	56,299,140	118,059,436	106,760,525	0
2018	25	Mar. 20-26	48,460,000	0.00	1.18	-1,574,353	63,006,606	0	63,006,606	101,938,477	90,639,566	0
2018	26	Mar. 27-Apr. 2	50,350,000	1.20	1.29	-115,086	44,889,690	0	44,889,690	107,283,700	95,984,789	5,345,223
2018	27	Apr. 3-9	51,370,000	0.00	1.54	-2,055,272	47,535,559	0	47,535,559	109,062,869	97,763,958	1,779,169
2018	28	Apr. 10-16	31,990,000	0.00	1.54	-2,055,272	51,689,721	0	51,689,721	87,307,877	76,008,966	0
2018	29	Apr. 17-23	35,520,000	0.00	1.54	-2,055,272	54,000,209	0	54,000,209	66,772,396	55,473,485	0
2018	30	Apr. 24-30	42,800,000	0.00	1.54	-2,055,272	50,022,378	0	50,022,378	57,494,747	46,195,836	0
2018	31	May 1-7	45,210,000	0.00	1.55	-2,058,076	41,298,682	0	41,298,682	59,347,989	48,049,078	1,853,242
2018	32	May 8-14	44,510,000	0.00	1.55	-2,058,076	26,912,906	0	26,912,906	74,887,007	63,588,096	15,539,018
2018	33	May 15-21	31,480,000	1.40	1.55	-195,292	27,408,583	0	27,408,583	78,763,132	67,464,221	3,876,125
2018	34	May 22-28	38,410,000	0.00	1.55	-2,058,076	18,037,321	0	18,037,321	97,077,735	85,778,824	18,314,603
2018	35	May 29-Jun. 4	43,710,000	1.50	1.77	-356,905	69,796,821	0	69,796,821	70,634,009	59,335,098	0
2018	36	Jun. 5-11	42,970,000	0.20	1.93	-2,307,635	95,956,649	0	0	15,339,725	99,997,463	40,662,365
2018	37	Jun. 12-18	41,880,000	0.60	1.93	-1,775,411	99,421,914	95,956,649	125,880,941	-43,977,600	14,221,112	0
2018	38	Jun. 19-25	39,050,000	0.00	1.93	-2,573,747	98,869,065	69,497,622	36,476,253	-106,370,411	14,221,112	0
2018	39	Jun. 26-Jul. 2	37,280,000	0.80	1.96	-1,543,950	102,355,629	131,890,434	35,736,050	-172,989,990	14,221,112	0
2018	40	Jul. 3-9	35,840,000	0.00	2.03	-2,695,028	101,597,837	198,510,013	33,144,972	-241,442,855	14,221,112	0
2018	41	Jul. 10-16	0	0.00	2.03	-2,695,028	104,030,693	171,006,228	-2,695,028	-348,168,575	14,221,112	0
2018	42	Jul. 17-23	0	0.00	2.03	-2,695,028	111,190,933	304,190,976	-2,695,028	-462,054,536	14,221,112	0
2018	43	Jul. 24-30	0	0.00	2.03	-2,695,028	114,887,654	355,684,125	-2,695,028	-579,637,217	14,221,112	0
2018	44	Jul. 31-Aug. 6	0	0.00	1.83	-2,429,774	109,510,540	406,647,228	-2,429,774	-691,577,532	14,221,112	0
2018	45	Aug. 7-13	0	0.00	1.79	-2,385,565	114,127,072	450,134,678	-2,385,565	-808,090,169	14,221,112	0
2018	46	Aug. 14-20	0	0.00	1.79	-2,385,565	106,221,934	459,921,594	-2,385,565	-916,697,668	14,221,112	0
2018	47	Aug. 21-27	0	0.00	1.79	-2,385,565	96,973,852	454,643,132	-2,385,565	-1,016,057,085	14,221,112	0
2018	48	Aug. 28-Sep. 3	0	0.00	1.67	-2,218,730	91,542,635	436,419,868	-2,218,730	-1,109,818,450	14,221,112	0
2018	49	Sep. 4-10	0	0.00	1.50	-1,996,284	78,142,267	418,240,918	-1,996,284	-1,189,957,000	14,221,112	0
2018	50	Sep. 11-17	0	0.00	1.50	-1,996,284	65,060,430	381,866,831	-1,996,284	-1,257,013,714	14,221,112	0
2018	51	Sep. 18-24	0	0.00	1.50	-1,996,284	61,080,612	340,316,046	-1,996,284	-1,320,090,610	14,221,112	0
2018	52	Sep. 25-30	0	0.00	1.29	-1,711,100	54,999,918	304,033,525	-1,711,100	-1,376,801,629	14,221,112	0
	Total		1,562,470,000	6.70	68.46	-82,175,386	2,997,512,125		1,595,190,473			

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Table 13.
Example Lubbock Southeast Water Reclamation Plant Outflow

Year	Week	Date	Inflow (gal)	Outflow					
				Xcel Energy (gal)	Discharge (gal)	Discharge 007 (gal)	LReservoir (gal)	HReservoir1 (gal)	Total Outflow (gal)
2017	1	Oct. 1-9	188,280,000	9,240,000	34,070,000	49,420,000	49,400,000	46,150,000	188,280,000
2017	2	Oct. 10-16	142,980,000	2,700,000	34,280,000	36,000,000	36,990,000	33,010,000	142,980,000
2017	3	Oct. 17-23	143,910,000	1,300,000	33,900,000	37,160,000	38,640,000	32,910,000	143,910,000
2017	4	Oct. 24-30	140,130,000	1,020,000	34,970,000	35,850,000	35,420,000	32,870,000	140,130,000
2017	5	Oct. 31-Nov. 6	139,230,000	10,340,000	23,660,000	36,390,000	29,570,000	39,270,000	139,230,000
2017	6	Nov. 7-13	136,520,000	10,960,000	22,280,000	32,640,000	29,930,000	40,710,000	136,520,000
2017	7	Nov. 14-20	135,050,000	2,630,000	36,950,000	23,620,000	30,310,000	41,540,000	135,050,000
2017	8	Nov. 21-27	122,770,000	4,030,000	34,170,000	22,140,000	22,140,000	40,290,000	122,770,000
2017	9	Nov. 28-Dec. 4	103,330,000	3,250,000	35,470,000	6,560,000	54,850,000	3,200,000	103,330,000
2017	10	Dec. 5-11	86,020,000	6,930,000	30,220,000	16,750,000	32,120,000	0	86,020,000
2017	11	Dec. 12-18	96,690,000	3,570,000	34,410,000	24,410,000	24,990,000	9,310,000	96,690,000
2017	12	Dec. 19-25	115,940,000	4,030,000	32,960,000	25,330,000	17,350,000	36,270,000	115,940,000
2018	13	Dec. 26-Jan. 1	114,200,000	11,400,000	23,680,000	22,990,000	19,390,000	36,740,000	114,200,000
2018	14	Jan. 2-8	152,850,000	12,300,000	21,190,000	27,810,000	54,920,000	36,630,000	152,850,000
2018	15	Jan. 9-15	161,730,000	10,920,000	21,980,000	29,090,000	64,180,000	35,560,000	161,730,000
2018	16	Jan. 16-22	167,100,000	5,490,000	26,390,000	34,510,000	64,380,000	36,330,000	167,100,000
2018	17	Jan. 23-29	139,200,000	9,990,000	24,560,000	29,300,000	37,990,000	37,360,000	139,200,000
2018	18	Jan. 30-Feb. 5	134,010,000	9,730,000	26,640,000	24,620,000	36,750,000	36,270,000	134,010,000
2018	19	Feb. 6-12	141,640,000	10,400,000	26,050,000	27,570,000	35,580,000	42,040,000	141,640,000
2018	20	Feb. 13-19	140,050,000	9,890,000	25,500,000	29,780,000	33,090,000	41,790,000	140,050,000
2018	21	Feb. 20-26	137,000,000	10,230,000	22,360,000	30,240,000	34,980,000	39,190,000	137,000,000
2018	22	Feb. 27-Mar. 5	143,350,000	10,240,000	26,570,000	33,000,000	40,330,000	33,210,000	143,350,000
2018	23	Mar. 6-12	133,800,000	12,660,000	17,980,000	28,390,000	40,940,000	33,830,000	133,800,000
2018	24	Mar. 13-19	132,040,000	11,320,000	22,430,000	30,050,000	37,400,000	30,840,000	132,040,000
2018	25	Mar. 20-26	139,840,000	15,750,000	19,910,000	35,070,000	48,460,000	20,650,000	139,840,000
2018	26	Mar. 27-Apr. 2	134,560,000	19,340,000	16,700,000	28,970,000	50,350,000	19,200,000	134,560,000
2018	27	Apr. 3-9	129,680,000	18,460,000	17,150,000	29,780,000	51,370,000	12,920,000	129,680,000
2018	28	Apr. 10-16	130,200,000	6,790,000	28,820,000	28,790,000	31,990,000	33,810,000	130,200,000
2018	29	Apr. 17-23	131,040,000	23,910,000	8,180,000	27,040,000	35,520,000	36,390,000	131,040,000
2018	30	Apr. 24-30	128,820,000	23,030,000	10,230,000	17,440,000	42,800,000	35,320,000	128,820,000
2018	31	May 1-7	130,430,000	20,900,000	13,840,000	19,270,000	45,210,000	31,210,000	130,430,000
2018	32	May 8-14	129,750,000	20,010,000	17,190,000	21,620,000	44,510,000	26,420,000	129,750,000
2018	33	May 15-21	130,230,000	15,160,000	20,230,000	28,230,000	31,480,000	35,130,000	130,230,000
2018	34	May 22-28	127,280,000	25,260,000	12,230,000	23,760,000	38,410,000	27,620,000	127,280,000
2018	35	May 29-Jun. 4	136,290,000	25,610,000	15,820,000	23,210,000	43,710,000	27,940,000	136,290,000
2018	36	Jun. 5-11	127,710,000	20,130,000	13,840,000	23,890,000	42,970,000	26,880,000	127,710,000
2018	37	Jun. 12-18	140,790,000	22,780,000	11,960,000	28,580,000	41,880,000	35,590,000	140,790,000
2018	38	Jun. 19-25	138,830,000	23,890,000	10,910,000	28,450,000	39,050,000	36,530,000	138,830,000
2018	39	Jun. 26-Jul. 2	142,600,000	23,720,000	11,230,000	30,250,000	37,280,000	40,120,000	142,600,000
2018	40	Jul. 3-9	131,440,000	26,040,000	8,590,000	25,130,000	35,840,000	35,840,000	131,440,000
2018	41	Jul. 10-16	0	0	0	0	0	0	0
2018	42	Jul. 17-23	0	0	0	0	0	0	0
2018	43	Jul. 24-30	0	0	0	0	0	0	0
2018	44	Jul. 31-Aug. 6	0	0	0	0	0	0	0
2018	45	Aug. 7-13	0	0	0	0	0	0	0
2018	46	Aug. 14-20	0	0	0	0	0	0	0
2018	47	Aug. 21-27	0	0	0	0	0	0	0
2018	48	Aug. 28-Sep. 3	0	0	0	0	0	0	0
2018	49	Sep. 4-10	0	0	0	0	0	0	0
2018	50	Sep. 11-17	0	0	0	0	0	0	0
2018	51	Sep. 18-24	0	0	0	0	0	0	0
2018	52	Sep. 25-30	0	0	0	0	0	0	0
2018	Total		5,377,310,000	515,350,000	909,500,000	1,113,100,000	1,562,470,000	1,276,890,000	5,377,310,000

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ATTACHMENT TR-18

Lab Reports

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Water Reclamation
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SAMPLE CROSS REFERENCE

Project
1093785

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SEWRP

City of Lubbock
Craig Anderson
Water Reclamation
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3603 Guava
Lubbock, TX 79457-

Sample	Sample ID	Taken	Time	Received
2277372	*12953*	02/28/2024	10:00:00	03/01/2024

Bottle 01 Client Supplied Amber Glass
Bottle 02 Client Supplied Amber Glass
Bottle 03 Client Supplied Amber Glass
Bottle 04 Client Supplied Amber Glass
Bottle 05 Client Supplied Amber Glass
Bottle 06 Client Supplied Amber Glass
Bottle 07 Client Supplied Amber Glass
Bottle 08 Client Supplied Amber Glass
Bottle 09 Prepared Bottle: 632L\632S 2 mL Autosampler Vial (Batch 1107610) Volume: 1.00000 mL <== Derived from 02 (989 ml)
Bottle 10 Prepared Bottle: GCXL\GCXS 2 mL Autosampler Vial (Batch 1107611) Volume: 1.00000 mL <== Derived from 02 (989 ml)
Bottle 11 Prepared Bottle: OPXL/OPXS 2 mL Autosampler Vial (Batch 1107612) Volume: 1.00000 mL <== Derived from 02 (989 ml)
Bottle 12 Prepared Bottle:PCBL 2 mL Autosampler Vial (Batch 1107613) Volume: 1.00000 mL <== Derived from 02 (989 ml)
Bottle 13 Prepared Bottle: 2 mL Autosampler Vial (Batch 1107897) Volume: 10.00000 mL <== Derived from 01 (980 ml)

Method	Bottle	PrepSet	Preparation	QcGroup	Analytical
EPA 608.3	10	1107611	03/05/2024	1108715	03/08/2024
EPA 608.3	12	1107613	03/05/2024	1108745	03/08/2024
EPA 615	13	1107897	03/06/2024	1108395	03/07/2024
EPA 632	09	1107610	03/05/2024	1108592	03/08/2024
EPA 614	11	1107612	03/05/2024	1108838	03/07/2024
EPA 622	11	1107612	03/05/2024	1108835	03/07/2024

Sample	Sample ID	Taken	Time	Received
2277373	*12954*	02/28/2024	10:00:00	03/01/2024

Bottle 01 Client Supplied Amber Glass
Bottle 02 Client Supplied Amber Glass
Bottle 03 Prepared Bottle: 2 mL Autosampler Vial (Batch 1107430) Volume: 1.00000 mL <== Derived from 02 (1020 ml)

Method	Bottle	PrepSet	Preparation	QcGroup	Analytical
EPA 625.1	03	1107430	03/04/2024	1108434	03/08/2024
EPA 625.1	03	1107430	03/04/2024	1108899	03/12/2024

Sample	Sample ID	Taken	Time	Received
2277378	*12955*	02/28/2024	10:00:00	03/01/2024

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Bottle 01 Client Supplied Amber Glass
Bottle 02 H2SO4 to pH <2 Glass Qt w/Teflon lined lid
Bottle 03 Prepared Bottle: 2 mL Autosampler Vial (Batch 1107920) Volume: 1.00000 mL <== Derived from 02 (887 ml)

Method	Bottle	PrepSet	Preparation	QcGroup	Analytical
ASTM D7065-11	03	1107920	03/06/2024	1108679	03/07/2024

Sample	Sample ID	Taken	Time	Received
2277386	*12956*	02/29/2024	04:10:00	03/01/2024

Bottle 01 Client Supplied Amber Glass
Bottle 02 Client Supplied Amber Glass
Bottle 03 Client Supplied Amber Glass
Bottle 04 Client Supplied Amber Glass
Bottle 05 Client Supplied Amber Glass
Bottle 06 Client Supplied Amber Glass
Bottle 07 Client Supplied Amber Glass
Bottle 08 Client Supplied Amber Glass
Bottle 09 Prepared Bottle: 632L\632S 2 mL Autosampler Vial (Batch 1107610) Volume: 1.00000 mL <== Derived from 02 (924 ml)
Bottle 10 Prepared Bottle: GCXL\GCXS 2 mL Autosampler Vial (Batch 1107611) Volume: 1.00000 mL <== Derived from 02 (924 ml)
Bottle 11 Prepared Bottle: OPXL/OPXS 2 mL Autosampler Vial (Batch 1107612) Volume: 1.00000 mL <== Derived from 02 (924 ml)
Bottle 12 Prepared Bottle:PCBL 2 mL Autosampler Vial (Batch 1107613) Volume: 1.00000 mL <== Derived from 02 (924 ml)
Bottle 13 Prepared Bottle: 2 mL Autosampler Vial (Batch 1107897) Volume: 10.00000 mL <== Derived from 04 (922 ml)

Method	Bottle	PrepSet	Preparation	QcGroup	Analytical
EPA 608.3	10	1107611	03/05/2024	1108715	03/08/2024
EPA 608.3	12	1107613	03/05/2024	1108745	03/08/2024
EPA 615	13	1107897	03/06/2024	1108395	03/07/2024
EPA 632	09	1107610	03/05/2024	1108592	03/08/2024
EPA 614	11	1107612	03/05/2024	1108838	03/07/2024
EPA 622	11	1107612	03/05/2024	1108835	03/07/2024

Sample	Sample ID	Taken	Time	Received
2277387	*12957*	02/29/2024	04:10:00	03/01/2024

Bottle 01 Client Supplied Amber Glass
Bottle 02 Client Supplied Amber Glass
Bottle 03 Prepared Bottle: 2 mL Autosampler Vial (Batch 1107430) Volume: 1.00000 mL <== Derived from 02 (921 ml)

Method	Bottle	PrepSet	Preparation	QcGroup	Analytical

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Sample	Sample ID	Taken	Time	Received
2277387	*12957*	02/29/2024	04:10:00	03/01/2024

Bottle 01 Client Supplied Amber Glass
Bottle 02 Client Supplied Amber Glass
Bottle 03 Prepared Bottle: 2 mL Autosampler Vial (Batch 1107430) Volume: 1.00000 mL <== Derived from 02 (921 ml)

Method	Bottle	PrepSet	Preparation	QcGroup	Analytical
EPA 625.1	03	1107430	03/04/2024	1108434	03/08/2024

Sample	Sample ID	Taken	Time	Received
2277388	*12958*	02/29/2024	04:10:00	03/01/2024

Bottle 01 Client Supplied Amber Glass
Bottle 02 H2SO4 to pH <2 Glass Qt w/Teflon lined lid
Bottle 03 Prepared Bottle: 2 mL Autosampler Vial (Batch 1107920) Volume: 1.00000 mL <== Derived from 02 (877 ml)

Method	Bottle	PrepSet	Preparation	QcGroup	Analytical
ASTM D7065-11	03	1107920	03/06/2024	1108679	03/07/2024

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RESULTS

Sample Results

2277372 12953 COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:

Composite Stop 10:00 2/28/24 Taken: 02/28/2024 10:00:00

EPA 608.3 Prepared: 1107611 03/05/2024 13:40:00 Analyzed 1108715 03/08/2024 22:22:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	4,4-DDD	<0.0000101	mg/L	0.0000101		72-54-8	10
NELAC	4,4-DDE	<0.0000101	mg/L	0.0000101		72-55-9	10
NELAC	4,4-DDT	<0.0000101	mg/L	0.0000101		50-29-3	10
NELAC	Aldrin	<0.000016	mg/L	0.000016	M	309-00-2	10
NELAC	Alpha-BHC(hexachlorocyclohexane)	<0.0000101	mg/L	0.0000101		319-84-6	10
NELAC	alpha-Chlordane	<0.0000101	mg/L	0.0000101		5103-71-9	10
NELAC	Beta-BHC(hexachlorocyclohexane)	<0.0000287	mg/L	0.0000287	M	319-85-7	10
NELAC	Delta-BHC(hexachlorocyclohexane)	<0.0000101	mg/L	0.0000101		319-86-8	10
NELAC	Dieldrin	<0.0000101	mg/L	0.0000101		60-57-1	10
NELAC	Endosulfan I (alpha)	<0.00001	mg/L	0.00001		959-98-8	10
NELAC	Endosulfan II (beta)	<0.0000101	mg/L	0.0000101		33213-65-9	10
NELAC	Endosulfan sulfate	<0.0000101	mg/L	0.0000101		1031-07-8	10
NELAC	Endrin	<0.0000101	mg/L	0.0000101		72-20-8	10
NELAC	Endrin aldehyde	<0.0000101	mg/L	0.0000101		7421-93-4	10
NELAC	Gamma-BHC(Lindane)	<0.0000101	mg/L	0.0000101	JM	58-89-9	10
NELAC	gamma-Chlordane	<0.0000101	mg/L	0.0000101		5103-74-2	10
NELAC	Heptachlor	<0.0000323	mg/L	0.0000323	M	76-44-8	10
NELAC	Heptachlor epoxide	<0.00001	mg/L	0.00001		1024-57-3	10
z	Kelthane (Dicofol)	<0.000101	mg/L	0.000101	X	115-32-2	10
NELAC	Methoxychlor	<0.0000101	mg/L	0.0000101	X	72-43-5	10
z	Mirex	<0.0000152	mg/L	0.0000152	S	2385-85-5	10
NELAC	Toxaphene	<0.000202	mg/L	0.000202		8001-35-2	10

EPA 608.3 Prepared: 1107613 03/05/2024 13:40:00 Analyzed 1108745 03/08/2024 22:22:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	PCB-1016	<0.0002	mg/L	0.0002	X	12674-11-2	12
NELAC	PCB-1221	<0.0002	mg/L	0.0002		11104-28-2	12
NELAC	PCB-1232	<0.0002	mg/L	0.0002		11141-16-5	12
NELAC	PCB-1242	<0.0002	mg/L	0.0002		53469-21-9	12
NELAC	PCB-1248	<0.0002	mg/L	0.0002		12672-29-6	12

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2277372 **12953** COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 10:00 2/28/24 Taken: 02/28/2024 10:00:00

EPA 608.3 Prepared: 1107613 03/05/2024 13:40:00 Analyzed 1108745 03/08/2024 22:22:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	PCB-1254	<0.0002	mg/L	0.0002		11097-69-1	12
NELAC	PCB-1260	<0.0002	mg/L	0.0002		11096-82-5	12
NELAC	PCB-1262	<0.000202	mg/L	0.000202		37324-23-5	12
NELAC	PCB-1268	<0.000202	mg/L	0.000202		11100-14-4	12

EPA 614 Prepared: 1107612 03/05/2024 13:40:00 Analyzed 1108838 03/07/2024 21:31:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Azinphos-methyl (Guthion)	<0.0000506	mg/L	0.0000506	X	86-50-0	11
NELAC	Demeton	<0.0000506	mg/L	0.0000506		8065-48-3	11
NELAC	Diazinon	<0.0000506	mg/L	0.0000506		333-41-5	11
NELAC	Malathion	<0.0000506	mg/L	0.0000506		121-75-5	11
NELAC	Parathion, ethyl	<0.0000506	mg/L	0.0000506		56-38-2	11
NELAC	Parathion, methyl	<0.00005	mg/L	0.00005		298-00-0	11

EPA 615 Prepared: 1107897 03/06/2024 13:30:00 Analyzed 1108395 03/07/2024 21:18:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	2,4 Dichlorophenoxyacetic acid	<0.00051	mg/L	0.00051		94-75-7	13
NELAC	2,4,5-TP (Silvex)	<0.0003	mg/L	0.0003		93-72-1	13

EPA 622 Prepared: 1107612 03/05/2024 13:40:00 Analyzed 1108835 03/07/2024 21:31:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Chlorpyrifos	<0.00005	mg/L	0.00005		2921-88-2	11

EPA 632 Prepared: 1107610 03/05/2024 13:40:00 Analyzed 1108592 03/08/2024 16:44:00 BRU

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Carbaryl (Sevin)	<0.00253	mg/L	0.00253		63-25-2	09
z	Diuron	<0.0000455	mg/L	0.0000455		330-54-1	09

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2277373 12954 COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 10:00 2/28/24 Taken: 02/28/2024 10:00:00

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Analyzed 1108434 03/08/2024 02:43:00 DWL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	1,2,4,5-Tetrachlorobenzene	<0.00098	mg/L	0.00098		95-94-3	03
NELAC	1,2,4-Trichlorobenzene	<0.00098	mg/L	0.00098		120-82-1	03
NELAC	1,2-Dichlorobenzene	<0.00098	mg/L	0.00098	X	95-50-1	03
NELAC	1,2-DPH (as azobenzene)	<0.00098	mg/L	0.00098		122-66-7	03
NELAC	1,3-Dichlorobenzene	<0.00098	mg/L	0.00098	X	541-73-1	03
NELAC	1,4-Dichlorobenzene	0.000892	mg/L	0.00098	JX	106-46-7	03
NELAC	2,4,5-Trichlorophenol	<0.00098	mg/L	0.00098		95-95-4	03
NELAC	2,4,6-Trichlorophenol	<0.00098	mg/L	0.00098		88-06-2	03
NELAC	2,4-Dichlorophenol	<0.00098	mg/L	0.00098		120-83-2	03
NELAC	2,4-Dimethylphenol	<0.00235	mg/L	0.00235		105-67-9	03
NELAC	2,4-Dinitrophenol	<0.00882	mg/L	0.00882		51-28-5	03
NELAC	2,4-Dinitrotoluene	<0.00343	mg/L	0.00343		121-14-2	03
NELAC	2,6-Dinitrotoluene	<0.00098	mg/L	0.00098		606-20-2	03
NELAC	2-Chloronaphthalene	<0.00098	mg/L	0.00098		91-58-7	03
NELAC	2-Chlorophenol	<0.00098	mg/L	0.00098		95-57-8	03
NELAC	2-Methylphenol (o-Cresol)	<0.0051	mg/L	0.0051	X	95-48-7	03
NELAC	2-Nitrophenol	<0.00098	mg/L	0.00098		88-75-5	03
NELAC	3&4-Methylphenol (m&p-Cresol)	0.0895	mg/L	0.00608		MEPH34	03
NELAC	3,3'-Dichlorobenzidine	<0.0049	mg/L	0.0049		91-94-1	03
NELAC	4,6-Dinitro-2-methylphenol	<0.00784	mg/L	0.00784		534-52-1	03
NELAC	4-Bromophenyl phenyl ether	<0.00098	mg/L	0.00098		101-55-3	03
NELAC	4-Chlorophenyl phenyl ethe	<0.00098	mg/L	0.00098		7005-72-3	03
NELAC	4-Nitrophenol	<0.00098	mg/L	0.00098		100-02-7	03
NELAC	Acenaphthene	<0.00098	mg/L	0.00098		83-32-9	03
NELAC	Acenaphthylene	<0.00098	mg/L	0.00098		208-96-8	03
NELAC	Anthracene	<0.00098	mg/L	0.00098		120-12-7	03
NELAC	Benzidine	<0.0196	mg/L	0.0196	XD	92-87-5	03
NELAC	Benzo(a)anthracene	<0.00098	mg/L	0.00098		56-55-3	03
NELAC	Benzo(a)pyrene	<0.00098	mg/L	0.00098		50-32-8	03
NELAC	Benzo(b)fluoranthene	<0.00098	mg/L	0.00098		205-99-2	03
NELAC	Benzo(ghi)perylene	<0.00098	mg/L	0.00098		191-24-2	03
NELAC	Benzo(k)fluoranthene	<0.00098	mg/L	0.00098		207-08-9	03
NELAC	Benzyl Butyl phthalate	0.00319	mg/L	0.00735	J	85-68-7	03
NELAC	Bis(2-chloroethoxy)methane	<0.00098	mg/L	0.00098		111-91-1	03
NELAC	Bis(2-chloroethyl)ether	<0.00098	mg/L	0.00098		111-44-4	03
NELAC	Bis(2-chloroisopropyl)ether	<0.00098	mg/L	0.00098		108-60-1	03

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Printed: 03/14/2024

2277373 12954 COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:

Composite Stop 10:00 2/28/24 Taken: 02/28/2024 10:00:00

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Analyzed 1108434 03/08/2024 02:43:00 DWL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Chrysene (Benzo(a)phenanthrene)	<0.00098	mg/L	0.00098		218-01-9	03
NELAC	Dibenz(a,h)anthracene	<0.00098	mg/L	0.00098		53-70-3	03
NELAC	Diethyl phthalate	0.00301	mg/L	0.00559	J	84-66-2	03
NELAC	Dimethyl phthalate	0.00294	mg/L	0.00471	J	131-11-3	03
NELAC	Di-n-butylphthalate	<0.00735	mg/L	0.00735		84-74-2	03
NELAC	Di-n-octylphthalate	<0.00098	mg/L	0.00098	X	117-84-0	03
NELAC	Fluoranthene(Benzo(j,k)fluorene)	<0.00098	mg/L	0.00098		206-44-0	03
NELAC	Fluorene	<0.00098	mg/L	0.00098		86-73-7	03
NELAC	Hexachlorobenzene	<0.00098	mg/L	0.00098		118-74-1	03
NELAC	Hexachlorobutadiene	<0.00098	mg/L	0.00098		87-68-3	03
NELAC	Hexachlorocyclopentadiene	<0.00882	mg/L	0.00882		77-47-4	03
NELAC	Hexachloroethane	<0.00098	mg/L	0.00098	X	67-72-1	03
NELAC	Indeno(1,2,3-cd)pyrene	<0.00098	mg/L	0.00098		193-39-5	03
NELAC	Isophorone	<0.00098	mg/L	0.00098		78-59-1	03
NELAC	Naphthalene	<0.00098	mg/L	0.00098		91-20-3	03
NELAC	Nitrobenzene	<0.00098	mg/L	0.00098		98-95-3	03
NELAC	n-Nitrosodiethylamine	<0.00098	mg/L	0.00098	X	55-18-5	03
NELAC	N-Nitrosodimethylamine	<0.00686	mg/L	0.00686	X	62-75-9	03
NELAC	n-Nitroso-di-n-butylamine	<0.00098	mg/L	0.00098	X	924-16-3	03
NELAC	N-Nitrosodi-n-propylamine	<0.00098	mg/L	0.00098		621-64-7	03
NELAC	N-Nitrosodiphenylamine (as DPA	<0.00098	mg/L	0.00098		86-30-6	03
NELAC	p-Chloro-m-Cresol (4-Chloro-3-me	<0.00235	mg/L	0.00235		59-50-7	03
NELAC	Pentachlorobenzene	<0.00098	mg/L	0.00098		608-93-5	03
NELAC	Pentachlorophenol	<0.00098	mg/L	0.00098		87-86-5	03
NELAC	Phenanthrene	<0.00098	mg/L	0.00098		85-01-8	03
NELAC	Phenol	0.0277	mg/L	0.00147		108-95-2	03
NELAC	Pyrene	<0.00098	mg/L	0.00098		129-00-0	03
NELAC	Pyridine	<0.00529	mg/L	0.00529	XD	110-86-1	03

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Calculated 1108434 03/11/2024 07:37:55 CAL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Cresols Total	0.0895	mg/L	0.00608		1319-77-3, etc.	03

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Analyzed 1108899 03/12/2024 02:05:00 DWL

Parameter	Results	Units	RL	Flags	CAS	Bottle

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Printed: 03/14/2024

2277373 12954 COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 10:00 2/28/24 Taken: 02/28/2024 10:00:00

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Analyzed 1108899 03/12/2024 02:05:00 DWL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Bis(2-ethylhexyl)phthalate	0.00993	mg/L	0.00735		117-81-7	03

2277378 12955 COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 10:00 2/28/24 Taken: 02/28/2024 10:00:00

ASTM D7065-11 Prepared: 1107920 03/06/2024 14:00:00 Analyzed 1108679 03/07/2024 21:37:00 DWL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
	Nonylphenol	0.0337	mg/L	0.0338	J	25154-52-3	03

2277386 12956 COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 04:10 2/29/24 Taken: 02/29/2024 04:10:00

EPA 608.3 Prepared: 1107611 03/05/2024 13:40:00 Analyzed 1108715 03/08/2024 22:40:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	4,4-DDD	<0.0000108	mg/L	0.0000108		72-54-8	10
NELAC	4,4-DDE	<0.0000108	mg/L	0.0000108		72-55-9	10
NELAC	4,4-DDT	<0.0000108	mg/L	0.0000108		50-29-3	10
NELAC	Aldrin	<0.00001	mg/L	0.00001		309-00-2	10
NELAC	Alpha-BHC(hexachlorocyclohexane)	<0.0000108	mg/L	0.0000108		319-84-6	10
NELAC	alpha-Chlordane	<0.0000108	mg/L	0.0000108		5103-71-9	10
NELAC	Beta-BHC(hexachlorocyclohexane)	<0.0000108	mg/L	0.0000108		319-85-7	10
NELAC	Delta-BHC(hexachlorocyclohexane)	<0.0000108	mg/L	0.0000108		319-86-8	10
NELAC	Dieldrin	<0.0000108	mg/L	0.0000108		60-57-1	10
NELAC	Endosulfan I (alpha)	<0.00001	mg/L	0.00001		959-98-8	10
NELAC	Endosulfan II (beta)	<0.0000108	mg/L	0.0000108		33213-65-9	10
NELAC	Endosulfan sulfate	<0.0000108	mg/L	0.0000108		1031-07-8	10
NELAC	Endrin	<0.0000108	mg/L	0.0000108		72-20-8	10

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2277386 **12956** COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 04:10 2/29/24 Taken: 02/29/2024 04:10:00

EPA 608.3 Prepared: 1107611 03/05/2024 13:40:00 Analyzed 1108715 03/08/2024 22:40:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Endrin aldehyde	<0.0000108	mg/L	0.0000108		7421-93-4	10
NELAC	Gamma-BHC(Lindane)	<0.0000108	mg/L	0.0000108		58-89-9	10
NELAC	gamma-Chlordane	<0.0000108	mg/L	0.0000108		5103-74-2	10
NELAC	Heptachlor	<0.0000108	mg/L	0.0000108		76-44-8	10
NELAC	Heptachlor epoxide	<0.0000108	mg/L	0.0000108		1024-57-3	10
z	Kelthane (Dicofol)	<0.000108	mg/L	0.000108	X	115-32-2	10
NELAC	Methoxychlor	<0.0000108	mg/L	0.0000108	X	72-43-5	10
z	Mirex	<0.0000162	mg/L	0.0000162	S	2385-85-5	10
NELAC	Toxaphene	<0.000216	mg/L	0.000216		8001-35-2	10

EPA 608.3 Prepared: 1107613 03/05/2024 13:40:00 Analyzed 1108745 03/08/2024 22:40:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	PCB-1016	<0.0002	mg/L	0.0002	X	12674-11-2	12
NELAC	PCB-1221	<0.0002	mg/L	0.0002		11104-28-2	12
NELAC	PCB-1232	<0.0002	mg/L	0.0002		11141-16-5	12
NELAC	PCB-1242	<0.0002	mg/L	0.0002		53469-21-9	12
NELAC	PCB-1248	<0.0002	mg/L	0.0002		12672-29-6	12
NELAC	PCB-1254	<0.0002	mg/L	0.0002		11097-69-1	12
NELAC	PCB-1260	<0.0002	mg/L	0.0002		11096-82-5	12
NELAC	PCB-1262	<0.000216	mg/L	0.000216		37324-23-5	12
NELAC	PCB-1268	<0.000216	mg/L	0.000216		11100-14-4	12

EPA 614 Prepared: 1107612 03/05/2024 13:40:00 Analyzed 1108838 03/07/2024 21:58:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Azinphos-methyl (Guthion)	<0.0000541	mg/L	0.0000541	X	86-50-0	11
NELAC	Demeton	<0.0000541	mg/L	0.0000541		8065-48-3	11
NELAC	Diazinon	<0.0000541	mg/L	0.0000541		333-41-5	11
NELAC	Malathion	<0.0000541	mg/L	0.0000541		121-75-5	11
NELAC	Parathion, ethyl	<0.0000541	mg/L	0.0000541		56-38-2	11
NELAC	Parathion, methyl	<0.00005	mg/L	0.00005		298-00-0	11

EPA 615 Prepared: 1107897 03/06/2024 13:30:00 Analyzed 1108395 03/07/2024 21:39:00 KAP

Parameter	Results	Units	RL	Flags	CAS	Bottle

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2277386 12956 COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 04:10 2/29/24 Taken: 02/29/2024 04:10:00

EPA 615 Prepared: 1107897 03/06/2024 13:30:00 Analyzed 1108395 03/07/2024 21:39:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	2,4 Dichlorophenoxyacetic acid	<0.000542	mg/L	0.000542		94-75-7	13
NELAC	2,4,5-TP (Silvex)	<0.0003	mg/L	0.0003		93-72-1	13

EPA 622 Prepared: 1107612 03/05/2024 13:40:00 Analyzed 1108835 03/07/2024 21:58:00 KAP

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Chlorpyrifos	<0.00005	mg/L	0.00005		2921-88-2	11

EPA 632 Prepared: 1107610 03/05/2024 13:40:00 Analyzed 1108592 03/08/2024 17:13:00 BRU

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Carbaryl (Sevin)	<0.00271	mg/L	0.00271		63-25-2	09
z	Diuron	<0.0000487	mg/L	0.0000487	D	330-54-1	09

2277387 12957 COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 04:10 2/29/24 Taken: 02/29/2024 04:10:00

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Analyzed 1108434 03/08/2024 01:23:00 DWL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	1,2,4,5-Tetrachlorobenzene	<0.00109	mg/L	0.00109		95-94-3	03
NELAC	1,2,4-Trichlorobenzene	<0.00109	mg/L	0.00109		120-82-1	03
NELAC	1,2-Dichlorobenzene	<0.00109	mg/L	0.00109	X	95-50-1	03
NELAC	1,2-DPH (as azobenzene)	<0.00109	mg/L	0.00109		122-66-7	03
NELAC	1,3-Dichlorobenzene	<0.00109	mg/L	0.00109	X	541-73-1	03
NELAC	1,4-Dichlorobenzene	<0.00109	mg/L	0.00109	X	106-46-7	03
NELAC	2,4,5-Trichlorophenol	<0.00109	mg/L	0.00109		95-95-4	03
NELAC	2,4,6-Trichlorophenol	<0.00109	mg/L	0.00109		88-06-2	03
NELAC	2,4-Dichlorophenol	<0.00109	mg/L	0.00109		120-83-2	03
NELAC	2,4-Dimethylphenol	<0.00261	mg/L	0.00261		105-67-9	03
NELAC	2,4-Dinitrophenol	<0.00977	mg/L	0.00977		51-28-5	03
NELAC	2,4-Dinitrotoluene	<0.0038	mg/L	0.0038		121-14-2	03

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2277387 12957 COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 04:10 2/29/24 Taken: 02/29/2024 04:10:00

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Analyzed 1108434 03/08/2024 01:23:00 DWL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	2,6-Dinitrotoluene	<0.00109	mg/L	0.00109		606-20-2	03
NELAC	2-Chloronaphthalene	<0.00109	mg/L	0.00109		91-58-7	03
NELAC	2-Chlorophenol	<0.00109	mg/L	0.00109		95-57-8	03
NELAC	2-Methylphenol (o-Cresol)	<0.00565	mg/L	0.00565	X	95-48-7	03
NELAC	2-Nitrophenol	<0.00109	mg/L	0.00109		88-75-5	03
NELAC	3&4-Methylphenol (m&p-Cresol)	<0.00673	mg/L	0.00673		MEPH34	03
NELAC	3,3'-Dichlorobenzidine	<0.005	mg/L	0.005		91-94-1	03
NELAC	4,6-Dinitro-2-methylphenol	<0.00869	mg/L	0.00869		534-52-1	03
NELAC	4-Bromophenyl phenyl ether	<0.00109	mg/L	0.00109		101-55-3	03
NELAC	4-Chlorophenyl phenyl ethe	<0.00109	mg/L	0.00109		7005-72-3	03
NELAC	4-Nitrophenol	<0.00109	mg/L	0.00109		100-02-7	03
NELAC	Acenaphthene	<0.00109	mg/L	0.00109		83-32-9	03
NELAC	Acenaphthylene	<0.00109	mg/L	0.00109		208-96-8	03
NELAC	Anthracene	<0.00109	mg/L	0.00109		120-12-7	03
NELAC	Benzidine	<0.0217	mg/L	0.0217	XD	92-87-5	03
NELAC	Benzo(a)anthracene	<0.00109	mg/L	0.00109		56-55-3	03
NELAC	Benzo(a)pyrene	<0.00109	mg/L	0.00109		50-32-8	03
NELAC	Benzo(b)fluoranthene	<0.00109	mg/L	0.00109		205-99-2	03
NELAC	Benzo(ghi)perylene	<0.00109	mg/L	0.00109		191-24-2	03
NELAC	Benzo(k)fluoranthene	<0.00109	mg/L	0.00109		207-08-9	03
NELAC	Benzyl Butyl phthalate	0.00183	mg/L	0.00814	J	85-68-7	03
NELAC	Bis(2-chloroethoxy)methane	<0.00109	mg/L	0.00109		111-91-1	03
NELAC	Bis(2-chloroethyl)ether	<0.00109	mg/L	0.00109		111-44-4	03
NELAC	Bis(2-chloroisopropyl)ether	<0.00109	mg/L	0.00109		108-60-1	03
NELAC	Bis(2-ethylhexyl)phthalate	<0.00814	mg/L	0.00814	X	117-81-7	03
NELAC	Chrysene (Benzo(a)phenanthrene)	<0.00109	mg/L	0.00109		218-01-9	03
NELAC	Dibenz(a,h)anthracene	<0.00109	mg/L	0.00109		53-70-3	03
NELAC	Diethyl phthalate	<0.00619	mg/L	0.00619		84-66-2	03
NELAC	Dimethyl phthalate	0.00127	mg/L	0.00521	J	131-11-3	03
NELAC	Di-n-butylphthalate	0.00148	mg/L	0.00814	J	84-74-2	03
NELAC	Di-n-octylphthalate	<0.00109	mg/L	0.00109	X	117-84-0	03
NELAC	Fluoranthene(Benzo(j,k)fluorene)	<0.00109	mg/L	0.00109		206-44-0	03
NELAC	Fluorene	<0.00109	mg/L	0.00109		86-73-7	03
NELAC	Hexachlorobenzene	<0.00109	mg/L	0.00109		118-74-1	03
NELAC	Hexachlorobutadiene	<0.00109	mg/L	0.00109		87-68-3	03
NELAC	Hexachlorocyclopentadiene	<0.00977	mg/L	0.00977		77-47-4	03

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Printed: 03/14/2024

2277387 12957 COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 04:10 2/29/24 Taken: 02/29/2024 04:10:00

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Analyzed 1108434 03/08/2024 01:23:00 DWL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Hexachloroethane	<0.00109	mg/L	0.00109	X	67-72-1	03
NELAC	Indeno(1,2,3-cd)pyrene	<0.00109	mg/L	0.00109		193-39-5	03
NELAC	Isophorone	<0.00109	mg/L	0.00109		78-59-1	03
NELAC	Naphthalene	<0.00109	mg/L	0.00109		91-20-3	03
NELAC	Nitrobenzene	<0.00109	mg/L	0.00109		98-95-3	03
NELAC	n-Nitrosodiethylamine	<0.00109	mg/L	0.00109	X	55-18-5	03
NELAC	N-Nitrosodimethylamine	<0.0076	mg/L	0.0076	X	62-75-9	03
NELAC	n-Nitroso-di-n-butylamine	<0.00109	mg/L	0.00109	X	924-16-3	03
NELAC	N-Nitrosodi-n-propylamine	<0.00109	mg/L	0.00109		621-64-7	03
NELAC	N-Nitrosodiphenylamine (as DPA	<0.00109	mg/L	0.00109		86-30-6	03
NELAC	p-Chloro-m-Cresol (4-Chloro-3-me	<0.00261	mg/L	0.00261		59-50-7	03
NELAC	Pentachlorobenzene	<0.00109	mg/L	0.00109		608-93-5	03
NELAC	Pentachlorophenol	<0.00109	mg/L	0.00109		87-86-5	03
NELAC	Phenanthrene	<0.00109	mg/L	0.00109		85-01-8	03
NELAC	Phenol	<0.00163	mg/L	0.00163		108-95-2	03
NELAC	Pyrene	<0.00109	mg/L	0.00109		129-00-0	03
NELAC	Pyridine	<0.00586	mg/L	0.00586	XD	110-86-1	03

EPA 625.1 Prepared: 1107430 03/04/2024 14:00:00 Calculated 1108434 03/11/2024 07:37:56 CAL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
NELAC	Cresols Total	<0.00673	mg/L	0.00673		1319-77-3, etc.	03

2277388 12958 COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Non-Potable Water Collected by: Client City of Lubbock PO:
Composite Stop 04:10 2/29/24 Taken: 02/29/2024 04:10:00

ASTM D7065-11 Prepared: 1107920 03/06/2024 14:00:00 Analyzed 1108679 03/07/2024 17:57:00 DWL

	Parameter	Results	Units	RL	Flags	CAS	Bottle
2	Nonylphenol	<0.0342	mg/L	0.0342		25154-52-3	03

Sample Preparation

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Printed: 03/14/2024

2277372 **12953** COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Composite Stop 10:00 2/28/24 02/28/2024

		Prepared:		03/01/2024	15:39:26	Calculated		03/01/2024	15:39:26	CAL
2	**Environmental Fee (per Project)**	**Verified**								
	EPA 608.3	*Prepared:*	*1107611*	*03/05/2024*	*13:40:00*	*Analyzed*	*1107611*	*03/05/2024*	*13:40:00*	*MCC*
	Liquid-Liquid Extr. W/Hex Ex	**1/989**	**ml**							02
	EPA 608.3	*Prepared:*	*1107611*	*03/05/2024*	*13:40:00*	*Analyzed*	*1108715*	*03/08/2024*	*22:22:00*	*KAP*
NELAC	**Pesticides Method 608.3 full lis**	**Entered**								10
	EPA 608.3	*Prepared:*	*1107612*	*03/05/2024*	*13:40:00*	*Analyzed*	*1107612*	*03/05/2024*	*13:40:00*	*MCC*
	Solvent Extraction	**1/989**	**ml**							02
	EPA 608.3	*Prepared:*	*1107613*	*03/05/2024*	*13:40:00*	*Analyzed*	*1107613*	*03/05/2024*	*13:40:00*	*MCC*
	PCB Liq-Liq Extr. W/Hex Exch.	**1/989**	**ml**							02
	EPA 608.3	*Prepared:*	*1107613*	*03/05/2024*	*13:40:00*	*Analyzed*	*1108745*	*03/08/2024*	*22:22:00*	*KAP*
NELAC	**Polychlorinated Biphenyls**	**Entered**								12
	EPA 614	*Prepared:*	*1107612*	*03/05/2024*	*13:40:00*	*Analyzed*	*1108838*	*03/07/2024*	*21:31:00*	*KAP*
2	**Permit Organophos. Pesticides**	**Entered**								11
	EPA 615	*Prepared:*	*1107897*	*03/06/2024*	*13:30:00*	*Analyzed*	*1107897*	*03/06/2024*	*13:30:00*	*MCC*
NELAC	**Esterification of Sample**	**10/980**	**ml**							01

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2277372 **12953** COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Composite Stop 10:00 2/28/24 02/28/2024

EPA 615	Prepared:	1107897	03/06/2024	13:30:00	Analyzed	1108395	03/07/2024	21:18:00	KAP
NELAC **Herbicides by GC**	**Entered**								13
EPA 622	Prepared:	1107612	03/05/2024	13:40:00	Analyzed	1108835	03/07/2024	21:31:00	KAP
NELAC **For use with EXP !CPP only**	**Entered**								11
EPA 632	Prepared:	1107610	03/05/2024	13:40:00	Analyzed	1107610	03/05/2024	13:40:00	MCC
Liquid-Liquid Extr. W/Hex Ex	**1/989**	**ml**							02
EPA 632	Prepared:	1107610	03/05/2024	13:40:00	Analyzed	1108592	03/08/2024	16:44:00	BRU
NELAC **Carbaryl/Diuron**	**Entered**								09

2277373 **12954** COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Composite Stop 10:00 2/28/24 02/28/2024

EPA 625.1	Prepared:	1107430	03/04/2024	14:00:00	Analyzed	1107430	03/04/2024	14:00:00	MCC
Liquid-Liquid Extraction, BNA	**1/1020**	**ml**							02
EPA 625.1	Prepared:	1107430	03/04/2024	14:00:00	Analyzed	1108434	03/08/2024	02:43:00	DWL
z **Table 2 & 7 Semivolatiles**	**Entered**								03

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2277378 **12955** COMP 2/27 1000-2/28 1000 Received: 03/01/2024

Composite Stop 10:00 2/28/24 02/28/2024

	Prepared: 1107214	03/01/2024	15:02:00	Analyzed	1107214	03/01/2024	15:02:00	KAT
2 **Bottle Poured Up in Lab**	**BOTTLE 02**	**FROM 01**						
ASTM D7065-11	Prepared: 1107920	03/06/2024	14:00:00	Analyzed	1108679	03/07/2024	21:37:00	DWL
2 **Nonyl Phenol Expansion**	**Entered**							03
EPA 625.1	Prepared: 1107920	03/06/2024	14:00:00	Analyzed	1107920	03/06/2024	14:00:00	MCC
Nonylphenol Liq-Liq Extract	**1/887**	**ml**						02

2277386 **12956** COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Composite Stop 04:10 2/29/24 02/29/2024

EPA 608.3	Prepared: 1107611	03/05/2024	13:40:00	Analyzed	1107611	03/05/2024	13:40:00	MCC
Liquid-Liquid Extr. W/Hex Ex	**1/924**	**ml**						02
EPA 608.3	Prepared: 1107611	03/05/2024	13:40:00	Analyzed	1108715	03/08/2024	22:40:00	KAP
NELAC **Pesticides Method 608.3 full lis**	**Entered**							10
EPA 608.3	Prepared: 1107612	03/05/2024	13:40:00	Analyzed	1107612	03/05/2024	13:40:00	MCC
Solvent Extraction	**1/924**	**ml**						02
EPA 608.3	Prepared: 1107613	03/05/2024	13:40:00	Analyzed	1107613	03/05/2024	13:40:00	MCC

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2277386 12956 COMP 2/28 0600-2/29 0410 Received: 03/01/2024

Composite Stop 04:10 2/29/24 02/29/2024

	EPA 608.3	Prepared:	1107613	03/05/2024	13:40:00	Analyzed	1107613	03/05/2024	13:40:00	MCC
	PCB Liq-Liq Extr. W/Hex Exch.	1/924	ml							02
	EPA 608.3	Prepared:	1107613	03/05/2024	13:40:00	Analyzed	1108745	03/08/2024	22:40:00	KAP
NELAC	Polychlorinated Biphenyls	Entered								12
	EPA 614	Prepared:	1107612	03/05/2024	13:40:00	Analyzed	1108538	03/07/2024	21:58:00	KAP
z	Permit Organophos. Pesticides	Entered								11
	EPA 615	Prepared:	1107897	03/06/2024	13:30:00	Analyzed	1107897	03/06/2024	13:30:00	MCC
NELAC	Esterification of Sample	10/922	ml							04
	EPA 615	Prepared:	1107897	03/06/2024	13:30:00	Analyzed	1108395	03/07/2024	21:39:00	KAP
NELAC	Herbicides by GC	Entered								13
	EPA 622	Prepared:	1107612	03/05/2024	13:40:00	Analyzed	1108535	03/07/2024	21:58:00	KAP
NELAC	For use with EXP !CPP only	Entered								11
	EPA 632	Prepared:	1107610	03/05/2024	13:40:00	Analyzed	1107610	03/05/2024	13:40:00	MCC
	Liquid-Liquid Extr. W/Hex Ex	1/924	ml							02
	EPA 632	Prepared:	1107610	03/05/2024	13:40:00	Analyzed	1108592	03/08/2024	17:13:00	BRU
NELAC	Carbaryl/Diuron	Entered								09

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2277387 **12957** COMP 2/28 0600-2/29 0410 *Received:* 03/01/2024

Composite Stop 04:10 2/29/24 02/29/2024

EPA 625.1	*Prepared:*	*1107430*	*03/04/2024*	*14:00:00*	*Analyzed*	*1107430*	*03/04/2024*	*14:00:00*	*MCC*
Liquid-Liquid Extraction, BNA	**1/921**	**ml**							02
EPA 625.1	*Prepared:*	*1107430*	*03/04/2024*	*14:00:00*	*Analyzed*	*1108434*	*03/08/2024*	*01:23:00*	*DWL*
z **Table 2 & 7 Semivolatiles**	**Entered**								03

2277388 **12958** COMP 2/28 0600-2/29 0410 *Received:* 03/01/2024

Composite Stop 04:10 2/29/24 02/29/2024

	Prepared:	*1107214*	*03/01/2024*	*15:11:00*	*Analyzed*	*1107214*	*03/01/2024*	*15:11:00*	*KAT*
z **Bottle Poured Up in Lab**	**BOTTLE 02**	**FROM BOTTL**							
ASTM D7065-11	*Prepared:*	*1107920*	*03/06/2024*	*14:00:00*	*Analyzed*	*1108679*	*03/07/2024*	*17:57:00*	*DWL*
z **Nonyl Phenol Expansion**	**Entered**								03
EPA 625.1	*Prepared:*	*1107920*	*03/06/2024*	*14:00:00*	*Analyzed*	*1107920*	*03/06/2024*	*14:00:00*	*MCC*
Nonylphenol Liq-Liq Extract	**1/877**	**ml**							02

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Qualifiers

J - Analyte detected below quantitation limit
D - Duplicate RPD was higher than expected
M - High reporting level resulting from matrix interference
X - Standard reads higher than desired.
S - Standard reads lower than desired

We report results on an As Received (or Wet) basis unless marked Dry Weight.

Unless otherwise noted, testing was performed at SPL, Inc - Kilgore laboratory which holds International, Federal, and state accreditations. Please see our Websites for details

(N)ELAC - Covered in our NELAC scope of accreditation
z -- Not covered by our NELAC scope of accreditation

These analytical results relate to the sample tested. This report may NOT be reproduced EXCEPT in FULL without written approval of SPL Kilgore. Unless otherwise specified, these test results meet the requirements of NELAC
RL is the Reporting Limit (sample specific quantitation limit) and is at or above the Method Detection Limit (MDL). CAS is Chemical Abstract Service number. RL is our Reporting Limit, or Minimum Quantitation Level. The RL takes into account the Instrument Detection Limit (IDL), Method Detection Limit (MDL), and Practical Quantitation Limit (POL), and any dilutions and/or concentrations performed during sample preparation (EQL). Our analytical result must be above this RL before we report a value in the 'Results' column of our report (without a 'J' flag). Otherwise, we report ND (Not Detected above RL), because the result is "<" (less than) the number in the RL column. MAL is Minimum Analytical Level and is typically from regulatory agencies. Unless we report a result in the result column, or interferences prevent it, we work to have our RL at or below the MAL.

Bill Peery

Bill Peery, MS, VP Technical Services

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Analytical Set 1108395 — EPA 615

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
2,4 Dichlorophenoxyacetic acid	1107897	ND	0.159	0.500	ug/L	126077526
2,4,5-TP (Silvex)	1107897	ND	0.0893	0.300	ug/L	126077526

CCV

Parameter	Reading	Known	Units	Recover%	Limits%	File
2,4 Dichlorophenoxyacetic acid	148	150	ug/L	98.7	80.0 - 115	126077525
2,4 Dichlorophenoxyacetic acid	143	150	ug/L	95.6	80.0 - 115	126077534
2,4,5-TP (Silvex)	151	150	ug/L	101	80.0 - 115	126077525
2,4,5-TP (Silvex)	141	150	ug/L	94.1	80.0 - 115	126077534

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
2,4 Dichlorophenoxyacetic acid	1107897	1.07	0.911	1.00	0.100 - 319	107	91.1	ug/L	16.1	30.0
2,4,5-TP (Silvex)	1107897	0.813	0.805	1.00	0.100 - 244	81.3	80.5	ug/L	0.989	30.0

Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
2,4-Dichlorophenylacetic Acid		CCV	146	200	ug/L	73.0	0.100 - 313	126077525
2,4-Dichlorophenylacetic Acid		CCV	136	200	ug/L	68.0	0.100 - 313	126077534
2,4-Dichlorophenylacetic Acid	1107897	Blank	117	200	ug/L	58.5	0.100 - 313	126077526
2,4-Dichlorophenylacetic Acid	1107897	LCS	108	200	ug/L	54.0	0.100 - 313	126077527
2,4-Dichlorophenylacetic Acid	1107897	LCS Dup	112	200	ug/L	56.0	0.100 - 313	126077528
2,4-Dichlorophenylacetic Acid	2277372	Unknown	0.014	2.04	ug/L	0.686	0.100 - 313	126077529
2,4-Dichlorophenylacetic Acid	2277386	Unknown	1.07	2.17	ug/L	49.3	0.100 - 313	126077530

Analytical Set 1108434 — EPA 625.1

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
1,2,4,5-Tetrachlorobenzene	1107430	ND	0.517	1.00	ug/L	126078697
1,2,4-Trichlorobenzene	1107430	ND	0.720	1.00	ug/L	126078697
1,2-Dichlorobenzene	1107430	ND	0.598	1.00	ug/L	126078697
1,2-DPH (as azobenzene)	1107430	ND	0.695	1.00	ug/L	126078697
1,3-Dichlorobenzene	1107430	ND	0.686	1.00	ug/L	126078697
1,4-Dichlorobenzene	1107430	ND	0.633	1.00	ug/L	126078697
2,4,5-Trichlorophenol	1107430	ND	0.734	1.00	ug/L	126078697
2,4,6-Trichlorophenol	1107430	ND	0.704	1.00	ug/L	126078697
2,4-Dichlorophenol	1107430	ND	0.567	1.00	ug/L	126078697
2,4-Dimethylphenol	1107430	ND	2.32	2.40	ug/L	126078697
2,4-Dinitrophenol	1107430	ND	8.07	9.00	ug/L	126078697
2,4-Dinitrotoluene	1107430	ND	3.35	3.50	ug/L	126078697
2,6-Dinitrotoluene	1107430	ND	0.675	1.00	ug/L	126078697
2-Chloronaphthalene	1107430	ND	0.333	1.00	ug/L	126078697
2-Chlorophenol	1107430	ND	0.367	1.00	ug/L	126078697

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Parameter	PrepSet	Reading	MDL	MQL	Units	File
2-Methylphenol (o-Cresol)	1107430	ND	5.13	5.20	ug/L	126078697
2-Nitrophenol	1107430	ND	0.495	1.00	ug/L	126078697
3&4-Methylphenol (m&p-Cresol)	1107430	ND	6.15	6.20	ug/L	126078697
3,3'-Dichlorobenzidine	1107430	ND	4.79	5.00	ug/L	126078697
4,6-Dinitro-2-methylphenol	1107430	ND	7.88	8.00	ug/L	126078697
4-Bromophenyl phenyl ether	1107430	ND	0.311	1.00	ug/L	126078697
4-Chlorophenyl phenyl ethe	1107430	ND	0.281	1.00	ug/L	126078697
4-Nitrophenol	1107430	ND	0.932	1.00	ug/L	126078697
Acenaphthene	1107430	ND	0.139	1.00	ug/L	126078697
Acenaphthylene	1107430	ND	0.202	1.00	ug/L	126078697
Anthracene	1107430	ND	0.538	1.00	ug/L	126078697
Benzidine	1107430	ND	19.9	20.0	ug/L	126078697
Benzo(a)anthracene	1107430	ND	0.627	1.00	ug/L	126078697
Benzo(a)pyrene	1107430	ND	0.478	1.00	ug/L	126078697
Benzo(b)fluoranthene	1107430	ND	0.517	1.00	ug/L	126078697
Benzo(ghi)perylene	1107430	ND	0.750	1.00	ug/L	126078697
Benzo(k)fluoranthene	1107430	ND	0.763	1.00	ug/L	126078697
Benzyl Butyl phthalate	1107430	1.20	0.696	7.50	ug/L	126078697
Bis(2-chloroethoxy)methane	1107430	ND	0.312	1.00	ug/L	126078697
Bis(2-chloroethyl)ether	1107430	ND	0.434	1.00	ug/L	126078697
Bis(2-chloroisopropyl)ether	1107430	ND	0.448	1.00	ug/L	126078697
Bis(2-ethylhexyl)phthalate	1107430	ND	1.63	7.50	ug/L	126078697
Chrysene (Benzo(a)phenanthrene)	1107430	ND	0.575	1.00	ug/L	126078697
Dibenz(a,h)anthracene	1107430	ND	0.872	1.00	ug/L	126078697
Diethyl phthalate	1107430	ND	0.721	5.70	ug/L	126078697
Dimethyl phthalate	1107430	ND	0.497	4.80	ug/L	126078697
Di-n-butylphthalate	1107430	ND	0.834	7.50	ug/L	126078697
Di-n-octylphthalate	1107430	ND	0.782	1.00	ug/L	126078697
Fluoranthene(Benzo(j,k)fluorene)	1107430	ND	0.772	1.00	ug/L	126078697
Fluorene	1107430	ND	0.512	1.00	ug/L	126078697
Hexachlorobenzene	1107430	ND	0.187	1.00	ug/L	126078697
Hexachlorobutadiene	1107430	ND	0.618	1.00	ug/L	126078697
Hexachlorocyclopentadiene	1107430	ND	8.69	9.00	ug/L	126078697
Hexachloroethane	1107430	ND	0.789	1.00	ug/L	126078697
Indeno(1,2,3-cd)pyrene	1107430	ND	0.793	1.00	ug/L	126078697
Isophorone	1107430	ND	0.468	1.00	ug/L	126078697
Naphthalene	1107430	ND	0.387	1.00	ug/L	126078697
Nitrobenzene	1107430	ND	0.390	1.00	ug/L	126078697
n-Nitrosodiethylamine	1107430	ND	0.282	1.00	ug/L	126078697
N-Nitrosodimethylamine	1107430	ND	6.64	7.00	ug/L	126078697
n-Nitroso-di-n-butylamine	1107430	ND	0.403	1.00	ug/L	126078697
N-Nitrosodi-n-propylamine	1107430	ND	0.777	1.00	ug/L	126078697
N-Nitrosodiphenylamine (as DPA	1107430	ND	0.427	1.00	ug/L	126078697
p-Chloro-m-Cresol (4-Chloro-3-me	1107430	ND	2.35	2.40	ug/L	126078697

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Project 1093785

Printed 03/14/2024

LUB2-P

City of Lubbock
Craig Anderson
Water Reclamation
P O Box 2000
3603 Guava
Lubbock, TX 79457-

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
Pentachlorobenzene	1107430	ND	0.420	1.00	ug/L	126078697
Pentachlorophenol	1107430	ND	0.129	1.00	ug/L	126078697
Phenanthrene	1107430	ND	0.624	1.00	ug/L	126078697
Phenol	1107430	ND	1.50	1.50	ug/L	126078697
Pyrene	1107430	ND	0.587	1.00	ug/L	126078697
Pyridine	1107430	ND	5.33	5.40	ug/L	126078697

CCV

Parameter	Reading	Known	Units	Recover%	Limits%	File
1,2,4,5-Tetrachlorobenzene	47200	50000	ug/L	94.4	60.0 - 140	126078693
1,2,4-Trichlorobenzene	54400	50000	ug/L	109	61.0 - 130	126078693
1,2-Dichlorobenzene	50100	50000	ug/L	100	60.0 - 140	126078693
1,2-DPH (as azobenzene)	51600	50000	ug/L	103	60.0 - 140	126078693
1,3-Dichlorobenzene	58000	50000	ug/L	116	60.0 - 140	126078693
1,4-Dichlorobenzene	52700	50000	ug/L	105	60.0 - 140	126078693
2,4,5-Trichlorophenol	48100	50000	ug/L	96.2	69.0 - 130	126078693
2,4,6-Trichlorophenol	50000	50000	ug/L	100	69.0 - 130	126078693
2,4-Dichlorophenol	52800	50000	ug/L	106	64.0 - 130	126078693
2,4-Dimethylphenol	51900	50000	ug/L	104	58.0 - 130	126078693
2,4-Dinitrophenol	45100	50000	ug/L	90.2	39.0 - 173	126078693
2,4-Dinitrotoluene	57400	50000	ug/L	115	53.0 - 130	126078693
2,6-Dinitrotoluene	53700	50000	ug/L	107	68.0 - 137	126078693
2-Chloronaphthalene	37600	50000	ug/L	75.2	70.0 - 130	126078693
2-Chlorophenol	58500	50000	ug/L	117	55.0 - 130	126078693
2-Methylphenol (o-Cresol)	47200	50000	ug/L	94.4	60.0 - 140	126078693
2-Nitrophenol	54100	50000	ug/L	108	61.0 - 163	126078693
3&4-Methylphenol (m&p-Cresol)	46800	50000	ug/L	93.6	60.0 - 140	126078693
3,3'-Dichlorobenzidine	53700	50000	ug/L	107	18.0 - 213	126078693
4,6-Dinitro-2-methylphenol	43600	50000	ug/L	87.2	56.0 - 130	126078693
4-Bromophenyl phenyl ether	58300	50000	ug/L	117	70.0 - 130	126078693
4-Chlorophenyl phenyl ethe	46700	50000	ug/L	93.4	57.0 - 145	126078693
4-Nitrophenol	60200	50000	ug/L	120	35.0 - 135	126078693
Acenaphthene	55700	50000	ug/L	111	70.0 - 130	126078693
Acenaphthylene	54200	50000	ug/L	108	60.0 - 130	126078693
Anthracene	60200	50000	ug/L	120	58.0 - 130	126078693
Benzidine	34300	50000	ug/L	68.6	20.0 - 180	126078693
Benzo(a)anthracene	55100	50000	ug/L	110	42.0 - 133	126078693
Benzo(a)pyrene	55800	50000	ug/L	112	32.0 - 148	126078693
Benzo(b)fluoranthene	58500	50000	ug/L	117	42.0 - 140	126078693
Benzo(ghi)perylene	45600	50000	ug/L	91.2	13.0 - 195	126078693
Benzo(k)fluoranthene	72400	50000	ug/L	145	25.0 - 146	126078693
Benzyl Butyl phthalate	61100	50000	ug/L	122	43.0 - 140	126078693
Bis(2-chloroethoxy)methane	59200	50000	ug/L	118	52.0 - 164	126078693
Bis(2-chloroethyl)ether	62600	50000	ug/L	125	52.0 - 130	126078693

Email: Kilgore.ProjectManagement@spllabs.com

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CCV

Parameter	Reading	Known	Units	Recover%	Limits%		File
Bis(2-chloroisopropyl)ether	59700	50000	ug/L	119	63.0 - 139		126078693
Bis(2-ethylhexyl)phthalate	77600	50000	ug/L	155	43.0 - 137	*	126078693
Chrysene (Benzo(a)phenanthrene)	65400	50000	ug/L	131	44.0 - 140		126078693
Dibenz(a,h)anthracene	44100	50000	ug/L	88.2	13.0 - 200		126078693
Diethyl phthalate	56400	50000	ug/L	113	47.0 - 130		126078693
Dimethyl phthalate	63300	50000	ug/L	127	50.0 - 130		126078693
Di-n-butylphthalate	60100	50000	ug/L	120	52.0 - 130		126078693
Di-n-octylphthalate	86900	50000	ug/L	174	21.0 - 132	*	126078693
Fluoranthene(Benzo(j,k)fluorene)	55000	50000	ug/L	110	47.0 - 130		126078693
Fluorene	49600	50000	ug/L	99.2	70.0 - 130		126078693
Hexachlorobenzene	57100	50000	ug/L	114	38.0 - 142		126078693
Hexachlorobutadiene	50900	50000	ug/L	102	68.0 - 130		126078693
Hexachlorocyclopentadiene	36200	50000	ug/L	72.4	60.0 - 140		126078693
Hexachloroethane	69700	50000	ug/L	139	55.0 - 130	*	126078693
Indeno(1,2,3-cd)pyrene	44000	50000	ug/L	88.0	13.0 - 151		126078693
Isophorone	76300	50000	ug/L	153	52.0 - 180		126078693
Naphthalene	54300	50000	ug/L	109	70.0 - 130		126078693
Nitrobenzene	60200	50000	ug/L	120	54.0 - 158		126078693
n-Nitrosodiethylamine	59700	50000	ug/L	119	60.0 - 140		126078693
N-Nitrosodimethylamine	44800	50000	ug/L	89.6	60.0 - 140		126078693
n-Nitroso-di-n-butylamine	52400	50000	ug/L	105	60.0 - 140		126078693
N-Nitrosodi-n-propylamine	59900	50000	ug/L	120	59.0 - 170		126078693
N-Nitrosodiphenylamine (as DPA	48100	50000	ug/L	96.2	60.0 - 140		126078693
p-Chloro-m-Cresol (4-Chloro-3-me	54900	50000	ug/L	110	68.0 - 130		126078693
Pentachlorobenzene	49400	50000	ug/L	98.8	60.0 - 140		126078693
Pentachlorophenol	53900	50000	ug/L	108	42.0 - 152		126078693
Phenanthrene	58000	50000	ug/L	116	67.0 - 130		126078693
Phenol	59000	50000	ug/L	118	48.0 - 130		126078693
Pyrene	55400	50000	ug/L	111	70.0 - 130		126078693
Pyridine	43400	50000	ug/L	86.8	60.0 - 140		126078693

DFTPP

Parameter		RefMass	Reading	%	Limits%	File
DFTPP Mass 127	623138	198	9885	57.9	40.0 - 60.0	126078692
DFTPP Mass 197	623138	198	21	0.1	0 - 1.00	126078692
DFTPP Mass 198	623138	198	17074	100.0	100 - 100	126078692
DFTPP Mass 199	623138	198	1192	7.0	5.00 - 9.00	126078692
DFTPP Mass 275	623138	198	4629	27.1	10.0 - 30.0	126078692
DFTPP Mass 365	623138	198	820	4.8	1.00 - 100	126078692
DFTPP Mass 441	623138	443	2337	98.4	0 - 100	126078692
DFTPP Mass 442	623138	198	11335	66.4	40.0 - 100	126078692
DFTPP Mass 443	623138	442	2376	21.0	17.0 - 23.0	126078692
DFTPP Mass 51	623138	198	6339	37.1	30.0 - 60.0	126078692
DFTPP Mass 68	623138	69.0	15	0.1	0 - 2.00	126078692

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DFTPP

Parameter		RefMass	Reading	%	Limits%		File
DFTPP Mass 69	623138	198	10434	61.1	0 - 100		126078692
DFTPP Mass 70	623138	69.0	58	0.6	0 - 2.00		126078692

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
1,2,4,5-Tetrachlorobenzene	1107430	18.0	21.1	25.0	27.5 - 85.5	72.0	84.4	ug/L	15.9	50.0
1,2,4-Trichlorobenzene	1107430	19.3	20.6	25.0	44.0 - 142	77.2	82.4	ug/L	6.52	50.0
1,2-Dichlorobenzene	1107430	19.2	20.9	25.0	23.0 - 81.8	76.8	83.6 *	ug/L	8.48	50.0
1,2-DPH (as azobenzene)	1107430	25.8	25.6	25.0	12.6 - 110	103	102	ug/L	0.976	50.0
1,3-Dichlorobenzene	1107430	18.8	20.9	25.0	21.1 - 80.5	75.2	83.6 *	ug/L	10.6	50.0
1,4-Dichlorobenzene	1107430	18.7	20.3	25.0	21.4 - 76.9	74.8	81.2 *	ug/L	8.21	50.0
2,4,5-Trichlorophenol	1107430	22.4	22.1	25.0	51.3 - 109	89.6	88.4	ug/L	1.35	50.0
2,4,6-Trichlorophenol	1107430	23.2	23.5	25.0	37.0 - 144	92.8	94.0	ug/L	1.28	58.0
2,4-Dichlorophenol	1107430	21.6	22.9	25.0	39.0 - 135	86.4	91.6	ug/L	5.84	50.0
2,4-Dimethylphenol	1107430	17.2	16.3	25.0	23.0 - 120	68.8	65.2	ug/L	5.37	68.0
2,4-Dinitrophenol	1107430	16.4	14.1	25.0	0.100 - 191	65.6	56.4	ug/L	15.1	132
2,4-Dinitrotoluene	1107430	23.9	25.3	25.0	39.0 - 139	95.6	101	ug/L	5.49	42.0
2,6-Dinitrotoluene	1107430	24.4	23.4	25.0	50.0 - 158	97.6	93.6	ug/L	4.18	48.0
2-Chloronaphthalene	1107430	21.4	22.0	25.0	60.0 - 120	85.6	88.0	ug/L	2.76	24.0
2-Chlorophenol	1107430	22.3	23.9	25.0	23.0 - 134	89.2	95.6	ug/L	6.93	61.0
2-Methylphenol (o-Cresol)	1107430	20.6	20.1	25.0	38.9 - 76.1	82.4 *	80.4 *	ug/L	2.46	50.0
2-Nitrophenol	1107430	21.4	21.9	25.0	29.0 - 182	85.6	87.6	ug/L	2.31	55.0
3&4-Methylphenol (m&p-Cresol)	1107430	16.8	17.1	25.0	33.0 - 70.4	67.2	68.4	ug/L	1.77	50.0
3,3'-Dichlorobenzidine	1107430	27.8	28.9	25.0	0.100 - 262	111	116	ug/L	4.41	108
4,6-Dinitro-2-methylphenol	1107430	20.9	19.4	25.0	0.100 - 181	83.6	77.6	ug/L	7.44	203
4-Bromophenyl phenyl ether	1107430	24.1	23.1	25.0	53.0 - 127	96.4	92.4	ug/L	4.24	43.0
4-Chlorophenyl phenyl ethe	1107430	24.9	23.4	25.0	25.0 - 158	99.6	93.6	ug/L	6.21	61.0
4-Nitrophenol	1107430	11.9	12.2	25.0	0.100 - 132	47.6	48.8	ug/L	2.49	131
Acenaphthene	1107430	23.4	24.1	25.0	47.0 - 145	93.6	96.4	ug/L	2.95	48.0
Acenaphthylene	1107430	23.2	23.9	25.0	33.0 - 145	92.8	95.6	ug/L	2.97	74.0
Anthracene	1107430	24.7	24.8	25.0	27.0 - 133	98.8	99.2	ug/L	0.404	66.0
Benzidine	1107430	3.39	12.2	25.0	0.100 - 36.9	13.6	48.8 *	ug/L	113 *	90.0
Benzo(a)anthracene	1107430	23.8	24.2	25.0	33.0 - 143	95.2	96.8	ug/L	1.67	53.0
Benzo(a)pyrene	1107430	24.6	24.8	25.0	17.0 - 163	98.4	99.2	ug/L	0.810	72.0
Benzo(b)fluoranthene	1107430	22.4	26.3	25.0	24.0 - 159	89.6	105	ug/L	15.8	71.0
Benzo(ghi)perylene	1107430	19.3	18.4	25.0	0.100 - 219	77.2	73.6	ug/L	4.77	97.0
Benzo(k)fluoranthene	1107430	26.4	31.0	25.0	11.0 - 162	106	124	ug/L	15.7	63.0
Benzyl Butyl phthalate	1107430	22.9	23.4	25.0	0.100 - 152	91.6	93.6	ug/L	2.16	60.0
Bis(2-chloroethoxy)methane	1107430	23.8	24.2	25.0	33.0 - 184	95.2	96.8	ug/L	1.67	54.0
Bis(2-chloroethyl)ether	1107430	25.3	25.7	25.0	12.0 - 158	101	103	ug/L	1.96	108
Bis(2-chloroisopropyl)ether	1107430	22.0	21.8	25.0	36.0 - 166	88.0	87.2	ug/L	0.913	76.0
Bis(2-ethylhexyl)phthalate	1107430	33.9	34.4	25.0	8.00 - 158	136	138	ug/L	1.46	82.0
Chrysene (Benzo(a)phenanthrene)	1107430	26.7	26.8	25.0	17.0 - 168	107	107	ug/L	0	87.0
Dibenz(a,h)anthracene	1107430	19.6	18.2	25.0	0.100 - 227	78.4	72.8	ug/L	7.41	126

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LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
Diethyl phthalate	1107430	25.3	28.1	25.0	0.100 - 120	101	112	ug/L	10.3	100
Dimethyl phthalate	1107430	26.4	26.0	25.0	0.100 - 120	106	104	ug/L	1.90	183
Di-n-butylphthalate	1107430	27.9	29.8	25.0	1.00 - 120	112	119	ug/L	6.06	47.0
Di-n-octylphthalate	1107430	34.2	35.3	25.0	4.00 - 146	137	141	ug/L	2.88	69.0
Fluoranthene(Benzo(j,k)fluorene)	1107430	27.5	30.4	25.0	26.0 - 137	110	122	ug/L	10.3	66.0
Fluorene	1107430	22.9	23.9	25.0	59.0 - 121	91.6	95.6	ug/L	4.27	38.0
Hexachlorobenzene	1107430	23.2	23.3	25.0	0.100 - 152	92.8	93.2	ug/L	0.430	55.0
Hexachlorobutadiene	1107430	18.9	20.5	25.0	24.0 - 120	75.6	82.0	ug/L	8.12	62.0
Hexachlorocyclopentadiene	1107430	9.82	10.7	25.0	3.97 - 68.7	39.3	42.8	ug/L	8.53	50.0
Hexachloroethane	1107430	19.9	21.6	25.0	40.0 - 120	79.6	86.4	ug/L	8.19	52.0
Indeno(1,2,3-cd)pyrene	1107430	19.6	18.9	25.0	0.100 - 171	78.4	75.6	ug/L	3.64	99.0
Isophorone	1107430	28.1	27.6	25.0	21.0 - 196	112	110	ug/L	1.80	93.0
Naphthalene	1107430	21.6	22.7	25.0	21.0 - 133	86.4	90.8	ug/L	4.97	65.0
Nitrobenzene	1107430	24.4	25.8	25.0	35.0 - 180	97.6	103	ug/L	5.38	62.0
n-Nitrosodiethylamine	1107430	22.6	27.2	25.0	18.0 - 100	90.4	109 *	ug/L	18.7	50.0
N-Nitrosodimethylamine	1107430	15.9	19.7	25.0	30.2 - 74.9	63.6	78.8 *	ug/L	21.3	50.0
n-Nitroso-di-n-butylamine	1107430	28.0	27.3	25.0	48.4 - 98.5	112 *	109 *	ug/L	2.71	50.0
N-Nitrosodi-n-propylamine	1107430	26.1	26.9	25.0	0.100 - 230	104	108	ug/L	3.77	87.0
N-Nitrosodiphenylamine (as DPA	1107430	22.9	22.4	25.0	49.3 - 94.2	91.6	89.6	ug/L	2.21	50.0
p-Chloro-m-Cresol (4-Chloro-3-me	1107430	24.5	24.6	25.0	22.0 - 147	98.0	98.4	ug/L	0.407	70.0
Pentachlorobenzene	1107430	22.9	23.4	25.0	39.3 - 93.7	91.6	93.6	ug/L	2.16	50.0
Pentachlorophenol	1107430	20.8	20.6	25.0	14.0 - 176	83.2	82.4	ug/L	0.966	86.0
Phenanthrene	1107430	21.9	24.4	25.0	54.0 - 120	87.6	97.6	ug/L	10.8	39.0
Phenol	1107430	9.89	10.8	25.0	5.00 - 120	39.6	43.2	ug/L	8.70	64.0
Pyrene	1107430	18.7	17.5	25.0	52.0 - 120	74.8	70.0	ug/L	6.63	49.0
Pyridine	1107430	7.70	17.3	25.0	11.2 - 50.6	30.8	69.2 *	ug/L	76.8 *	50.0

Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
2,4,6-Tribromophenol	623306	CCV	49600	100000	ug/L	49.6	10.0 - 150	126078693
2-Fluorophenol-SURR	623306	CCV	57800	100000	ug/L	57.8	10.0 - 150	126078693
4-Terphenyl-d14-SURR	623306	CCV	58000	50000	ug/L	116	30.0 - 150	126078693
Nitrobenzene-d5-SURR	623306	CCV	54100	50000	ug/L	108	30.0 - 150	126078693
Phenol-d6-SURR	623306	CCV	51900	100000	ug/L	51.9	10.0 - 150	126078693
2,4,6-Tribromophenol	1107430	Blank	75.7	100	ug/L	75.7	10.0 - 150	126078697
2,4,6-Tribromophenol	1107430	LCS	77.8	100	ug/L	77.8	10.0 - 150	126078698
2,4,6-Tribromophenol	1107430	LCS Dup	74.6	100	ug/L	74.6	10.0 - 150	126078699
2-Fluorophenol-SURR	1107430	Blank	62500	100000	ug/L	62.5	10.0 - 150	126078697
2-Fluorophenol-SURR	1107430	LCS	46800	100000	ug/L	46.8	10.0 - 150	126078698
2-Fluorophenol-SURR	1107430	LCS Dup	54400	100000	ug/L	54.4	10.0 - 150	126078699
4-Terphenyl-d14-SURR	1107430	Blank	41700	50000	ug/L	83.4	30.0 - 150	126078697
4-Terphenyl-d14-SURR	1107430	LCS	41000	50000	ug/L	82.0	30.0 - 150	126078698
4-Terphenyl-d14-SURR	1107430	LCS Dup	40200	50000	ug/L	80.4	30.0 - 150	126078699
Nitrobenzene-d5-SURR	1107430	Blank	45600	50000	ug/L	91.2	30.0 - 150	126078697

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Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
Nitrobenzene-d5-SURR	1107430	LCS	43000	50000	ug/L	86.0	30.0 - 150	126078698
Nitrobenzene-d5-SURR	1107430	LCS Dup	44400	50000	ug/L	88.8	30.0 - 150	126078699
Phenol-d6-SURR	1107430	Blank	38600	100000	ug/L	38.6	10.0 - 150	126078697
Phenol-d6-SURR	1107430	LCS	32700	100000	ug/L	32.7	10.0 - 150	126078698
Phenol-d6-SURR	1107430	LCS Dup	34100	100000	ug/L	34.1	10.0 - 150	126078699
2,4,6-Tribromophenol	2277373	Unknown	59.0	98.0	ug/L	60.2	10.0 - 150	126078702
2-Fluorophenol-SURR	2277373	Unknown	49.4	98.0	ug/L	50.4	10.0 - 150	126078702
4-Terphenyl-d14-SURR	2277373	Unknown	44.5	49.0	ug/L	90.8	30.0 - 150	126078702
Nitrobenzene-d5-SURR	2277373	Unknown	38.8	49.0	ug/L	79.2	30.0 - 150	126078702
Phenol-d6-SURR	2277373	Unknown	34.9	98.0	ug/L	35.6	10.0 - 150	126078702
2,4,6-Tribromophenol	2277387	Unknown	90.4	109	ug/L	82.9	10.0 - 150	126078700
2-Fluorophenol-SURR	2277387	Unknown	53.1	109	ug/L	48.7	10.0 - 150	126078700
4-Terphenyl-d14-SURR	2277387	Unknown	40.2	54.3	ug/L	74.0	30.0 - 150	126078700
Nitrobenzene-d5-SURR	2277387	Unknown	41.4	54.3	ug/L	76.2	30.0 - 150	126078700
Phenol-d6-SURR	2277387	Unknown	36.1	109	ug/L	33.1	10.0 - 150	126078700

Analytical Set 1108592 — EPA 632

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
Carbaryl (Sevin)	1107610	ND	66.1	2500	ug/L	126081649
Diuron	1107610	ND	44.4	45.0	ug/L	126081649

CCV

Parameter	Reading	Known	Units	Recover%	Limits%	File
Carbaryl (Sevin)	1060	1000	ug/L	106	70.0 - 130	126081648
Carbaryl (Sevin)	1090	1000	ug/L	109	70.0 - 130	126081652
Carbaryl (Sevin)	1080	1000	ug/L	108	70.0 - 130	126081656
Carbaryl (Sevin)	1070	1000	ug/L	107	70.0 - 130	126081659
Carbaryl (Sevin)	1090	1000	ug/L	109	70.0 - 130	126081662
Diuron	1090	1000	ug/L	109	70.0 - 130	126081648
Diuron	1090	1000	ug/L	109	70.0 - 130	126081652
Diuron	1080	1000	ug/L	108	70.0 - 130	126081656
Diuron	1100	1000	ug/L	110	70.0 - 130	126081659
Diuron	1120	1000	ug/L	112	70.0 - 130	126081662

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
Carbaryl (Sevin)	1107610	742	1100	1000	17.1 - 131	74.2	110	ug/L	38.9 *	30.0
Diuron	1107610	581	841	1000	0.100 - 138	58.1	84.1	ug/L	36.6 *	30.0

MSD

Parameter	Sample	MS	MSD	UNK	Known	Limits	MS%	MSD%	Units	RPD	Limit%
Carbaryl (Sevin)	2277402	0	0	ND	1000	0.100 - 215	0 *	0 *	ug/L		30.0
Diuron	2277402	0.916	0.969	ND	1000	0.100 - 148	0.092 *	0.0973 *	ug/L	5.62	50.0

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Analytical Set 1108679

ASTM D7065-11

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
Nonylphenol	1107920	ND	5.00	30.0	ug/L	126083370

CCV

Parameter	Reading	Known	Units	Recover%	Limits%	File
Nonylphenol	155000	150000	ug/L	104	70.0 - 130	126083369
Nonylphenol	167000	150000	ug/L	111	70.0 - 130	126083384

IS Areas

Parameter	Sample	Type	Reading	CCVISM	Low	High		File	PrepSet
Acenaphthene-d10-ISTD	623252	CCV	155300	155300	77670	233000		126083369	623252
Acenaphthene-d10-ISTD	623252	CCV	111500	155300	77670	233000		126083384	623252
Phenanthrene-d10-ISTD	623252	CCV	249300	249300	124600	373900		126083369	623252
Phenanthrene-d10-ISTD	623252	CCV	170200	249300	124600	373900		126083384	623252
Acenaphthene-d10-ISTD	1107920	Blank	86710	155300	77670	233000		126083370	1107920
Acenaphthene-d10-ISTD	1107920	LCS	97910	155300	77670	233000		126083371	1107920
Acenaphthene-d10-ISTD	1107920	LCS Dup	86450	155300	77670	233000		126083372	1107920
Phenanthrene-d10-ISTD	1107920	Blank	132700	249300	124600	373900		126083370	1107920
Phenanthrene-d10-ISTD	1107920	LCS	157600	249300	124600	373900		126083371	1107920
Phenanthrene-d10-ISTD	1107920	LCS Dup	136300	249300	124600	373900		126083372	1107920
Acenaphthene-d10-ISTD	2277378	Unknown	71910	155300	77670	233000	*	126083382	1107920
Phenanthrene-d10-ISTD	2277378	Unknown	114400	249300	124600	373900	*	126083382	1107920
Acenaphthene-d10-ISTD	2277388	Unknown	91860	155300	77670	233000		126083375	1107920
Phenanthrene-d10-ISTD	2277388	Unknown	146400	249300	124600	373900		126083375	1107920

IS RetTime

Parameter	Sample	Type	Reading	CCVISM	Low	High	File	PrepSet
Acenaphthene-d10-ISTD	623252	CCV	6.135	6.135	6.075	6.195	126083369	623252
Acenaphthene-d10-ISTD	623252	CCV	6.135	6.135	6.075	6.195	126083384	623252
Phenanthrene-d10-ISTD	623252	CCV	7.315	7.315	7.255	7.375	126083369	623252
Phenanthrene-d10-ISTD	623252	CCV	7.321	7.315	7.255	7.375	126083384	623252
Acenaphthene-d10-ISTD	1107920	Blank	6.135	6.135	6.075	6.195	126083370	1107920
Acenaphthene-d10-ISTD	1107920	LCS	6.135	6.135	6.075	6.195	126083371	1107920
Acenaphthene-d10-ISTD	1107920	LCS Dup	6.129	6.135	6.075	6.195	126083372	1107920
Phenanthrene-d10-ISTD	1107920	Blank	7.315	7.315	7.255	7.375	126083370	1107920
Phenanthrene-d10-ISTD	1107920	LCS	7.321	7.315	7.255	7.375	126083371	1107920
Phenanthrene-d10-ISTD	1107920	LCS Dup	7.315	7.315	7.255	7.375	126083372	1107920
Acenaphthene-d10-ISTD	2277378	Unknown	6.141	6.135	6.075	6.195	126083382	1107920
Phenanthrene-d10-ISTD	2277378	Unknown	7.321	7.315	7.255	7.375	126083382	1107920
Acenaphthene-d10-ISTD	2277388	Unknown	6.135	6.135	6.075	6.195	126083375	1107920
Phenanthrene-d10-ISTD	2277388	Unknown	7.315	7.315	7.255	7.375	126083375	1107920

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
Nonylphenol	1107920	106	121	150	56.0 - 112	70.7	80.7	ug/L	13.2	30.0

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Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
4-Nonylphenol-SURR	623252	CCV	24600	25000	ug/L	98.4	50.0 - 130	126083369
4-Nonylphenol-SURR	623252	CCV	26600	25000	ug/L	106	50.0 - 130	126083384
4-Nonylphenol-SURR	1107920	Blank	22800	25000	ug/L	91.2	50.0 - 130	126083370
4-Nonylphenol-SURR	1107920	LCS	15100	25000	ug/L	60.4	50.0 - 130	126083371
4-Nonylphenol-SURR	1107920	LCS Dup	17400	25000	ug/L	69.6	50.0 - 130	126083372
4-Nonylphenol-SURR	2277378	Unknown	10.4	28.2	ug/L	36.9 *	50.0 - 130	126083382
4-Nonylphenol-SURR	2277388	Unknown	21.9	28.5	ug/L	76.8	50.0 - 130	126083375

Analytical Set 1108715 EPA 608.3

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
4,4-DDD	1107611	ND	0.731	1.00	ug/L	126085274
4,4-DDE	1107611	ND	0.361	1.00	ug/L	126085274
4,4-DDT	1107611	ND	0.862	1.00	ug/L	126085274
Aldrin	1107611	ND	0.260	1.00	ug/L	126085274
Alpha-BHC(hexachlorocyclohexane)	1107611	ND	0.280	1.00	ug/L	126085274
alpha-Chlordane	1107611	ND	0.615	1.00	ug/L	126085274
Beta-BHC(hexachlorocyclohexane)	1107611	ND	0.579	1.00	ug/L	126085274
Delta-BHC(hexachlorocyclohexane)	1107611	ND	0.898	1.00	ug/L	126085274
Dieldrin	1107611	ND	0.162	1.00	ug/L	126085274
Endosulfan I (alpha)	1107611	ND	0.679	1.00	ug/L	126085274
Endosulfan II (beta)	1107611	ND	0.356	1.00	ug/L	126085274
Endosulfan sulfate	1107611	ND	0.588	1.00	ug/L	126085274
Endrin	1107611	ND	0.538	1.00	ug/L	126085274
Endrin aldehyde	1107611	ND	0.699	1.00	ug/L	126085274
Gamma-BHC(Lindane)	1107611	ND	0.385	1.00	ug/L	126085274
gamma-Chlordane	1107611	ND	0.415	1.00	ug/L	126085274
Heptachlor	1107611	ND	0.207	1.00	ug/L	126085274
Heptachlor epoxide	1107611	ND	0.660	1.00	ug/L	126085274
Kelthane (Dicofol)	1107611	ND	0.0208	0.100	ug/L	126085274
Methoxychlor	1107611	ND	0.898	1.00	ug/L	126085274
Mirex	1107611	ND	0.00889	0.015	ug/L	126085274
Toxaphene	1107611	ND	0.169	0.200	ug/L	126085274

CCV

Parameter	Reading	Known	Units	Recover%	Limits%	File
4,4-DDD	51.3	50.0	ug/L	103	75.0 - 125	126085273
4,4-DDD	57.8	50.0	ug/L	116	75.0 - 125	126085281
4,4-DDD	58.0	50.0	ug/L	116	75.0 - 125	126085282
4,4-DDD	49.9	50.0	ug/L	99.8	75.0 - 125	126085283
4,4-DDD	53.4	50.0	ug/L	107	75.0 - 125	126085286
4,4-DDE	47.3	50.0	ug/L	94.6	75.0 - 125	126085273
4,4-DDE	55.8	50.0	ug/L	112	75.0 - 125	126085281
4,4-DDE	53.2	50.0	ug/L	106	75.0 - 125	126085282

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Parameter	Reading	Known	Units	Recover%	Limits%	File
4,4-DDE	46.8	50.0	ug/L	93.6	75.0 - 125	126085283
4,4-DDE	47.0	50.0	ug/L	94.0	75.0 - 125	126085286
4,4-DDT	53.1	50.0	ug/L	106	75.0 - 125	126085273
4,4-DDT	60.2	50.0	ug/L	120	75.0 - 125	126085281
4,4-DDT	59.6	50.0	ug/L	119	75.0 - 125	126085282
4,4-DDT	54.3	50.0	ug/L	109	75.0 - 125	126085283
4,4-DDT	52.3	50.0	ug/L	105	75.0 - 125	126085286
Aldrin	45.6	50.0	ug/L	91.2	75.0 - 125	126085273
Aldrin	53.9	50.0	ug/L	108	75.0 - 125	126085281
Aldrin	55.6	50.0	ug/L	111	75.0 - 125	126085282
Aldrin	55.2	50.0	ug/L	110	75.0 - 125	126085283
Aldrin	54.6	50.0	ug/L	109	75.0 - 125	126085286
Alpha-BHC(hexachlorocyclohexane)	46.5	50.0	ug/L	93.0	75.0 - 125	126085273
Alpha-BHC(hexachlorocyclohexane)	53.8	50.0	ug/L	108	75.0 - 125	126085281
Alpha-BHC(hexachlorocyclohexane)	58.0	50.0	ug/L	116	75.0 - 125	126085282
Alpha-BHC(hexachlorocyclohexane)	59.3	50.0	ug/L	119	75.0 - 125	126085283
Alpha-BHC(hexachlorocyclohexane)	60.3	50.0	ug/L	121	75.0 - 125	126085286
alpha-Chlordane	44.9	50.0	ug/L	89.8	75.0 - 125	126085273
alpha-Chlordane	54.1	50.0	ug/L	108	75.0 - 125	126085281
alpha-Chlordane	57.3	50.0	ug/L	115	75.0 - 125	126085282
alpha-Chlordane	50.7	50.0	ug/L	101	75.0 - 125	126085283
alpha-Chlordane	51.5	50.0	ug/L	103	75.0 - 125	126085286
Beta-BHC(hexachlorocyclohexane)	48.0	50.0	ug/L	96.0	75.0 - 125	126085273
Beta-BHC(hexachlorocyclohexane)	54.8	50.0	ug/L	110	75.0 - 125	126085281
Beta-BHC(hexachlorocyclohexane)	57.0	50.0	ug/L	114	75.0 - 125	126085282
Beta-BHC(hexachlorocyclohexane)	57.0	50.0	ug/L	114	75.0 - 125	126085283
Beta-BHC(hexachlorocyclohexane)	59.6	50.0	ug/L	119	75.0 - 125	126085286
Delta-BHC(hexachlorocyclohexane)	48.4	50.0	ug/L	96.8	75.0 - 125	126085273
Delta-BHC(hexachlorocyclohexane)	57.2	50.0	ug/L	114	75.0 - 125	126085281
Delta-BHC(hexachlorocyclohexane)	61.5	50.0	ug/L	123	75.0 - 125	126085282
Delta-BHC(hexachlorocyclohexane)	58.8	50.0	ug/L	118	75.0 - 125	126085283
Delta-BHC(hexachlorocyclohexane)	60.9	50.0	ug/L	122	75.0 - 125	126085286
Dieldrin	47.7	50.0	ug/L	95.4	75.0 - 125	126085273
Dieldrin	55.5	50.0	ug/L	111	75.0 - 125	126085281
Dieldrin	57.6	50.0	ug/L	115	75.0 - 125	126085282
Dieldrin	52.1	50.0	ug/L	104	75.0 - 125	126085283
Dieldrin	52.1	50.0	ug/L	104	75.0 - 125	126085286
Endosulfan I (alpha)	46.3	50.0	ug/L	92.6	75.0 - 125	126085273
Endosulfan I (alpha)	53.7	50.0	ug/L	107	75.0 - 125	126085281
Endosulfan I (alpha)	56.5	50.0	ug/L	113	75.0 - 125	126085282
Endosulfan I (alpha)	50.8	50.0	ug/L	102	75.0 - 125	126085283
Endosulfan I (alpha)	52.3	50.0	ug/L	105	75.0 - 125	126085286
Endosulfan II (beta)	47.8	50.0	ug/L	95.6	75.0 - 125	126085273
Endosulfan II (beta)	51.8	50.0	ug/L	104	75.0 - 125	126085281

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Parameter	Reading	Known	Units	Recover%	Limits%		File
Endosulfan II (beta)	54.5	50.0	ug/L	109	75.0 - 125		126085282
Endosulfan II (beta)	46.2	50.0	ug/L	92.4	75.0 - 125		126085283
Endosulfan II (beta)	48.8	50.0	ug/L	97.6	75.0 - 125		126085286
Endosulfan sulfate	49.9	50.0	ug/L	99.8	75.0 - 125		126085273
Endosulfan sulfate	56.2	50.0	ug/L	112	75.0 - 125		126085281
Endosulfan sulfate	57.4	50.0	ug/L	115	75.0 - 125		126085282
Endosulfan sulfate	51.3	50.0	ug/L	103	75.0 - 125		126085283
Endosulfan sulfate	52.5	50.0	ug/L	105	75.0 - 125		126085286
Endrin	47.1	50.0	ug/L	94.2	75.0 - 125		126085273
Endrin	56.0	50.0	ug/L	112	75.0 - 125		126085281
Endrin	56.9	50.0	ug/L	114	75.0 - 125		126085282
Endrin	50.8	50.0	ug/L	102	75.0 - 125		126085283
Endrin	51.6	50.0	ug/L	103	75.0 - 125		126085286
Endrin aldehyde	51.6	50.0	ug/L	103	75.0 - 125		126085273
Endrin aldehyde	54.8	50.0	ug/L	110	75.0 - 125		126085281
Endrin aldehyde	53.6	50.0	ug/L	107	75.0 - 125		126085282
Endrin aldehyde	50.4	50.0	ug/L	101	75.0 - 125		126085283
Endrin aldehyde	49.0	50.0	ug/L	98.0	75.0 - 125		126085286
Gamma-BHC(Lindane)	46.3	50.0	ug/L	92.6	75.0 - 125		126085273
Gamma-BHC(Lindane)	48.6	50.0	ug/L	97.2	75.0 - 125		126085281
Gamma-BHC(Lindane)	55.7	50.0	ug/L	111	75.0 - 125		126085282
Gamma-BHC(Lindane)	59.1	50.0	ug/L	118	75.0 - 125		126085283
Gamma-BHC(Lindane)	60.9	50.0	ug/L	122	75.0 - 125		126085286
gamma-Chlordane	46.7	50.0	ug/L	93.4	75.0 - 125		126085273
gamma-Chlordane	54.1	50.0	ug/L	108	75.0 - 125		126085281
gamma-Chlordane	57.0	50.0	ug/L	114	75.0 - 125		126085282
gamma-Chlordane	52.0	50.0	ug/L	104	75.0 - 125		126085283
gamma-Chlordane	53.2	50.0	ug/L	106	75.0 - 125		126085286
Heptachlor	45.0	50.0	ug/L	90.0	75.0 - 125		126085273
Heptachlor	47.3	50.0	ug/L	94.6	75.0 - 125		126085281
Heptachlor	49.6	50.0	ug/L	99.2	75.0 - 125		126085282
Heptachlor	54.6	50.0	ug/L	109	75.0 - 125		126085283
Heptachlor	56.4	50.0	ug/L	113	75.0 - 125		126085286
Heptachlor epoxide	44.2	50.0	ug/L	88.4	75.0 - 125		126085273
Heptachlor epoxide	54.4	50.0	ug/L	109	75.0 - 125		126085281
Heptachlor epoxide	57.2	50.0	ug/L	114	75.0 - 125		126085282
Heptachlor epoxide	55.1	50.0	ug/L	110	75.0 - 125		126085283
Heptachlor epoxide	53.6	50.0	ug/L	107	75.0 - 125		126085286
Kelthane (Dicofol)	103	100	ug/L	103	75.0 - 125		126085273
Kelthane (Dicofol)	148	100	ug/L	148	75.0 - 125	*	126085281
Kelthane (Dicofol)	164	100	ug/L	164	75.0 - 125	*	126085282
Kelthane (Dicofol)	119	100	ug/L	119	75.0 - 125		126085283
Kelthane (Dicofol)	116	100	ug/L	116	75.0 - 125		126085286
Methoxychlor	50.7	50.0	ug/L	101	75.0 - 125		126085273

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Parameter	Reading	Known	Units	Recover%	Limits%		File
Methoxychlor	60.4	50.0	ug/L	121	75.0 - 125		126085281
Methoxychlor	63.1	50.0	ug/L	126	75.0 - 125	*	126085282
Methoxychlor	52.9	50.0	ug/L	106	75.0 - 125		126085283
Methoxychlor	50.3	50.0	ug/L	101	75.0 - 125		126085286
Mirex	45.9	50.0	ug/L	91.8	75.0 - 125		126085273
Mirex	53.0	50.0	ug/L	106	75.0 - 125		126085281
Mirex	54.8	50.0	ug/L	110	75.0 - 125		126085282
Mirex	41.6	50.0	ug/L	83.2	75.0 - 125		126085283
Mirex	41.6	50.0	ug/L	83.2	75.0 - 125		126085286

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
4,4-DDD	1107611	64.3	59.9	100	31.0 - 141	64.3	59.9	ug/L	7.09	39.0
4,4-DDE	1107611	57.7	56.1	100	30.0 - 145	57.7	56.1	ug/L	2.81	35.0
4,4-DDT	1107611	64.2	63.3	100	25.0 - 160	64.2	63.3	ug/L	1.41	42.0
Aldrin	1107611	61.2	62.0	100	42.0 - 140	61.2	62.0	ug/L	1.30	35.0
Alpha-BHC(hexachlorocyclohexane)	1107611	73.1	71.2	100	37.0 - 140	73.1	71.2	ug/L	2.63	36.0
alpha-Chlordane	1107611	66.7	62.8	100	45.0 - 140	66.7	62.8	ug/L	6.02	35.0
Beta-BHC(hexachlorocyclohexane)	1107611	80.3	77.7	100	17.0 - 147	80.3	77.7	ug/L	3.29	44.0
Delta-BHC(hexachlorocyclohexane)	1107611	76.1	74.3	100	19.0 - 140	76.1	74.3	ug/L	2.39	52.0
Dieldrin	1107611	65.3	62.8	100	36.0 - 146	65.3	62.8	ug/L	3.90	49.0
Endosulfan I (alpha)	1107611	63.7	59.6	100	45.0 - 153	63.7	59.6	ug/L	6.65	28.0
Endosulfan II (beta)	1107611	59.0	55.0	100	0.100 - 202	59.0	55.0	ug/L	7.02	53.0
Endosulfan sulfate	1107611	60.9	57.8	100	26.0 - 144	60.9	57.8	ug/L	5.22	38.0
Endrin	1107611	62.4	59.4	100	30.0 - 147	62.4	59.4	ug/L	4.93	48.0
Endrin aldehyde	1107611	65.4	61.1	100	37.6 - 158	65.4	61.1	ug/L	6.80	30.0
Gamma-BHC(Lindane)	1107611	73.6	71.3	100	32.0 - 140	73.6	71.3	ug/L	3.17	39.0
gamma-Chlordane	1107611	67.0	63.0	100	45.0 - 140	67.0	63.0	ug/L	6.15	35.0
Heptachlor	1107611	63.1	64.8	100	34.0 - 140	63.1	64.8	ug/L	2.66	43.0
Heptachlor epoxide	1107611	66.3	62.8	100	37.0 - 142	66.3	62.8	ug/L	5.42	26.0
Kelthane (Dicofol)	1107611	0.911	0.954	1.00	70.0 - 130	91.1	95.4	ug/L	4.61	30.0
Methoxychlor	1107611	60.2	59.1	100	33.1 - 137	60.2	59.1	ug/L	1.84	30.0
Mirex	1107611	0.529	0.528	1.00	70.0 - 130	52.9 *	52.8 *	ug/L	0.189	30.0

Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
Decachlorobiphenyl	621878	CCV	47.7	100	ug/L	47.7	0.100 - 144	126085273
Decachlorobiphenyl	621878	CCV	55.0	100	ug/L	55.0	0.100 - 144	126085281
Decachlorobiphenyl	621878	CCV	50.2	100	ug/L	50.2	0.100 - 144	126085282
Decachlorobiphenyl	621878	CCV	32.2	100	ug/L	32.2	0.100 - 144	126085283
Decachlorobiphenyl	621878	CCV	32.1	100	ug/L	32.1	0.100 - 144	126085286
Tetrachloro-m-Xylene (Surr)	621878	CCV	44.1	100	ug/L	44.1	0.100 - 107	126085273
Tetrachloro-m-Xylene (Surr)	621878	CCV	43.2	100	ug/L	43.2	0.100 - 107	126085281
Tetrachloro-m-Xylene (Surr)	621878	CCV	42.2	100	ug/L	42.2	0.100 - 107	126085282
Tetrachloro-m-Xylene (Surr)	621878	CCV	45.4	100	ug/L	45.4	0.100 - 107	126085283

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Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
Tetrachloro-m-Xylene (Surr)	621878	CCV	44.0	100	ug/L	44.0	0.100 - 107	126085286
Decachlorobiphenyl	1107611	Blank	76.1	100	ug/L	76.1	0.100 - 144	126085274
Decachlorobiphenyl	1107611	LCS	39.3	100	ug/L	39.3	0.100 - 144	126085284
Decachlorobiphenyl	1107611	LCS Dup	46.3	100	ug/L	46.3	0.100 - 144	126085285
Tetrachloro-m-Xylene (Surr)	1107611	Blank	53.8	100	ug/L	53.8	0.100 - 107	126085274
Tetrachloro-m-Xylene (Surr)	1107611	LCS	56.7	100	ug/L	56.7	0.100 - 107	126085284
Tetrachloro-m-Xylene (Surr)	1107611	LCS Dup	54.8	100	ug/L	54.8	0.100 - 107	126085285
Decachlorobiphenyl	2277372	Unknown	0.0356	0.101	ug/L	35.2	0.100 - 144	126085275
Tetrachloro-m-Xylene (Surr)	2277372	Unknown	0.0401	0.101	ug/L	39.7	0.100 - 107	126085275
Decachlorobiphenyl	2277386	Unknown	0.0716	0.108	ug/L	66.3	0.100 - 144	126085276
Tetrachloro-m-Xylene (Surr)	2277386	Unknown	0.0479	0.108	ug/L	44.4	0.100 - 107	126085276

Analytical Set 1108745 EPA 608.3

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
PCB-1016	1107613	ND	0.202	0.202	ug/L	126086493
PCB-1221	1107613	ND	0.143	0.200	ug/L	126086493
PCB-1232	1107613	ND	0.143	0.200	ug/L	126086493
PCB-1242	1107613	ND	0.192	0.200	ug/L	126086493
PCB-1248	1107613	ND	0.143	0.200	ug/L	126086493
PCB-1254	1107613	ND	0.143	0.200	ug/L	126086493
PCB-1260	1107613	ND	0.161	0.200	ug/L	126086493
PCB-1262	1107613	ND	0.198	0.200	ug/L	126086493
PCB-1268	1107613	ND	0.143	0.200	ug/L	126086493

CCV

Parameter	Reading	Known	Units	Recover%	Limits%		File
PCB-1016	1170	1000	ug/L	117	80.0 - 115	*	126086492
PCB-1016	1110	1000	ug/L	111	80.0 - 115		126086497
PCB-1016	1170	1000	ug/L	117	80.0 - 115	*	126086498
PCB-1016	1070	1000	ug/L	107	80.0 - 115		126086501
PCB-1016	1140	1000	ug/L	114	80.0 - 115		126086504
PCB-1260	979	1000	ug/L	97.9	80.0 - 115		126086492
PCB-1260	939	1000	ug/L	93.9	80.0 - 115		126086497
PCB-1260	914	1000	ug/L	91.4	80.0 - 115		126086498
PCB-1260	830	1000	ug/L	83.0	80.0 - 115		126086501
PCB-1260	897	1000	ug/L	89.7	80.0 - 115		126086504

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
PCB-1016	1107613	919	1030	1000	39.8 - 135	91.9	103	ug/L	11.4	30.0
PCB-1260	1107613	909	1000	1000	36.1 - 134	90.9	100	ug/L	9.53	30.0

Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File

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Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
Decachlorobiphenyl	1107613	Blank	76.1	100	ug/L	76.1	10.0 - 200	126086493
Tetrachloro-m-Xylene (Surr)	1107613	Blank	53.8	100	ug/L	53.8	10.0 - 200	126086493
Decachlorobiphenyl	2277372	Unknown	0.0356	0.101	ug/L	35.2	10.0 - 200	126086494
Tetrachloro-m-Xylene (Surr)	2277372	Unknown	0.0401	0.101	ug/L	39.7	10.0 - 200	126086494
Decachlorobiphenyl	2277386	Unknown	0.0716	0.108	ug/L	66.3	10.0 - 200	126086495
Tetrachloro-m-Xylene (Surr)	2277386	Unknown	0.0479	0.108	ug/L	44.4	10.0 - 200	126086495

Analytical Set 1108835 — EPA 622

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
Chlorpyrifos	1107612	ND	0.0904	50.0	ug/L	126087719

CCV

Parameter	Reading	Known	Units	Recover%	Limits%	File
Chlorpyrifos	993	1000	ug/L	99.3	48.0 - 150	126087718
Chlorpyrifos	1270	1000	ug/L	127	48.0 - 150	126087726

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
Chlorpyrifos	1107612	815	773	1000	0.100 - 128	81.5	77.3	ug/L	5.29	30.0

Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
Tributylphosphate		CCV	1000	1000	ug/L	100	0.100 - 115	126087718
Tributylphosphate		CCV	1170	1000	ug/L	117 *	0.100 - 115	126087726
Triphenylphosphate		CCV	1070	1000	ug/L	107	0.100 - 115	126087718
Triphenylphosphate		CCV	1250	1000	ug/L	125 *	0.100 - 115	126087726
Tributylphosphate	1107612	Blank	528	1000	ug/L	52.8	0.100 - 115	126087719
Tributylphosphate	1107612	LCS	763	1000	ug/L	76.3	0.100 - 115	126087720
Tributylphosphate	1107612	LCS Dup	759	1000	ug/L	75.9	0.100 - 115	126087721
Triphenylphosphate	1107612	Blank	497	1000	ug/L	49.7	0.100 - 115	126087719
Triphenylphosphate	1107612	LCS	649	1000	ug/L	64.9	0.100 - 115	126087720
Triphenylphosphate	1107612	LCS Dup	623	1000	ug/L	62.3	0.100 - 115	126087721

Analytical Set 1108838 — EPA 614

Blank

Parameter	PrepSet	Reading	MDL	MQL	Units	File
Azinphos-methyl (Guthion)	1107612	ND	41.4	50.0	ug/L	126087741
Demeton	1107612	ND	31.9	50.0	ug/L	126087741
Diazinon	1107612	ND	19.7	50.0	ug/L	126087741
Malathion	1107612	ND	24.8	50.0	ug/L	126087741
Parathion, ethyl	1107612	ND	23.9	50.0	ug/L	126087741
Parathion, methyl	1107612	ND	27.4	50.0	ug/L	126087741

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Parameter	Reading	Known	Units	Recover%	Limits%		File
Azinphos-methyl (Guthion)	1070	1000	ug/L	107	37.5 - 164		126087740
Azinphos-methyl (Guthion)	2100	1000	ug/L	210	37.5 - 164	*	126087748
Demeton	1000	1000	ug/L	100	58.6 - 150		126087740
Demeton	1450	1000	ug/L	145	58.6 - 150		126087748
Diazinon	982	1000	ug/L	98.2	65.4 - 138		126087740
Diazinon	1220	1000	ug/L	122	65.4 - 138		126087748
Malathion	1000	1000	ug/L	100	49.5 - 160		126087740
Malathion	1180	1000	ug/L	118	49.5 - 160		126087748
Parathion, ethyl	1010	1000	ug/L	101	56.0 - 142		126087740
Parathion, ethyl	1320	1000	ug/L	132	56.0 - 142		126087748
Parathion, methyl	1020	1000	ug/L	102	12.6 - 194		126087740
Parathion, methyl	1370	1000	ug/L	137	12.6 - 194		126087748

LCS Dup

Parameter	PrepSet	LCS	LCSD	Known	Limits%	LCS%	LCSD%	Units	RPD	Limit%
Azinphos-methyl (Guthion)	1107612	993	1290	1000	0.100 - 155	99.3	129	ug/L	26.0	30.0
Demeton	1107612	786	809	1000	0.100 - 109	78.6	80.9	ug/L	2.88	30.0
Diazinon	1107612	771	735	1000	0.100 - 125	77.1	73.5	ug/L	4.78	30.0
Malathion	1107612	1010	943	1000	0.100 - 130	101	94.3	ug/L	6.86	30.0
Parathion, ethyl	1107612	1120	1040	1000	0.100 - 122	112	104	ug/L	7.41	30.0
Parathion, methyl	1107612	951	916	1000	0.100 - 131	95.1	91.6	ug/L	3.75	30.0

Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
Tributylphosphate		CCV	1000	2000	ug/L	50.0	0.100 - 106	126087740
Tributylphosphate		CCV	1170	2000	ug/L	58.5	0.100 - 106	126087748
Triphenylphosphate		CCV	1070	2000	ug/L	53.5	0.100 - 172	126087740
Triphenylphosphate		CCV	1250	2000	ug/L	62.5	0.100 - 172	126087748
Tributylphosphate	1107612	Blank	528	2000	ug/L	26.4	0.100 - 106	126087741
Tributylphosphate	1107612	LCS	763	2000	ug/L	38.2	0.100 - 106	126087742
Tributylphosphate	1107612	LCS Dup	759	2000	ug/L	38.0	0.100 - 106	126087743
Triphenylphosphate	1107612	Blank	497	2000	ug/L	24.8	0.100 - 172	126087741
Triphenylphosphate	1107612	LCS	649	2000	ug/L	32.4	0.100 - 172	126087742
Triphenylphosphate	1107612	LCS Dup	623	2000	ug/L	31.2	0.100 - 172	126087743
Tributylphosphate	2277372	Unknown	0.088	2.02	ug/L	4.36	0.100 - 106	126087744
Triphenylphosphate	2277372	Unknown	3.54	2.02	ug/L	175 *	0.100 - 172	126087744
Tributylphosphate	2277386	Unknown	0.635	2.16	ug/L	29.4	0.100 - 106	126087745
Triphenylphosphate	2277386	Unknown	0.676	2.16	ug/L	31.3	0.100 - 172	126087745

Analytical Set 1108899 EPA 625.1

CCV

Parameter	Reading	Known	Units	Recover%	Limits%	File
1,2,4,5-Tetrachlorobenzene	51900	50000	ug/L	104	60.0 - 140	126089054
1,2,4-Trichlorobenzene	53300	50000	ug/L	107	61.0 - 130	126089054

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Parameter	Reading	Known	Units	Recover%	Limits%	File
1,2-Dichlorobenzene	55300	50000	ug/L	111	60.0 - 140	126089054
1,2-DPH (as azobenzene)	53800	50000	ug/L	108	60.0 - 140	126089054
1,3-Dichlorobenzene	55800	50000	ug/L	112	60.0 - 140	126089054
1,4-Dichlorobenzene	54500	50000	ug/L	109	60.0 - 140	126089054
2,4,5-Trichlorophenol	55300	50000	ug/L	111	69.0 - 130	126089054
2,4,6-Trichlorophenol	55600	50000	ug/L	111	69.0 - 130	126089054
2,4-Dichlorophenol	54400	50000	ug/L	109	64.0 - 130	126089054
2,4-Dimethylphenol	47600	50000	ug/L	95.2	58.0 - 130	126089054
2,4-Dinitrophenol	52100	50000	ug/L	104	39.0 - 173	126089054
2,4-Dinitrotoluene	59200	50000	ug/L	118	53.0 - 130	126089054
2,6-Dinitrotoluene	59500	50000	ug/L	119	68.0 - 137	126089054
2-Chloronaphthalene	48400	50000	ug/L	96.8	70.0 - 130	126089054
2-Chlorophenol	55400	50000	ug/L	111	55.0 - 130	126089054
2-Methylphenol (o-Cresol)	51400	50000	ug/L	103	60.0 - 140	126089054
2-Nitrophenol	54000	50000	ug/L	108	61.0 - 163	126089054
3&4-Methylphenol (m&p-Cresol)	49200	50000	ug/L	98.4	60.0 - 140	126089054
3,3'-Dichlorobenzidine	53000	50000	ug/L	106	18.0 - 213	126089054
4,6-Dinitro-2-methylphenol	54100	50000	ug/L	108	56.0 - 130	126089054
4-Bromophenyl phenyl ether	54500	50000	ug/L	109	70.0 - 130	126089054
4-Chlorophenyl phenyl ethe	58800	50000	ug/L	118	57.0 - 145	126089054
4-Nitrophenol	53700	50000	ug/L	107	35.0 - 135	126089054
Acenaphthene	57600	50000	ug/L	115	70.0 - 130	126089054
Acenaphthylene	60000	50000	ug/L	120	60.0 - 130	126089054
Anthracene	56400	50000	ug/L	113	58.0 - 130	126089054
Benzidine	29800	50000	ug/L	59.6	20.0 - 180	126089054
Benzo(a)anthracene	56200	50000	ug/L	112	42.0 - 133	126089054
Benzo(a)pyrene	59600	50000	ug/L	119	32.0 - 148	126089054
Benzo(b)fluoranthene	51400	50000	ug/L	103	42.0 - 140	126089054
Benzo(ghi)perylene	59000	50000	ug/L	118	13.0 - 195	126089054
Benzo(k)fluoranthene	59200	50000	ug/L	118	25.0 - 146	126089054
Benzyl Butyl phthalate	55000	50000	ug/L	110	43.0 - 140	126089054
Bis(2-chloroethoxy)methane	53300	50000	ug/L	107	52.0 - 164	126089054
Bis(2-chloroethyl)ether	53800	50000	ug/L	108	52.0 - 130	126089054
Bis(2-chloroisopropyl)ether	62100	50000	ug/L	124	63.0 - 139	126089054
Bis(2-ethylhexyl)phthalate	56400	50000	ug/L	113	43.0 - 137	126089054
Chrysene (Benzo(a)phenanthrene)	57900	50000	ug/L	116	44.0 - 140	126089054
Dibenz(a,h)anthracene	52500	50000	ug/L	105	13.0 - 200	126089054
Diethyl phthalate	60400	50000	ug/L	121	47.0 - 130	126089054
Dimethyl phthalate	58600	50000	ug/L	117	50.0 - 130	126089054
Di-n-butylphthalate	56900	50000	ug/L	114	52.0 - 130	126089054
Di-n-octylphthalate	56400	50000	ug/L	113	21.0 - 132	126089054
Fluoranthene(Benzo(j,k)fluorene)	55700	50000	ug/L	111	47.0 - 130	126089054
Fluorene	60500	50000	ug/L	121	70.0 - 130	126089054
Hexachlorobenzene	61500	50000	ug/L	123	38.0 - 142	126089054

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Parameter	Reading	Known	Units	Recover%	Limits%	File
Hexachlorobutadiene	57600	50000	ug/L	115	68.0 - 130	126089054
Hexachlorocyclopentadiene	48500	50000	ug/L	97.0	60.0 - 140	126089054
Hexachloroethane	55200	50000	ug/L	110	55.0 - 130	126089054
Indeno(1,2,3-cd)pyrene	53100	50000	ug/L	106	13.0 - 151	126089054
Isophorone	61500	50000	ug/L	123	52.0 - 180	126089054
Naphthalene	55300	50000	ug/L	111	70.0 - 130	126089054
Nitrobenzene	54600	50000	ug/L	109	54.0 - 158	126089054
n-Nitrosodiethylamine	54900	50000	ug/L	110	60.0 - 140	126089054
N-Nitrosodimethylamine	52800	50000	ug/L	106	60.0 - 140	126089054
n-Nitroso-di-n-butylamine	50800	50000	ug/L	102	60.0 - 140	126089054
N-Nitrosodi-n-propylamine	62500	50000	ug/L	125	59.0 - 170	126089054
N-Nitrosodiphenylamine (as DPA	48300	50000	ug/L	96.6	60.0 - 140	126089054
p-Chloro-m-Cresol (4-Chloro-3-me	51700	50000	ug/L	103	68.0 - 130	126089054
Pentachlorobenzene	53000	50000	ug/L	106	60.0 - 140	126089054
Pentachlorophenol	57500	50000	ug/L	115	42.0 - 152	126089054
Phenanthrene	59500	50000	ug/L	119	67.0 - 130	126089054
Phenol	53800	50000	ug/L	108	48.0 - 130	126089054
Pyrene	58400	50000	ug/L	117	70.0 - 130	126089054
Pyridine	48700	50000	ug/L	97.4	60.0 - 140	126089054

DFTPP

Parameter		RefMass	Reading	%	Limits%	File
DFTPP Mass 127	623485	198	125837	54.3	40.0 - 60.0	126089053
DFTPP Mass 197	623485	198	0	0.0	0 - 1.00	126089053
DFTPP Mass 198	623485	198	231796	100.0	100 - 100	126089053
DFTPP Mass 199	623485	198	15840	6.8	5.00 - 9.00	126089053
DFTPP Mass 275	623485	198	62725	27.1	10.0 - 30.0	126089053
DFTPP Mass 365	623485	198	11688	5.0	1.00 - 100	126089053
DFTPP Mass 441	623485	443	8186	28.0	0 - 100	126089053
DFTPP Mass 442	623485	198	154786	66.8	40.0 - 100	126089053
DFTPP Mass 443	623485	442	29216	18.9	17.0 - 23.0	126089053
DFTPP Mass 51	623485	198	81489	35.2	30.0 - 60.0	126089053
DFTPP Mass 68	623485	69.0	0	0.0	0 - 2.00	126089053
DFTPP Mass 69	623485	198	128126	55.3	0 - 100	126089053
DFTPP Mass 70	623485	69.0	565	0.4	0 - 2.00	126089053

Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
2,4,6-Tribromophenol	623306	CCV	52500	100000	ug/L	52.5	10.0 - 150	126089054
2-Fluorophenol-SURR	623306	CCV	53600	100000	ug/L	53.6	10.0 - 150	126089054
4-Terphenyl-d14-SURR	623306	CCV	54700	50000	ug/L	109	30.0 - 150	126089054
Nitrobenzene-d5-SURR	623306	CCV	52100	50000	ug/L	104	30.0 - 150	126089054
Phenol-d6-SURR	623306	CCV	54200	100000	ug/L	54.2	10.0 - 150	126089054
2,4,6-Tribromophenol	2277373	Unknown	59.5	98.0	ug/L	60.7	10.0 - 150	126089059
2-Fluorophenol-SURR	2277373	Unknown	47.8	98.0	ug/L	48.8	10.0 - 150	126089059

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P O Box 2000
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Lubbock, TX 79457-

Project
1093785

Printed 03/14/2024

Surrogate

Parameter	Sample	Type	Reading	Known	Units	Recover%	Limits%	File
4-Terphenyl-d14-SURR	2277373	Unknown	40.6	49.0	ug/L	82.9	30.0 - 150	126089059
Nitrobenzene-d5-SURR	2277373	Unknown	43.1	49.0	ug/L	88.0	30.0 - 150	126089059
Phenol-d6-SURR	2277373	Unknown	31.6	98.0	ug/L	32.2	10.0 - 150	126089059

* Out RPD is Relative Percent Difference: abs(r1-r2) / mean(r1,r2) * 100% Recover% is Recovery Percent: result / known * 100%

Blank - Method Blank (reagent water or other blank matrices that contains all reagents except standard(s) and is processed simultaneously with and under the same conditions as samples; carried through preparation and analytical procedures exactly like a sample; monitors); CCV - Continuing Calibration Verification (same standard used to prepare the curve; typically a mid-range concentration; verifies the continued validity of the calibration curve); LCS Dup - Laboratory Control Sample Duplicate (replicate LCS; analyzed when there is insufficient sample for duplicate or MSD; quantifies accuracy and precision.); Surrogate - Surrogate (mimics the analyte of interest but is unlikely to be found in environmental samples; added to analytical samples for QC purposes. **ANSI/ASQC E4 1994 Ref #4 TRADE QA Resources Guide.), DFTPP - GC/MS Tuning Compound; MSD - Matrix Spike Duplicate (replicate of the matrix spike; same solution and amount of target analyte added to the MS is added to a third aliquot of sample; quantifies matrix bias and precision.); IS Areas - Internal Standard Area (The area of the internal stadard relative to a check standard. Internal Standard is a known concentration of an analyte(s) that is not a sample component or standard that is added to the sample and standard and is used to measure the relative responses of other analytes in the same sample or standard.); IS RetTime - Internal Standard Retention Time (the time the internal standard comes off the column. Internal Stardard is a known concentration of an analyte(s) that is not a sample component or standard that is added to the sample and standard and is used to measure the relative responses of other analytes in the same sample or standard.)

Email: Kilgore.ProjectManagement@spllabs.com

1093785 CoC Print Group 001 of 001

CITY OF LUBBOCK WATER UTILITIES LABORATORY
CHAIN OF CUSTODY AND ANALYSIS REQUEST

1 of 1

Report to:	Invoice to:	Project No.	Project Name:
Company: City of Lubbock	Company: SAME		PLANT SAMPLING ** NWWRP SEWRP
Address: Water Reclamation	Address:	Sampler's Name (printed)	
P O Box 2000		IWMP	
Lubbock TX 79457			
Contact:	Contact:		
Phone: (806) 775-3221	Phone:		
Fax: (806) 775-3246	Fax:		

Results by: Fax results ☐

Analysis Requested

Sample Source	Laboratory Ident #	Date (Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Yr. 2024)	Time	Composite	Grab	Blank	Glass	HDPE	VOA	Sterile	Liters	Water	Sludge	Soil	Sample load	load during transport	HCL (optima)	H2SO4	HNO3 (optima)	NaOH	None	Pesticides PCB's (see attached list)	Semi Volatiles (see attached list) *	Nonylphenol	Field pH	Field Temp
Plant Influent 2277372	12953	27 / 28	1000 / 1000	X			X				8 L	X			X	X					X	X				
Plant Influent 373	12954	27 / 28	1000 / 1000	X			X				2 L	X			X	X					X		X			
Plant Influent 378	12955	27 / 28	1000 / 1000	X			X				1 L	X			X	X					X			X		
Plant Effluent 386	12956	28 / 29	06:00 / 04:10	X			X				8 L	X			X	X					X	X				
Plant Effluent 387	12957	28 / 29	06:00 / 04:10	X			X				2 L	X			X	X					X		X			
Plant Effluent 388	12958	28 / 29	06:00 / 04:10	X			X				1 L	X			X	X					X			X		

Analyst:

Remarks: All analyses must be done in accordance with 40 CFR Part 136

* Please return all jars and ice chests ASAP. Thanks.

* Semi-volatiles list, please sign COC

** NWWRP= Northwest Water Reclamation Plant. SEWRP= Southeast Water Reclamation Plant

Sample Condition	Sampler Relinquished	Date / Time	Received by	Date / Time
Cool ☑ Yes ☐ No ☐	M. Akers	Date: 2/29/24 Time: 1500	FEDEX	Date: Time:
Checked by Handle	Relinquished by: FEDEX	Date: 3/1/24 Time: 1020	Received by: McGraw	Date: 3/1/24 Time: 1020
	Relinquished by:	Date: Time:	Received by	Date: Time:
	X Dispose of sample after analysis		Received by	Date: Time:
	☐ Return residual sample to collector			

Pesticides

PESTICIDES, PCB's & HERBICIDES	MAL ug/l
Aldrin	0.01
Chlordane	0.2
DDD	0.1
DDE	0.1
DDT	0.02
Dieldrin	0.02
alpha-Endosulfan	0.01
beta-Endosulfan	0.02
Endosulfan Sulfate	0.1
Endrin	0.02
Endrin Aldehyde	0.1
Heptachlor	0.01
Heptachlor Epoxide	0.01
alpha-BHC	0.05
beta-BHC	0.05
gamma-BHC	0.05
delta-BHC	0.05
PCB-1242	0.2
PCB-1254	0.2
PCB-1221	0.2
PCB-1232	0.2
PCB-1248	0.2
PCB-1260	0.2
PCB-1016	0.2
Toxaphene	0.3
Methoxychlor	2
Mirex	0.02
Chloropyrifos	0.05
Demeton	0.2
Diazinon	0.5
Dicofol (Kelthane)	1
Guthion	0.1
Malathion	0.1
Parathion	0.1
2,4-D	0.7
2,4,5-TP (Silvex)	0.3
Diuron	0.09
Carbaryl	5

Priority Pollutants

SEMI-VOLATILES ACID COMPOUNDS	MAL ug/l
2-Chlorophenol	10
4-Chloro-3-Methyl Phenol	10
2,4-Dichlorophenol	10
2,4-Dimethylphenol	10
2,4-Dinitrophenol	50
4,6-Dinitro-o-Cresol (o-Cresol)	10
2-Nitrophenol	20
4-Nitrophenol	50
Phenol	10
Pentachlorophenol	5
2,4,6-Trichlorophenol	10
Cresols	10
2,4,5-Trichlorophenol	50

SEMI-VOLATILES BASE/NEUTRAL COMPOUNDS	MAL ug/l
Acenaphthene	10
Acenaphthylene	10
Anthracene	10
Benzidine	50
Benzo(a) Anthracene	5
3,4-Benzofluoranthene	10
Benzo(k)Fluoranthene	5
Benzo(a) Pyrene	5
Benzo(ghi)Perylene	20
Benzyl butyl Phthalate	10
Bis(2-Chloroethyl) Ether	10
Bis(2-Chloroethoxy) Methane	10
Bis(2-Ethylhexyl) Phthalate	10
Bis(2-Chloroisopropyl) Ether	10
4-Bromophenyl Phenyl Ether	10
2-Chloronaphthalene	10
4-Chlorophenyl Phenyl Ether	10
Chrysene	5
Dibenzo(a,h) Anthracene	5
Di-n-Butyl Phthalate	10
1,2-Dichlorobenzene	10
1,3-Dichlorobenzene	10
1,4-Dichlorobenzene	10
3,3-Dichlorobenzidine	5
Diethyl Phthalate	10
Dimethyl Phthalate	10
2,4-Dinitrotoluene	10
2,6-Dinitrotoluene	10
Di-n-Octyl Phthalate	10
1,2-Diphenyl Hydrazine	20
Fluoranthene	10
Fluorene	10
Hexachlorobenzene	5
Hexachlorobutadiene	10
Hexachlorocyclopentadiene	10
Hexachloroethane	20
Indeno(1,2,3-cd)pyrene	5
Isophorone	10
Naphthalene	10
Nitrobenzene	10
N-Nitrosodimethylamine	50
N-Nitrosodiphenylamine	20
N-Nitrosodi-n-Propylamine	20
Phenanthrene	10
Pyrene	10
1,2,4-Trichlorobenzene	10
Hexachlorophene	10
N-Nitrosodiethylamine	20
N-Nitrosodi-n-butylamine	20
Pentachlorobenzene	20
Pyridine	20
1,2,4,5-Tetrachloro-benzene	20

Nonylphenol	333

VOLATILE COMPOUNDS	MAL ug/l	EPA Test Method
Acrolein	50	624
Acrylonitrile	50	624
Benzene	10	624
Bromodichloromethane	10	624
Bromoform	10	624
Carbon Tetrachloride	2	624
Chlorobenzene	10	624
Chloroethane	50	624
2-Chloroethyl Vinyl Ether	10	624
Chloroform	10	624
Dibromochloromethane	10	624
1,1-Dichloroethane	10	624
1,2-Dichloroethane	10	624
1,1-Dichloroethylene	10	624
1,2-Dichloropropane	10	624
1,3-Dichloropropylene	10	624
Ethyl benzene	10	624
Methyl Bromide	50	624
Methyl Chloride	50	624
Methylene Chloride	20	624
1,1,2,2-Tetrachloroethane	10	624
Tetrachloroethylene	10	624
Toluene	10	624
1,2-Trans Dichloroethylene	10	624
1,1,1-Trichloroethane	10	624
1,1,2-Trichloroethane	10	624
Trichloroethylene	10	624
Vinyl Chloride	10	624
1,2 Dibromoethane	10	624
Methyl Ethyl Ketone	50	624
Total Trihalomethanes	10	624

1093785 CoC Print Group 001 of 001

1093785 CoC Print Group 001 of 001

ORIGIN ID:LBBA (806) 775-3221
CITY OF LUBBOCK IWMP
3603 BUAVA AVE
LUBBOCK, TX 79404
UNITED STATES US

SHIP DATE: 29FEB24
ACTWGT: 64.85 LB
CAD: 5894408/SSFE2500
DIMS: 23x14x14 IN
BILL THIRD PARTY

TO ANA LAB

2600 DUDLEY RD

KILGORE TX 75662
(903) 000 0000

REF:

310 1046 JLG
Date Time Tech
Temp: 2.7/0.8 C

Therm#: 6443 Corr Fact: 0.1 C

FedEx Express

1 of 2
TRK# 0201 2715 9211 9850
MASTER
AH GGGA

FRI - 01 MAR 10:30A
PRIORITY OVERNIGHT
AHS
75662
TX-US SHV

1093785 CoC Print Group 001 of 001

1 of 1

CITY OF LUBBOCK WATER UTILITIES LABORATORY
CHAIN OF CUSTODY AND ANALYSIS REQUEST

Report to:
Company: City of Lubbock
Address: Water Reclamation
P O Box 2000
Lubbock TX 79457
Contact:
Phone: (806) 775-3221
Fax: (806) 775-3246

Invoice to:
Company: SAMI
Address:
Contact:
Phone:
Fax:

Project No.
Project Name: PLANT SAMPLING
** NWWRP SEWRP
Sampler's Name (printed): IWMP

Results by Fax results ☐

Analysis Requested

Sample Source	Laboratory Ident. #	Date (Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Yr 2024)	Time	Type: Composite	Type: Grab	Type: Blank	Container: Glass	Container: HDPE	Container: VOA	Container: Sterile	Size: Liters	Matrix: Water	Matrix: Sludge	Matrix: Soil	Handling: Sampler Iced	Handling: Iced during transport	Preservative: HCL HCL (optima)	Preservative: H2SO4	Preservative: HNO3 HNO3 (optima)	Preservative: NaOH	Preservative: None	Pesticides PCB's (see attached list)	Semi Volatiles (see attached list) *	Nonylphenol	Field pH	Field Temp
Plant Influent 2277372	12953	27 / 28	1000 / 1000	X			X				8 L	X			X	X					X	X				
Plant Influent 373	12954	27 / 28	1000 / 1000	X			X				2 L	X			X	X					X		X			
Plant Influent 378	12955	27 / 28	1000 / 1000	X			X				1 L	X			X	X					X			X		
Plant Effluent 386	12956	28 / 29	06:00 / 04:10	X			X				8 L	X			X	X					X	X				
Plant Effluent 387	12957	28 / 29	06:00 / 04:10	X			X				2 L	X			X	X					X		X			
Plant Effluent 388	12958	28 / 29	06:00 / 04:00	X			X				1 L	X			X	X					X			X		

Analyst:

Remarks: All analyses must be done in accordance with 40 CFR Part 136

*Please return all jars and ice chests ASAP. Thanks.

*Semi-volatiles list, please sign COC

** NWWRP= Northwest Water Reclamation Plant, SEWRP= Southeast Water Reclamation Plant

Sample Condition	Sampler Relinquished	Date / Time	Received by	Date / Time
Cont. ☑ ☑ Yes ☐ ☐ No	M. Akers	Date: 2/29/24 Time: 1500	FEDEX	Date: Time:
Checked by (initials)	Relinquished by: FEDEX	Date: 3/1/24 Time: 1020	Received by: McGraw	Date: 3/1/24 Time: 1020
	Relinquished by:	Date: Time:	Received by:	Date: Time:
	X Dispose of sample after analysis		Received by:	Date: Time:
	☐ Return residual sample to collector			

Pesticides

PESTICIDES, PCB's & HERBICIDES	MAL ug/l
Aldrin	0.01
Chlordane	0.2
DDD	0.1
DDE	0.1
DDT	0.02
Dieldrin	0.02
alpha-Endosulfan	0.01
beta-Endosulfan	0.02
Endosulfan Sulfate	0.1
Endrin	0.02
Endrin Aldehyde	0.1
Heptachlor	0.01
Heptachlor Epoxide	0.01
alpha-BHC	0.05
beta-BHC	0.05
gamma-BHC	0.05
delta-BHC	0.05
PCB-1242	0.2
PCB-1254	0.2
PCB-1221	0.2
PCB-1232	0.2
PCB-1248	0.2
PCB-1260	0.2
PCB-1016	0.2
Toxaphene	0.3
Methoxychlor	2
Mirex	0.02
Chloropyrifos	0.05
Demeton	0.2
Diazinon	0.5
Dicofol (Kelthane)	1
Guthion	0.1
Malathion	0.1
Parathion	0.1
2,4-D	0.7
2,4,5-TP (Silvex)	0.3
Diuron	0.09
Carbaryl	5

Priority Pollutants

SEMI-VOLATILES ACID COMPOUNDS	MAL ug/l
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4-Chloro-3-Methyl Phenol	10
2,4-Dichlorophenol	10
2,4-Dimethylphenol	10
2,4-Dinitrophenol	50
4,6-Dinitro-o-Cresol (o-Cresol)	10
2-Nitrophenol	20
4-Nitrophenol	50
Phenol	10
Pentachlorophenol	5
2,4,6-Trichlorophenol	10
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2,4,5-Trichlorophenol	50

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Benzo(k)Fluoranthene	5
Benzo(a) Pyrene	5
Benzo(ghi)Perylene	20
Butyl Benzyl Phthalate	10
Bis(2-Chloroethyl) Ether	10
Bis(2-Chloroethoxy) Methane	10
Bis(2-Ethylhexyl) Phthalate	10
Bis(2-Chloroisopropyl) Ether	10
4-Bromophenyl Phenyl Ether	10
2-Chloronaphthalene	10
4-Chlorophenyl Phenyl Ether	10
Chrysene	5
Dibenzo(a,h) Anthracene	5
Di-n-Butyl Phthalate	10
1,2-Dichlorobenzene	10
1,3-Dichlorobenzene	10
1,4-Dichlorobenzene	10
3,3-Dichlorobenzidine	5
Diethyl Phthalate	10
Dimethyl Phthalate	10
2,4-Dinitrotoluene	10
2,6-Dinitrotoluene	10
Di-n-Octyl Phthalate	10
1,2-Diphenyl Hydrazine	20
Fluoranthene	10
Fluorene	10
Hexachlorobenzene	5
Hexachlorobutadiene	10
Hexachlorocyclopentadiene	10
Hexachloroethane	20
Indeno(1,2,3-cd)pyrene	5
Isophorone	10
Naphthalene	10
Nitrobenzene	10
N-Nitrosodimethylamine	50
N-Nitrosodiphenylamine	20
N-Nitrosodi-n-Propylamine	20
Phenanthrene	10
Pyrene	10
1,2,4-Trichlorobenzene	10
Hexachlorophene	10
N-Nitrosodiethylamine	20
N-nitrosodi-n-butylamine	20
Pentachlorobenzene	20
Purdine	20
1,2,4,5-Tetrachloro-benzene	20

Nonylphenol	333

VOLATILE COMPOUNDS	MAL ug/l	EPA Test Method
Acrolein	50	624
Acrylonitrile	50	624
Benzene	10	624
Bromodichloromethane	10	624
Bromoform	10	624
Carbon Tetrachloride	2	624
Chlorobenzene	10	624
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Chloroform	10	624
Dibromochloromethane	10	624
1,1-Dichloroethane	10	624
1,2-Dichloroethane	10	624
1,1-Dichloroethylene	10	624
1,2-Dichloropropane	10	624
1,3-Dichloropropylene	10	624
Ethyl benzene	10	624
Methyl Bromide	50	624
Methyl Chloride	50	624
Methylene Chloride	20	624
1,1,2,2-Tetrachloroethane	10	624
Tetrachloroethylene	10	624
Toluene	10	624
1,2-Trans Dichloroethylene	10	624
1,1,1-Trichloroethane	10	624
1,1,2-Trichloroethane	10	624
Trichloroethylene	10	624
Vinyl Chloride	10	624
1,2 Dibromoethane	10	624
Methyl Ethyl Ketone	50	624
Total Trihalomethanes	10	624

1093785 CoC Print Group 001 of 001

ORIGIN ID:LBBA (806) 775 3221
CITY OF LUBBOCK IWNP
3603 GUAVA AVE
LUBBOCK, TX 79404
UNITED STATES US

SHIP DATE: 29FEB24
ACTWGT: 64.85 LB
CAD: 6994406/SSFE2500
DIMS: 23x14x14 IN
BILL THIRD PARTY

TO ANA LAB

2600 DUDLEY RD

KILGORE TX 75662

(800) 800 0000

DEPT:

FedEx Express

E

3/01 1040 JL6
Date Time Tech
Temp: 0.7/0.8 C

Therm#: 6448 Corr Fact: 0.1 C

1 of 2

TRK# 0201 2715 9211 9850

MASTER

AH GGGA

FRI – 01 MAR 10:30A
PRIORITY OVERNIGHT
AHS
75662
TX-US SHV

eurofins | Environment Testing

ANALYTICAL REPORT

PREPARED FOR

Attn: IWMP .
City of Lubbock
3603 Guava Ave
Lubbock, Texas 79404
Generated 3/4/2024 1:58:49 PM

JOB DESCRIPTION

Plant Sampling SEWRP

JOB NUMBER

820-12272-1

Eurofins Lubbock
6701 Aberdeen Ave.
Suite 8
Lubbock TX 79424

See page two for job notes and contact information

my EQI

Eurofins Lubbock

Job Notes

This report may not be reproduced except in full, and with written approval from the laboratory. The results relate only to the samples tested. For questions please contact the Project Manager at the e-mail address or telephone number listed on this page.

The test results in this report relate only to the samples as received by the laboratory and will meet all requirements of the methodology, with any exceptions noted. This report shall not be reproduced except in full, without the express written approval of the laboratory. All questions should be directed to the Eurofins Environment Testing South Central, LLC Project Manager.

Authorization

Holly Taylor

Generated
3/4/2024 1:58:49 PM

Authorized for release by
Holly Taylor, Project Manager
Holly.Taylor@et.eurofinsus.com
(806)794-1296

Table of Contents

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QC Sample Results 11
QC Association Summary 14
Lab Chronicle 15
Certification Summary 16
Method Summary 17
Sample Summary 18
Chain of Custody 19
Receipt Checklists 20

Definitions/Glossary

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Qualifiers

GC/MS VOA

Qualifier	Qualifier Description
U	Indicates the analyte was analyzed for but not detected.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
¤	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CFU	Colony Forming Unit
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MCL	EPA recommended "Maximum Contaminant Level"
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
MPN	Most Probable Number
MQL	Method Quantitation Limit
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
NEG	Negative / Absent
POS	Positive / Present
PQL	Practical Quantitation Limit
PRES	Presumptive
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)
TNTC	Too Numerous To Count

Job ID: 820-12272-1 Eurofins Lubbock

Job Narrative
820-12272-1

Analytical test results meet all requirements of the associated regulatory program listed on the Accreditation/Certification Summary Page unless otherwise noted under the individual analysis. Data qualifiers are applied to indicate exceptions. Noncompliant quality control (QC) is further explained in narrative comments.

- Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD may be performed, unless otherwise specified in the method.
- Surrogate and/or isotope dilution analyte recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in the narrative.

Regulated compliance samples (e.g. SDWA, NPDES) must comply with the associated agency requirements/permits.

Receipt
The samples were received on 2/29/2024 10:45 AM. Unless otherwise noted below, the samples arrived in good condition, and, where required, properly preserved and on ice. The temperature of the cooler at receipt time was 2.6°C.

GC/MS VOA
No additional analytical or quality issues were noted, other than those described above or in the Definitions/ Glossary page.

Client Sample Results

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Client Sample ID: 12959

Date Collected: 02/28/24 06:00
Date Received: 02/29/24 10:45

Lab Sample ID: 820-12272-1
Matrix: Water

Method: EPA 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	<0.000585	U	0.00500	0.000585	mg/L			03/01/24 18:06	1
1,1,2,2-Tetrachloroethane	<0.000470	U	0.00100	0.000470	mg/L			03/01/24 18:06	1
1,1,2-Trichloroethane	<0.000411	U	0.00100	0.000411	mg/L			03/01/24 18:06	1
1,1-Dichlorethylene	<0.000738	U	0.00100	0.000738	mg/L			03/01/24 18:06	1
1,1-Dichloroethane	<0.000635	U	0.00100	0.000635	mg/L			03/01/24 18:06	1
1,2-Dibromoethane	<0.000999	U	0.00500	0.000999	mg/L			03/01/24 18:06	1
1,2-Dichloroethane	<0.000372	U	0.00100	0.000372	mg/L			03/01/24 18:06	1
1,2-Dichloropropane	<0.000556	U	0.00500	0.000556	mg/L			03/01/24 18:06	1
2-Butanone (MEK)	<0.00828	U	0.0500	0.00828	mg/L			03/01/24 18:06	1
2-Chloroethyl vinyl ether	<0.000753	U	0.00500	0.000753	mg/L			03/01/24 18:06	1
Acrolein	<0.0111	U	0.0500	0.0111	mg/L			03/01/24 18:06	1
Acrylonitrile	<0.0143	U	0.0500	0.0143	mg/L			03/01/24 18:06	1
Benzene	<0.000460	U	0.00100	0.000460	mg/L			03/01/24 18:06	1
Bromodichloromethane	<0.000552	U	0.00100	0.000552	mg/L			03/01/24 18:06	1
Bromoform	<0.000633	U	0.00500	0.000633	mg/L			03/01/24 18:06	1
Carbon tetrachloride	<0.000896	U	0.00500	0.000896	mg/L			03/01/24 18:06	1
Chlorobenzene	<0.000455	U	0.00100	0.000455	mg/L			03/01/24 18:06	1
Chloroethane	<0.00198	U	0.0100	0.00198	mg/L			03/01/24 18:06	1
Chloroform	<0.000464	U	0.00100	0.000464	mg/L			03/01/24 18:06	1
Methyl chloride	<0.00204	U	0.0100	0.00204	mg/L			03/01/24 18:06	1
cis-1,3-Dichloropropylene	<0.00107	U	0.00500	0.00107	mg/L			03/01/24 18:06	1
Dibromochloromethane	<0.000547	U	0.00500	0.000547	mg/L			03/01/24 18:06	1
Ethylbenzene	<0.000385	U	0.00100	0.000385	mg/L			03/01/24 18:06	1
Hexachlorobutadiene	<0.000627	U	0.00500	0.000627	mg/L			03/01/24 18:06	1
Methyl bromide	<0.00142	U	0.00500	0.00142	mg/L			03/01/24 18:06	1
Methylene Chloride	<0.00173	U	0.00500	0.00173	mg/L			03/01/24 18:06	1
Naphthalene	<0.00135	U	0.0100	0.00135	mg/L			03/01/24 18:06	1
Tetrachloroethylene	<0.000655	U	0.00100	0.000655	mg/L			03/01/24 18:06	1
Toluene	<0.000475	U	0.00100	0.000475	mg/L			03/01/24 18:06	1
trans-1,2-Dichloroethylene	<0.000368	U	0.00100	0.000368	mg/L			03/01/24 18:06	1
trans-1,3-Dichloropropylene	<0.00127	U	0.00500	0.00127	mg/L			03/01/24 18:06	1
Trichloroethylene	<0.00150	U	0.00500	0.00150	mg/L			03/01/24 18:06	1
Vinyl chloride	<0.000428	U	0.00200	0.000428	mg/L			03/01/24 18:06	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*89*		*63 - 144*		*03/01/24 18:06*	*1*
4-Bromofluorobenzene (Surr)	*113*		*74 - 124*		*03/01/24 18:06*	*1*
Dibromofluoromethane (Surr)	*108*		*75 - 131*		*03/01/24 18:06*	*1*
Toluene-d8 (Surr)	*111*		*80 - 120*		*03/01/24 18:06*	*1*

Client Sample ID: 12960

Date Collected: 02/28/24 12:00
Date Received: 02/29/24 10:45

Lab Sample ID: 820-12272-2
Matrix: Water

Method: EPA 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	<0.000585	U	0.00500	0.000585	mg/L			03/01/24 18:24	1
1,1,2,2-Tetrachloroethane	<0.000470	U	0.00100	0.000470	mg/L			03/01/24 18:24	1
1,1,2-Trichloroethane	<0.000411	U	0.00100	0.000411	mg/L			03/01/24 18:24	1
1,1-Dichlorethylene	<0.000738	U	0.00100	0.000738	mg/L			03/01/24 18:24	1

Client Sample Results

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Client Sample ID: 12960

Lab Sample ID: 820-12272-2

Date Collected: 02/28/24 12:00
Date Received: 02/29/24 10:45

Matrix: Water

Method: EPA 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1-Dichloroethane	<0.000635	U	0.00100	0.000635	mg/L			03/01/24 18:24	1
1,2-Dibromoethane	<0.000999	U	0.00500	0.000999	mg/L			03/01/24 18:24	1
1,2-Dichloroethane	<0.000372	U	0.00100	0.000372	mg/L			03/01/24 18:24	1
1,2-Dichloropropane	<0.000556	U	0.00500	0.000556	mg/L			03/01/24 18:24	1
2-Butanone (MEK)	<0.00828	U	0.0500	0.00828	mg/L			03/01/24 18:24	1
2-Chloroethyl vinyl ether	<0.000753	U	0.00500	0.000753	mg/L			03/01/24 18:24	1
Acrolein	<0.0111	U	0.0500	0.0111	mg/L			03/01/24 18:24	1
Acrylonitrile	<0.0143	U	0.0500	0.0143	mg/L			03/01/24 18:24	1
Benzene	<0.000460	U	0.00100	0.000460	mg/L			03/01/24 18:24	1
Bromodichloromethane	<0.000552	U	0.00100	0.000552	mg/L			03/01/24 18:24	1
Bromoform	<0.000633	U	0.00500	0.000633	mg/L			03/01/24 18:24	1
Carbon tetrachloride	<0.000896	U	0.00500	0.000896	mg/L			03/01/24 18:24	1
Chlorobenzene	<0.000455	U	0.00100	0.000455	mg/L			03/01/24 18:24	1
Chloroethane	<0.00198	U	0.0100	0.00198	mg/L			03/01/24 18:24	1
Chloroform	<0.000464	U	0.00100	0.000464	mg/L			03/01/24 18:24	1
Methyl chloride	<0.00204	U	0.0100	0.00204	mg/L			03/01/24 18:24	1
cis-1,3-Dichloropropylene	<0.00107	U	0.00500	0.00107	mg/L			03/01/24 18:24	1
Dibromochloromethane	<0.000547	U	0.00500	0.000547	mg/L			03/01/24 18:24	1
Ethylbenzene	<0.000385	U	0.00100	0.000385	mg/L			03/01/24 18:24	1
Hexachlorobutadiene	<0.000627	U	0.00500	0.000627	mg/L			03/01/24 18:24	1
Methyl bromide	<0.00142	U	0.00500	0.00142	mg/L			03/01/24 18:24	1
Methylene Chloride	<0.00173	U	0.00500	0.00173	mg/L			03/01/24 18:24	1
Naphthalene	<0.00135	U	0.0100	0.00135	mg/L			03/01/24 18:24	1
Tetrachloroethylene	<0.000655	U	0.00100	0.000655	mg/L			03/01/24 18:24	1
Toluene	<0.000475	U	0.00100	0.000475	mg/L			03/01/24 18:24	1
trans-1,2-Dichloroethylene	<0.000368	U	0.00100	0.000368	mg/L			03/01/24 18:24	1
trans-1,3-Dichloropropylene	<0.00127	U	0.00500	0.00127	mg/L			03/01/24 18:24	1
Trichloroethylene	<0.00150	U	0.00500	0.00150	mg/L			03/01/24 18:24	1
Vinyl chloride	<0.000428	U	0.00200	0.000428	mg/L			03/01/24 18:24	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*89*		*63 - 144*		*03/01/24 18:24*	*1*
4-Bromofluorobenzene (Surr)	*107*		*74 - 124*		*03/01/24 18:24*	*1*
Dibromofluoromethane (Surr)	*106*		*75 - 131*		*03/01/24 18:24*	*1*
Toluene-d8 (Surr)	*109*		*80 - 120*		*03/01/24 18:24*	*1*

Client Sample ID: 12961

Lab Sample ID: 820-12272-3

Date Collected: 02/28/24 18:00
Date Received: 02/29/24 10:45

Matrix: Water

Method: EPA 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	<0.000585	U	0.00500	0.000585	mg/L			03/01/24 18:43	1
1,1,2,2-Tetrachloroethane	<0.000470	U	0.00100	0.000470	mg/L			03/01/24 18:43	1
1,1,2-Trichloroethane	<0.000411	U	0.00100	0.000411	mg/L			03/01/24 18:43	1
1,1-Dichlorethylene	<0.000738	U	0.00100	0.000738	mg/L			03/01/24 18:43	1
1,1-Dichloroethane	<0.000635	U	0.00100	0.000635	mg/L			03/01/24 18:43	1
1,2-Dibromoethane	<0.000999	U	0.00500	0.000999	mg/L			03/01/24 18:43	1
1,2-Dichloroethane	<0.000372	U	0.00100	0.000372	mg/L			03/01/24 18:43	1
1,2-Dichloropropane	<0.000556	U	0.00500	0.000556	mg/L			03/01/24 18:43	1

Client Sample ID: 12961

Date Collected: 02/28/24 18:00
Date Received: 02/29/24 10:45

Lab Sample ID: 820-12272-3
Matrix: Water

Method: EPA 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
2-Butanone (MEK)	<0.00828	U	0.0500	0.00828	mg/L			03/01/24 18:43	1
2-Chloroethyl vinyl ether	<0.000753	U	0.00500	0.000753	mg/L			03/01/24 18:43	1
Acrolein	<0.0111	U	0.0500	0.0111	mg/L			03/01/24 18:43	1
Acrylonitrile	<0.0143	U	0.0500	0.0143	mg/L			03/01/24 18:43	1
Benzene	<0.000460	U	0.00100	0.000460	mg/L			03/01/24 18:43	1
Bromodichloromethane	<0.000552	U	0.00100	0.000552	mg/L			03/01/24 18:43	1
Bromoform	<0.000633	U	0.00500	0.000633	mg/L			03/01/24 18:43	1
Carbon tetrachloride	<0.000896	U	0.00500	0.000896	mg/L			03/01/24 18:43	1
Chlorobenzene	<0.000455	U	0.00100	0.000455	mg/L			03/01/24 18:43	1
Chloroethane	<0.00198	U	0.0100	0.00198	mg/L			03/01/24 18:43	1
Chloroform	<0.000464	U	0.00100	0.000464	mg/L			03/01/24 18:43	1
Methyl chloride	<0.00204	U	0.0100	0.00204	mg/L			03/01/24 18:43	1
cis-1,3-Dichloropropylene	<0.00107	U	0.00500	0.00107	mg/L			03/01/24 18:43	1
Dibromochloromethane	<0.000547	U	0.00500	0.000547	mg/L			03/01/24 18:43	1
Ethylbenzene	<0.000385	U	0.00100	0.000385	mg/L			03/01/24 18:43	1
Hexachlorobutadiene	<0.000627	U	0.00500	0.000627	mg/L			03/01/24 18:43	1
Methyl bromide	<0.00142	U	0.00500	0.00142	mg/L			03/01/24 18:43	1
Methylene Chloride	<0.00173	U	0.00500	0.00173	mg/L			03/01/24 18:43	1
Naphthalene	<0.00135	U	0.0100	0.00135	mg/L			03/01/24 18:43	1
Tetrachloroethylene	<0.000655	U	0.00100	0.000655	mg/L			03/01/24 18:43	1
Toluene	<0.000475	U	0.00100	0.000475	mg/L			03/01/24 18:43	1
trans-1,2-Dichloroethylene	<0.000368	U	0.00100	0.000368	mg/L			03/01/24 18:43	1
trans-1,3-Dichloropropylene	<0.00127	U	0.00500	0.00127	mg/L			03/01/24 18:43	1
Trichloroethylene	<0.00150	U	0.00500	0.00150	mg/L			03/01/24 18:43	1
Vinyl chloride	<0.000428	U	0.00200	0.000428	mg/L			03/01/24 18:43	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*88*		*63 - 144*		*03/01/24 18:43*	*1*
4-Bromofluorobenzene (Surr)	*111*		*74 - 124*		*03/01/24 18:43*	*1*
Dibromofluoromethane (Surr)	*107*		*75 - 131*		*03/01/24 18:43*	*1*
Toluene-d8 (Surr)	*108*		*80 - 120*		*03/01/24 18:43*	*1*

Client Sample ID: 12962

Date Collected: 02/29/24 00:00
Date Received: 02/29/24 10:45

Lab Sample ID: 820-12272-4
Matrix: Water

Method: EPA 624.1 - Volatile Organic Compounds (GC/MS)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	<0.000585	U	0.00500	0.000585	mg/L			03/01/24 19:02	1
1,1,2,2-Tetrachloroethane	<0.000470	U	0.00100	0.000470	mg/L			03/01/24 19:02	1
1,1,2-Trichloroethane	<0.000411	U	0.00100	0.000411	mg/L			03/01/24 19:02	1
1,1-Dichlorethylene	<0.000738	U	0.00100	0.000738	mg/L			03/01/24 19:02	1
1,1-Dichloroethane	<0.000635	U	0.00100	0.000635	mg/L			03/01/24 19:02	1
1,2-Dibromoethane	<0.000999	U	0.00500	0.000999	mg/L			03/01/24 19:02	1
1,2-Dichloroethane	<0.000372	U	0.00100	0.000372	mg/L			03/01/24 19:02	1
1,2-Dichloropropane	<0.000556	U	0.00500	0.000556	mg/L			03/01/24 19:02	1
2-Butanone (MEK)	<0.00828	U	0.0500	0.00828	mg/L			03/01/24 19:02	1
2-Chloroethyl vinyl ether	<0.000753	U	0.00500	0.000753	mg/L			03/01/24 19:02	1
Acrolein	<0.0111	U	0.0500	0.0111	mg/L			03/01/24 19:02	1
Acrylonitrile	<0.0143	U	0.0500	0.0143	mg/L			03/01/24 19:02	1

Client Sample Results

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Client Sample ID: 12962
Date Collected: 02/29/24 00:00
Date Received: 02/29/24 10:45

Lab Sample ID: 820-12272-4
Matrix: Water

Method: EPA 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Analyte	Result	Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
Benzene	<0.000460	U	0.00100	0.000460	mg/L			03/01/24 19:02	1
Bromodichloromethane	<0.000552	U	0.00100	0.000552	mg/L			03/01/24 19:02	1
Bromoform	<0.000633	U	0.00500	0.000633	mg/L			03/01/24 19:02	1
Carbon tetrachloride	<0.000896	U	0.00500	0.000896	mg/L			03/01/24 19:02	1
Chlorobenzene	<0.000455	U	0.00100	0.000455	mg/L			03/01/24 19:02	1
Chloroethane	<0.00198	U	0.0100	0.00198	mg/L			03/01/24 19:02	1
Chloroform	<0.000464	U	0.00100	0.000464	mg/L			03/01/24 19:02	1
Methyl chloride	<0.00204	U	0.0100	0.00204	mg/L			03/01/24 19:02	1
cis-1,3-Dichloropropylene	<0.00107	U	0.00500	0.00107	mg/L			03/01/24 19:02	1
Dibromochloromethane	<0.000547	U	0.00500	0.000547	mg/L			03/01/24 19:02	1
Ethylbenzene	<0.000385	U	0.00100	0.000385	mg/L			03/01/24 19:02	1
Hexachlorobutadiene	<0.000627	U	0.00500	0.000627	mg/L			03/01/24 19:02	1
Methyl bromide	<0.00142	U	0.00500	0.00142	mg/L			03/01/24 19:02	1
Methylene Chloride	<0.00173	U	0.00500	0.00173	mg/L			03/01/24 19:02	1
Naphthalene	<0.00135	U	0.0100	0.00135	mg/L			03/01/24 19:02	1
Tetrachloroethylene	<0.000655	U	0.00100	0.000655	mg/L			03/01/24 19:02	1
Toluene	<0.000475	U	0.00100	0.000475	mg/L			03/01/24 19:02	1
trans-1,2-Dichloroethylene	<0.000368	U	0.00100	0.000368	mg/L			03/01/24 19:02	1
trans-1,3-Dichloropropylene	<0.00127	U	0.00500	0.00127	mg/L			03/01/24 19:02	1
Trichloroethylene	<0.00150	U	0.00500	0.00150	mg/L			03/01/24 19:02	1
Vinyl chloride	<0.000428	U	0.00200	0.000428	mg/L			03/01/24 19:02	1

Surrogate	*%Recovery*	*Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*88*		*63 - 144*		*03/01/24 19:02*	*1*
4-Bromofluorobenzene (Surr)	*111*		*74 - 124*		*03/01/24 19:02*	*1*
Dibromofluoromethane (Surr)	*107*		*75 - 131*		*03/01/24 19:02*	*1*
Toluene-d8 (Surr)	*108*		*80 - 120*		*03/01/24 19:02*	*1*

Surrogate Summary

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Matrix: Water

Prep Type: Total/NA

		Percent Surrogate Recovery (Acceptance Limits)			
		DCA	BFB	DBFM	TOL
Lab Sample ID	Client Sample ID	(63-144)	(74-124)	(75-131)	(80-120)
820-12272-1	12959	89	113	108	111
820-12272-2	12960	89	107	106	109
820-12272-3	12961	88	111	107	108
820-12272-4	12962	88	111	107	108
LCS 860-147779/3	Lab Control Sample	87	104	106	103
LCSD 860-147779/4	Lab Control Sample Dup	84	103	105	103
MB 860-147779/11	Method Blank	87	114	109	111

Surrogate Legend

DCA = 1,2-Dichloroethane-d4 (Surr)
BFB = 4-Bromofluorobenzene (Surr)
DBFM = Dibromofluoromethane (Surr)
TOL = Toluene-d8 (Surr)

QC Sample Results

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Method: 624.1 - Volatile Organic Compounds (GC/MS)

Lab Sample ID: MB 860-147779/11
Matrix: Water
Analysis Batch: 147779

Client Sample ID: Method Blank
Prep Type: Total/NA

Analyte	MB Result	MB Qualifier	RL	MDL	Unit	D	Prepared	Analyzed	Dil Fac
1,1,1-Trichloroethane	<0.000585	U	0.00500	0.000585	mg/L			03/01/24 13:12	1
1,1,2,2-Tetrachloroethane	<0.000470	U	0.00100	0.000470	mg/L			03/01/24 13:12	1
1,1,2-Trichloroethane	<0.000411	U	0.00100	0.000411	mg/L			03/01/24 13:12	1
1,1-Dichlorethylene	<0.000738	U	0.00100	0.000738	mg/L			03/01/24 13:12	1
1,1-Dichloroethane	<0.000635	U	0.00100	0.000635	mg/L			03/01/24 13:12	1
1,2-Dibromoethane	<0.000999	U	0.00500	0.000999	mg/L			03/01/24 13:12	1
1,2-Dichloroethane	<0.000372	U	0.00100	0.000372	mg/L			03/01/24 13:12	1
1,2-Dichloropropane	<0.000556	U	0.00500	0.000556	mg/L			03/01/24 13:12	1
2-Butanone (MEK)	<0.00828	U	0.0500	0.00828	mg/L			03/01/24 13:12	1
2-Chloroethyl vinyl ether	<0.000753	U	0.00500	0.000753	mg/L			03/01/24 13:12	1
Acrolein	<0.0111	U	0.0500	0.0111	mg/L			03/01/24 13:12	1
Acrylonitrile	<0.0143	U	0.0500	0.0143	mg/L			03/01/24 13:12	1
Benzene	<0.000460	U	0.00100	0.000460	mg/L			03/01/24 13:12	1
Bromodichloromethane	<0.000552	U	0.00100	0.000552	mg/L			03/01/24 13:12	1
Bromoform	<0.000633	U	0.00500	0.000633	mg/L			03/01/24 13:12	1
Carbon tetrachloride	<0.000896	U	0.00500	0.000896	mg/L			03/01/24 13:12	1
Chlorobenzene	<0.000455	U	0.00100	0.000455	mg/L			03/01/24 13:12	1
Chloroethane	<0.00198	U	0.0100	0.00198	mg/L			03/01/24 13:12	1
Chloroform	<0.000464	U	0.00100	0.000464	mg/L			03/01/24 13:12	1
Methyl chloride	<0.00204	U	0.0100	0.00204	mg/L			03/01/24 13:12	1
cis-1,3-Dichloropropylene	<0.00107	U	0.00500	0.00107	mg/L			03/01/24 13:12	1
Dibromochloromethane	<0.000547	U	0.00500	0.000547	mg/L			03/01/24 13:12	1
Ethylbenzene	<0.000385	U	0.00100	0.000385	mg/L			03/01/24 13:12	1
Hexachlorobutadiene	<0.000627	U	0.00500	0.000627	mg/L			03/01/24 13:12	1
Methyl bromide	<0.00142	U	0.00500	0.00142	mg/L			03/01/24 13:12	1
Methylene Chloride	<0.00173	U	0.00500	0.00173	mg/L			03/01/24 13:12	1
Naphthalene	<0.00135	U	0.0100	0.00135	mg/L			03/01/24 13:12	1
Tetrachloroethylene	<0.000655	U	0.00100	0.000655	mg/L			03/01/24 13:12	1
Toluene	<0.000475	U	0.00100	0.000475	mg/L			03/01/24 13:12	1
trans-1,2-Dichloroethylene	<0.000368	U	0.00100	0.000368	mg/L			03/01/24 13:12	1
trans-1,3-Dichloropropylene	<0.00127	U	0.00500	0.00127	mg/L			03/01/24 13:12	1
Trichloroethylene	<0.00150	U	0.00500	0.00150	mg/L			03/01/24 13:12	1
Vinyl chloride	<0.000428	U	0.00200	0.000428	mg/L			03/01/24 13:12	1

Surrogate	*MB %Recovery*	*MB Qualifier*	*Limits*	*Prepared*	*Analyzed*	*Dil Fac*
1,2-Dichloroethane-d4 (Surr)	*87*		*63 - 144*		*03/01/24 13:12*	*1*
4-Bromofluorobenzene (Surr)	*114*		*74 - 124*		*03/01/24 13:12*	*1*
Dibromofluoromethane (Surr)	*109*		*75 - 131*		*03/01/24 13:12*	*1*
Toluene-d8 (Surr)	*111*		*80 - 120*		*03/01/24 13:12*	*1*

Lab Sample ID: LCS 860-147779/3
Matrix: Water
Analysis Batch: 147779

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,1,1-Trichloroethane	0.0500	0.04812		mg/L		96	70 - 130
1,1,2,2-Tetrachloroethane	0.0500	0.05504		mg/L		110	74 - 125
1,1,2-Trichloroethane	0.0500	0.05609		mg/L		112	75 - 130

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCS 860-147779/3
Matrix: Water
Analysis Batch: 147779

Client Sample ID: Lab Control Sample
Prep Type: Total/NA

Analyte	Spike Added	LCS Result	LCS Qualifier	Unit	D	%Rec	%Rec Limits
1,1-Dichlorethylene	0.0500	0.04918		mg/L		98	50 - 150
1,1-Dichloroethane	0.0500	0.04972		mg/L		99	71 - 130
1,2-Dibromoethane	0.0500	0.05884		mg/L		118	73 - 125
1,2-Dichloroethane	0.0500	0.04278		mg/L		86	72 - 130
1,2-Dichloropropane	0.0500	0.05695		mg/L		114	74 - 125
2-Butanone (MEK)	0.250	0.2547		mg/L		102	60 - 140
2-Chloroethyl vinyl ether	0.0500	0.05457		mg/L		109	50 - 150
Acrolein	0.250	0.2149		mg/L		86	60 - 140
Acrylonitrile	0.500	0.5679		mg/L		114	60 - 140
Benzene	0.0500	0.05775		mg/L		116	75 - 125
Bromodichloromethane	0.0500	0.05111		mg/L		102	75 - 125
Bromoform	0.0500	0.05192		mg/L		104	70 - 130
Carbon tetrachloride	0.0500	0.04562		mg/L		91	70 - 125
Chlorobenzene	0.0500	0.05130		mg/L		103	82 - 135
Chloroethane	0.0500	0.05668		mg/L		113	60 - 140
Chloroform	0.0500	0.04911		mg/L		98	70 - 121
Methyl chloride	0.0500	0.04900		mg/L		98	60 - 140
cis-1,3-Dichloropropylene	0.0500	0.05548		mg/L		111	74 - 125
Dibromochloromethane	0.0500	0.05007		mg/L		100	73 - 125
Ethylbenzene	0.0500	0.05246		mg/L		105	75 - 125
Hexachlorobutadiene	0.0500	0.05597		mg/L		112	75 - 125
Methyl bromide	0.0500	0.04225		mg/L		84	60 - 140
Methylene Chloride	0.0500	0.05590		mg/L		112	71 - 125
Naphthalene	0.0500	0.04870		mg/L		97	70 - 130
Tetrachloroethylene	0.0500	0.05204		mg/L		104	71 - 125
Toluene	0.0500	0.04677		mg/L		94	75 - 130
trans-1,2-Dichloroethylene	0.0500	0.04793		mg/L		96	75 - 125
trans-1,3-Dichloropropylene	0.0500	0.05032		mg/L		101	66 - 125
Trichloroethylene	0.0500	0.04935		mg/L		99	75 - 135
Vinyl chloride	0.0500	0.05426		mg/L		109	60 - 140

Surrogate	*LCS %Recovery*	*LCS Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*87*		*63 - 144*
4-Bromofluorobenzene (Surr)	*104*		*74 - 124*
Dibromofluoromethane (Surr)	*106*		*75 - 131*
Toluene-d8 (Surr)	*103*		*80 - 120*

Lab Sample ID: LCSD 860-147779/4
Matrix: Water
Analysis Batch: 147779

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,1,1-Trichloroethane	0.0500	0.04743		mg/L		95	70 - 130	1	25
1,1,2,2-Tetrachloroethane	0.0500	0.05276		mg/L		106	74 - 125	4	25
1,1,2-Trichloroethane	0.0500	0.05447		mg/L		109	75 - 130	3	25
1,1-Dichlorethylene	0.0500	0.04873		mg/L		97	50 - 150	1	25
1,1-Dichloroethane	0.0500	0.04756		mg/L		95	71 - 130	4	25
1,2-Dibromoethane	0.0500	0.05644		mg/L		113	73 - 125	4	25

Method: 624.1 - Volatile Organic Compounds (GC/MS) (Continued)

Lab Sample ID: LCSD 860-147779/4
Matrix: Water
Analysis Batch: 147779

Client Sample ID: Lab Control Sample Dup
Prep Type: Total/NA

Analyte	Spike Added	LCSD Result	LCSD Qualifier	Unit	D	%Rec	%Rec Limits	RPD	RPD Limit
1,2-Dichloroethane	0.0500	0.04260		mg/L		85	72 - 130	0	25
1,2-Dichloropropane	0.0500	0.05443		mg/L		109	74 - 125	5	25
2-Butanone (MEK)	0.250	0.2644		mg/L		106	60 - 140	4	25
2-Chloroethyl vinyl ether	0.0500	0.05312		mg/L		106	50 - 150	3	25
Acrolein	0.250	0.2161		mg/L		86	60 - 140	1	25
Acrylonitrile	0.500	0.5615		mg/L		112	60 - 140	1	25
Benzene	0.0500	0.05380		mg/L		108	75 - 125	7	25
Bromodichloromethane	0.0500	0.04732		mg/L		95	75 - 125	8	25
Bromoform	0.0500	0.04917		mg/L		98	70 - 130	5	25
Carbon tetrachloride	0.0500	0.04349		mg/L		87	70 - 125	5	25
Chlorobenzene	0.0500	0.04933		mg/L		99	82 - 135	4	25
Chloroethane	0.0500	0.05561		mg/L		111	60 - 140	2	25
Chloroform	0.0500	0.04772		mg/L		95	70 - 121	3	25
Methyl chloride	0.0500	0.04862		mg/L		97	60 - 140	1	25
cis-1,3-Dichloropropylene	0.0500	0.05368		mg/L		107	74 - 125	3	25
Dibromochloromethane	0.0500	0.04828		mg/L		97	73 - 125	4	25
Ethylbenzene	0.0500	0.05024		mg/L		100	75 - 125	4	25
Hexachlorobutadiene	0.0500	0.05573		mg/L		111	75 - 125	0	25
Methyl bromide	0.0500	0.03946		mg/L		79	60 - 140	7	25
Methylene Chloride	0.0500	0.05435		mg/L		109	71 - 125	3	25
Naphthalene	0.0500	0.04646		mg/L		93	70 - 130	5	25
Tetrachloroethylene	0.0500	0.05058		mg/L		101	71 - 125	3	25
Toluene	0.0500	0.04382		mg/L		88	75 - 130	7	25
trans-1,2-Dichloroethylene	0.0500	0.04548		mg/L		91	75 - 125	5	25
trans-1,3-Dichloropropylene	0.0500	0.04940		mg/L		99	66 - 125	2	25
Trichloroethylene	0.0500	0.04695		mg/L		94	75 - 135	5	25
Vinyl chloride	0.0500	0.05314		mg/L		106	60 - 140	2	25

Surrogate	*LCSD %Recovery*	*LCSD Qualifier*	*Limits*
1,2-Dichloroethane-d4 (Surr)	*84*		*63 - 144*
4-Bromofluorobenzene (Surr)	*103*		*74 - 124*
Dibromofluoromethane (Surr)	*105*		*75 - 131*
Toluene-d8 (Surr)	*103*		*80 - 120*

QC Association Summary

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

GC/MS VOA

Analysis Batch: 147779

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
820-12272-1	12959	Total/NA	Water	624.1	
820-12272-2	12960	Total/NA	Water	624.1	
820-12272-3	12961	Total/NA	Water	624.1	
820-12272-4	12962	Total/NA	Water	624.1	
MB 860-147779/11	Method Blank	Total/NA	Water	624.1	
LCS 860-147779/3	Lab Control Sample	Total/NA	Water	624.1	
LCSD 860-147779/4	Lab Control Sample Dup	Total/NA	Water	624.1	

Lab Chronicle

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Client Sample ID: 12959

Lab Sample ID: 820-12272-1
Date Collected: 02/28/24 06:00
Matrix: Water
Date Received: 02/29/24 10:45

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		1	5 mL	5 mL	147779	03/01/24 18:06	AN	EET HOU

Client Sample ID: 12960

Lab Sample ID: 820-12272-2
Date Collected: 02/28/24 12:00
Matrix: Water
Date Received: 02/29/24 10:45

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		1	5 mL	5 mL	147779	03/01/24 18:24	AN	EET HOU

Client Sample ID: 12961

Lab Sample ID: 820-12272-3
Date Collected: 02/28/24 18:00
Matrix: Water
Date Received: 02/29/24 10:45

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		1	5 mL	5 mL	147779	03/01/24 18:43	AN	EET HOU

Client Sample ID: 12962

Lab Sample ID: 820-12272-4
Date Collected: 02/29/24 00:00
Matrix: Water
Date Received: 02/29/24 10:45

Prep Type	Batch Type	Batch Method	Run	Dil Factor	Initial Amount	Final Amount	Batch Number	Prepared or Analyzed	Analyst	Lab
Total/NA	Analysis	624.1		1	5 mL	5 mL	147779	03/01/24 19:02	AN	EET HOU

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Accreditation/Certification Summary

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Laboratory: Eurofins Houston

Unless otherwise noted, all analytes for this laboratory were covered under each accreditation/certification below.

Authority	Program	Identification Number	Expiration Date
Texas	NELAP	T104704215	06-30-24

The following analytes are included in this report, but the laboratory is not certified by the governing authority. This list may include analytes for which the agency does not offer certification.

Analysis Method	Prep Method	Matrix	Analyte
624.1		Water	Hexachlorobutadiene
624.1		Water	Naphthalene

Method Summary

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Method	Method Description	Protocol	Laboratory
624.1	Volatile Organic Compounds (GC/MS)	EPA	EET HOU

Protocol References:

EPA = US Environmental Protection Agency

Laboratory References:

EET HOU = Eurofins Houston, 4145 Greenbriar Dr, Stafford, TX 77477, TEL (281)240-4200

Sample Summary

Client: City of Lubbock
Project/Site: Plant Sampling SEWRP

Job ID: 820-12272-1

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
820-12272-1	12959	Water	02/28/24 06:00	02/29/24 10:45
820-12272-2	12960	Water	02/28/24 12:00	02/29/24 10:45
820-12272-3	12961	Water	02/28/24 18:00	02/29/24 10:45
820-12272-4	12962	Water	02/29/24 00:00	02/29/24 10:45

Loc: 820
12272

CITY OF LUBBOCK WATER UTILITIES LABORATORY

CHAIN OF CUSTODY AND ANALYSIS REQUEST

Report to: of Lubbock
Address: Water Reclamation
P O Box 2000
Lubbock TX 79457
Contact:
Phone: (806) 775-3221
Fax: (806) 775-3246

Invoice to:
Company: SAME
Address:
Contact:
Phone:
Fax:

Project No.
Project Name: PLANT SAMPLING
** NWWRP SEWRP

Sampler's Name (printed): IWMP

Analysis Requested

820-12272 Chain of Custody

Results by: Fax results ☐

Sample Source	Laboratory Ident. #	Date (Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Yr 2024)	Time	Composite	Grab	Blank	Glass	HDPE	VOA	Sterile	2 X 40mL	Water	Sludge	Soil	Sampler Iced	Iced during transport	~~HCL~~	H2SO4	HNO3	HNO3 (optima)	NaOH	None	Volatiles*									Field pH	Field Temp
~~Plant Influent~~					X				X		X	X				X	X						X											
~~Plant Influent~~					X				X		X	X				X	X						X											
~~Plant Influent~~					X				X		X	X				X	X						X											
~~Plant Influent~~					X				X		X	X				X	X						X											
Plant Effluent	12959	28	0600		X				X		X	X				X	X						X											
Plant Effluent	12960	28	1200		X				X		X	X				X	X						X											
Plant Effluent	12961	28	1800		X				X		X	X				X	X						X											
Plant Effluent	12962	29	2400		X				X		X	X				X	X						X											

Analyst:

Remarks: All analyses must be done in accordance with 40 CFR Part 136
5.1/2.6 C

** NWWRP= Northwest Water Reclamation Plant, SEWRP= Southeast Water Reclamation Plant

Sample Condition: Cool Yes ☑ No ☐; Intact Yes ☑ No ☐
Checked by (Initials): TK

Sampler Relinquished: [signature] Date: 2/29/24 Time: 10:45
Relinquished by: Date: Time:
Relinquished by: Date: Time:

Received by: Teddy Randolph Date: 2/29/24 Time: 10:45
Received by: Date: Time:
Received by: Date: Time:
Received by: Date: Time:

X Dispose of sample after analysis
Return residual sample to collector

Login Sample Receipt Checklist

Client: City of Lubbock

Job Number: 820-12272-1

Login Number: 12272
List Number: 1
Creator: Triplett, Colby

List Source: Eurofins Lubbock

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	N/A	
Sample custody seals, if present, are intact.	N/A	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	

Login Sample Receipt Checklist

Client: City of Lubbock

Job Number: 820-12272-1

Login Number: 12272
List Number: 2
Creator: Baker, Jeremiah

List Source: Eurofins Houston
List Creation: 03/01/24 11:16 AM

Question	Answer	Comment
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	True	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	True	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	True	

ANALYTICAL REPORT

December 05, 2023

1 Cp
2 Tc
3 Ss
4 Cn
5 Sr
6 Qc
7 Gl
8 Al
9 Sc

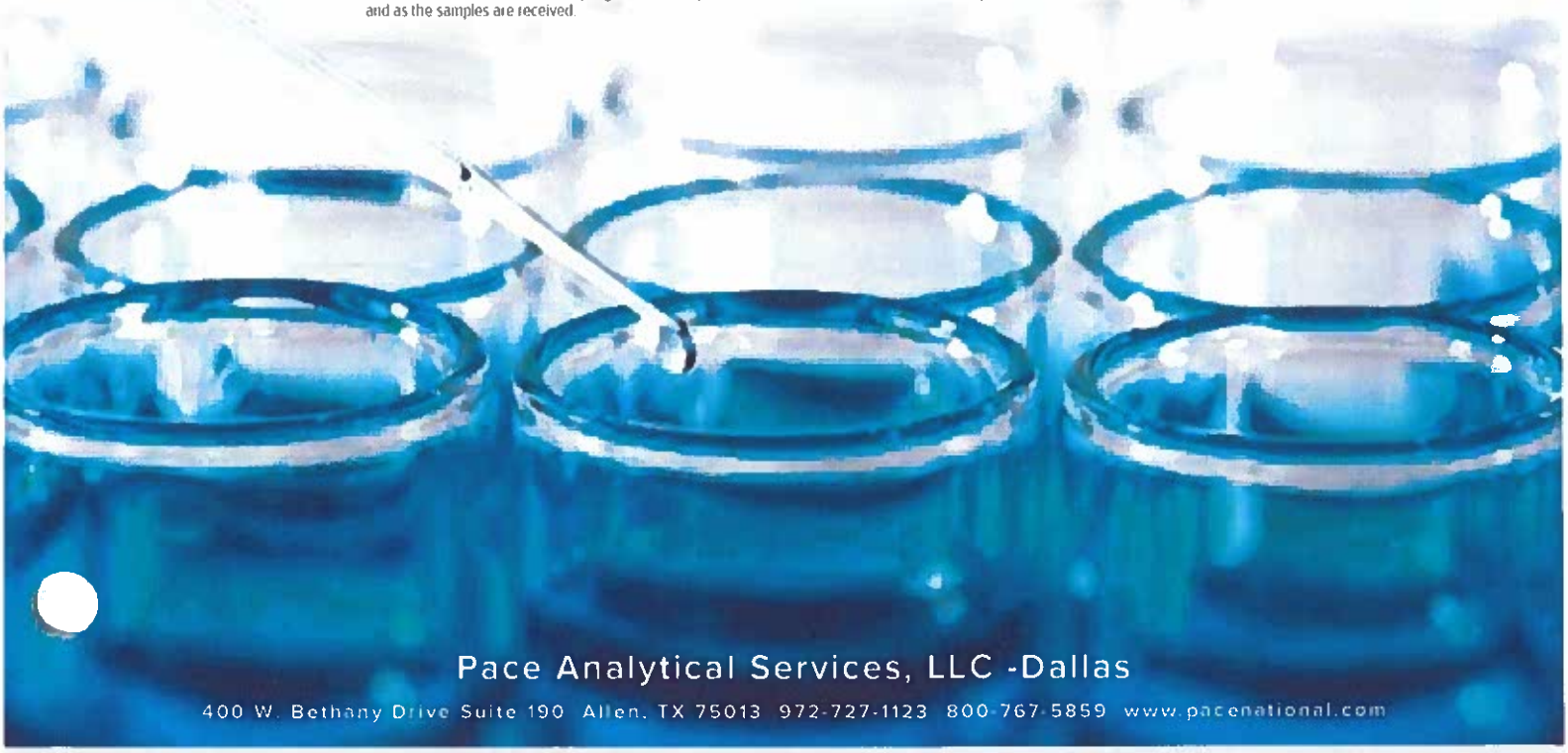
City of Lubbock

Sample Delivery Group:	L1679134
Samples Received:	11/17/2023
Project Number:	SEWRP PLANT SAMPLING
Description:	SEWRP Plant Sampling Q4
Site:	SE WATER RECLAMATION PLANT
Report To:	Martha Akers 1314 Ave K Lubbock, TX 79401

Entire Report Reviewed By: Dorothy P Roberts

Dorothy P Roberts
Project Manager

Results relate only to the items tested or calibrated and are reported as rounded values. This test report shall not be reproduced, except in full, without written approval of the laboratory. Where applicable, sampling conducted by Pace Analytical National is performed per guidance provided in laboratory standard operating procedures ENV-SOP-MTJL-0067 and ENV-SOP-MTJL-0068. Where sampling conducted by the customer, results relate to the accuracy of the information provided, and as the samples are received.



Pace Analytical Services, LLC -Dallas

400 W. Bethany Drive Suite 190 Allen, TX 75013 972-727-1123 800-767-5859 www.pacenational.com

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SAMPLE SUMMARY

SEWRP INFLUENT12863,12867,12871 L1679134-01 WW

Collected by: IWMP | Collected date/time: 11/14/23 10:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 1664A	WG2179079	1	11/29/23 14:29	11/30/23 15:31	TK	Allen, TX
Wet Chemistry by Method 1664A	WG2179081	1	11/29/23 14:29	12/04/23 15:32	TK	Allen, TX
Wet Chemistry by Method 420.1	WG2177847	1	11/27/23 11:12	11/28/23 11:38	KCM	Allen, TX
Wet Chemistry by Method 4500CN-E	WG2175755	1	11/22/23 11:30	11/22/23 17:23	KCM	Allen, TX
Wet Chemistry by Method 4500CN-G	WG2175755	1	11/22/23 17:23	11/22/23 17:23	KCM	Allen, TX

SEWRP INFLUENT12864,12868,12872 L1679134-02 WW

Collected by: IWMP | Collected date/time: 11/14/23 16:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 1664A	WG2179079	1	11/29/23 14:29	11/30/23 15:31	TK	Allen, TX
Wet Chemistry by Method 1664A	WG2179081	1	11/29/23 14:29	12/04/23 15:32	TK	Allen, TX
Wet Chemistry by Method 420.1	WG2177847	1	11/27/23 11:12	11/28/23 11:38	KCM	Allen, TX
Wet Chemistry by Method 4500CN-E	WG2175755	1	11/22/23 11:30	11/22/23 17:23	KCM	Allen, TX
Wet Chemistry by Method 4500CN-G	WG2175755	1	11/22/23 17:23	11/22/23 17:23	KCM	Allen, TX

SEWRP INFLUENT12865,12869,12873 L1679134-03 WW

Collected by: IWMP | Collected date/time: 11/14/23 22:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 1664A	WG2179079	1	11/29/23 14:29	11/30/23 15:31	TK	Allen, TX
Wet Chemistry by Method 1664A	WG2179081	1	11/29/23 14:29	12/04/23 15:32	TK	Allen, TX
Wet Chemistry by Method 420.1	WG2177847	1	11/27/23 11:12	11/28/23 11:38	KCM	Allen, TX
Wet Chemistry by Method 4500CN-E	WG2175755	1	11/22/23 11:30	11/22/23 17:23	KCM	Allen, TX
Wet Chemistry by Method 4500CN-G	WG2175755	1	11/22/23 17:23	11/22/23 17:23	KCM	Allen, TX

SEWRP INFLUENT12866,12870,12874 L1679134-04 WW

Collected by: IWMP | Collected date/time: 11/15/23 04:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 1664A	WG2179079	1	11/29/23 14:29	11/30/23 15:31	TK	Allen, TX
Wet Chemistry by Method 1664A	WG2179081	1	11/29/23 14:29	12/04/23 15:32	TK	Allen, TX
Wet Chemistry by Method 420.1	WG2177847	1	11/27/23 11:12	11/28/23 11:38	KCM	Allen, TX
Wet Chemistry by Method 4500CN-E	WG2175755	1	11/22/23 11:30	11/22/23 17:23	KCM	Allen, TX
Wet Chemistry by Method 4500CN-G	WG2175755	1	11/22/23 17:23	11/22/23 17:23	KCM	Allen, TX

SEWRP INFLUENT12875,12876 L1679134-05 WW

Collected by: IWMP | Collected date/time: 11/15/23 11:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 200.8	WG2174726	1	11/20/23 16:24	11/22/23 20:12	NA	Allen, TX
Metals (ICPMS) by Method 200.8	WG2174726	1	11/20/23 16:24	11/24/23 20:28	NA	Allen, TX
Metals (ICPMS) by Method 200.8	WG2174726	1	11/20/23 16:24	11/27/23 15:48	NA	Allen, TX
Subcontracted Analyses	WG2174852	1	12/01/23 00:00	12/01/23 00:00	-	Indianapolis, IN 46268

SAMPLE SUMMARY

SEWRP EFFLUENT12877,12881,12885 L1679134-06 WW

Collected by: IWMP | Collected date/time: 11/15/23 01:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 1664A	WG2179079	1	11/29/23 14:29	11/30/23 15:31	TK	Allen, TX
Wet Chemistry by Method 1664A	WG2179081	1	11/29/23 14:29	12/04/23 15:32	TK	Allen, TX
Wet Chemistry by Method 420.1	WG2180512	1	12/01/23 08:40	12/01/23 17:12	KCM	Allen, TX
Wet Chemistry by Method 4500CN-E	WG2175755	1	11/22/23 11:30	11/22/23 17:23	KCM	Allen, TX
Wet Chemistry by Method 4500CN-G	WG2175755	1	11/22/23 17:23	11/22/23 17:23	KCM	Allen, TX

SEWRP EFFLUENT12878,12882,12886 L1679134-07 WW

Collected by: IWMP | Collected date/time: 11/15/23 07:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 1664A	WG2179079	1	11/29/23 14:29	11/30/23 15:31	TK	Allen, TX
Wet Chemistry by Method 1664A	WG2179081	1	11/29/23 14:29	12/04/23 15:32	TK	Allen, TX
Wet Chemistry by Method 420.1	WG2180512	1	12/01/23 08:40	12/01/23 17:12	KCM	Allen, TX
Wet Chemistry by Method 4500CN-E	WG2175755	1	11/22/23 11:30	11/22/23 17:23	KCM	Allen, TX
Wet Chemistry by Method 4500CN-G	WG2175755	1	11/22/23 17:23	11/22/23 17:23	KCM	Allen, TX

SEWRP EFFLUENT12879,12883,12887 L1679134-08 WW

Collected by: IWMP | Collected date/time: 11/15/23 13:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 1664A	WG2179079	1	11/29/23 14:29	11/30/23 15:31	TK	Allen, TX
Wet Chemistry by Method 1664A	WG2179081	1	11/29/23 14:29	12/04/23 15:32	TK	Allen, TX
Wet Chemistry by Method 420.1	WG2180512	1	12/01/23 08:40	12/01/23 17:12	KCM	Allen, TX
Wet Chemistry by Method 4500CN-E	WG2175755	1	11/22/23 11:30	11/22/23 17:23	KCM	Allen, TX
Wet Chemistry by Method 4500CN-G	WG2178249	1	11/29/23 09:52	11/29/23 09:52	KCM	Allen, TX

SEWRP EFFLUENT12880,12884,12888 L1679134-09 WW

Collected by: IWMP | Collected date/time: 11/15/23 19:00 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Wet Chemistry by Method 1664A	WG2179079	1	11/29/23 14:29	11/30/23 15:31	TK	Allen, TX
Wet Chemistry by Method 1664A	WG2179081	1	11/29/23 14:29	12/04/23 15:32	TK	Allen, TX
Wet Chemistry by Method 420.1	WG2180512	1	12/01/23 08:40	12/01/23 17:12	KCM	Allen, TX
Wet Chemistry by Method 4500CN-E	WG2175755	1	11/22/23 11:30	11/22/23 17:23	KCM	Allen, TX
Wet Chemistry by Method 4500CN-G	WG2175755	1	11/22/23 17:23	11/22/23 17:23	KCM	Allen, TX

SEWRP EFFLUENT12889,12890 L1679134-10 WW

Collected by: IWMP | Collected date/time: 11/16/23 09:40 | Received date/time: 11/17/23 09:00

Method	Batch	Dilution	Preparation date/time	Analysis date/time	Analyst	Location
Metals (ICPMS) by Method 200.8	WG2174726	1	11/20/23 16:24	11/22/23 20:19	NA	Allen, TX
Metals (ICPMS) by Method 200.8	WG2174726	1	11/20/23 16:24	11/24/23 20:34	NA	Allen, TX
Metals (ICPMS) by Method 200.8	WG2174726	1	11/20/23 16:24	11/27/23 15:57	NA	Allen, TX
Subcontracted Analyses	WG2174852	1	12/01/23 00:00	12/01/23 00:00	-	Indianapolis, IN 46268

CASE NARRATIVE

All sample aliquots were received at the correct temperature, in the proper containers, with the appropriate preservatives, and within method specified holding times, unless qualified or notated within the report. Where applicable, all MDL (LOD) and RDL (LOQ) values reported for environmental samples have been corrected for the dilution factor used in the analysis. All Method and Batch Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results. By my digital signature below, I affirm to the best of my knowledge, all problems/anomalies observed by the laboratory as having the potential to affect the quality of the data have been identified by the laboratory, and no information or data have been knowingly withheld that would affect the quality of the data.

Dorothy P Roberts

Dorothy P Roberts
Project Manager

Project Narrative

L1679134-05, -10 contains subout data that is included after the chain of custody.

Wet Chemistry by Method 1664A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	42.3		0.350	5.00	1	11/30/2023 15:31	WG2179079
TPH - Oil & Grease	3.24	J	0.350	5.00	1	12/04/2023 15:32	WG2179081

Wet Chemistry by Method 420.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Total Phenols by 4AAP	0.0600		0.00550	0.0100	1	11/28/2023 11:38	WG2177847

Wet Chemistry by Method 4500CN-E

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 4500CN-G

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide,amenable	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

SAMPLE RESULTS - 02

L1679134

Wet Chemistry by Method 1664A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	57.7		0.350	5.00	1	11/30/2023 15:31	WG2179079
TPH - Oil & Grease	3.70	J	0.350	5.00	1	12/04/2023 15:32	WG2179081

Wet Chemistry by Method 420.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Total Phenols by 4AAP	0.0779		0.00550	0.0100	1	11/28/2023 11:38	WG2177847

Wet Chemistry by Method 4500CN-E

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 4500CN-G

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide,amenable	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

SAMPLE RESULTS - 03

Wet Chemistry by Method 1664A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	28.7		0.350	5.00	1	11/30/2023 15:31	WG2179079
TPH - Oil & Grease	U		0.350	5.00	1	12/04/2023 15:32	WG2179081

Wet Chemistry by Method 420.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Total Phenols by 4AAP	0.0809		0.00550	0.0100	1	11/28/2023 11:38	WG2177847

Wet Chemistry by Method 4500CN-E

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 4500CN-G

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide,amenable	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 1664A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	29.9		0.357	5.10	1	11/30/2023 15:31	WG2179079
TPH - Oil & Grease	0.610	J	0.357	5.10	1	12/04/2023 15:32	WG2179081

Wet Chemistry by Method 420.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Total Phenols by 4AAP	0.0740		0.00550	0.0100	1	11/28/2023 11:38	WG2177847

Wet Chemistry by Method 4500CN-E

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 4500CN-G

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide,amenable	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

SEWRP INFLUENT12875,12876 SAMPLE RESULTS - 05

Collected date/time: 11/15/23 11:00 **L1679134**

Metals (ICPMS) by Method 200.8

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.656		0.00186	0.00250	1	11/24/2023 20:28	WG2174726
Antimony	0.000620	J	0.000580	0.00500	1	11/24/2023 20:28	WG2174726
Arsenic	0.00309		0.000100	0.000500	1	11/24/2023 20:28	WG2174726
Barium	0.124		0.000440	0.00300	1	11/24/2023 20:28	WG2174726
Beryllium	U		0.0000600	0.000500	1	11/22/2023 20:12	WG2174726
Cadmium	U		0.000120	0.00100	1	11/24/2023 20:28	WG2174726
Chromium	0.00351		0.000510	0.00300	1	11/24/2023 20:28	WG2174726
Copper	0.0382		0.000900	0.00200	1	11/24/2023 20:28	WG2174726
Lead	0.00152		0.000140	0.000500	1	11/24/2023 20:28	WG2174726
Molybdenum	0.0130		0.000530	0.00100	1	11/24/2023 20:28	WG2174726
Nickel	0.00318		0.000640	0.00200	1	11/24/2023 20:28	WG2174726
Selenium	0.00156	J	0.000740	0.00500	1	11/22/2023 20:12	WG2174726
Silver	0.000274	J	0.0000800	0.000500	1	11/24/2023 20:28	WG2174726
Thallium	U		0.000190	0.000500	1	11/27/2023 15:48	WG2174726
Zinc	0.0820		0.00265	0.00500	1	11/24/2023 20:28	WG2174726

Wet Chemistry by Method 1664A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	0.430	J	0.372	5.32	1	11/30/2023 15:31	WG2179079
TPH - Oil & Grease	U		0.372	5.32	1	12/04/2023 15:32	WG2179081

Wet Chemistry by Method 420.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Total Phenols by 4AAP	U		0.00550	0.0100	1	12/01/2023 17:12	WG2180512

Wet Chemistry by Method 4500CN-E

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 4500CN-G

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide,amenable	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 1664A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	U		0.372	5.32	1	11/30/2023 15:31	WG2179079
TPH - Oil & Grease	U		0.372	5.32	1	12/04/2023 15:32	WG2179081

Wet Chemistry by Method 420.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Total Phenols by 4AAP	U		0.00550	0.0100	1	12/01/2023 17:12	WG2180512

Wet Chemistry by Method 4500CN-E

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 4500CN-G

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide,amenable	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 1664A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	U		0.380	5.44	1	11/30/2023 15:31	WG2179079
TPH - Oil & Grease	U		0.380	5.44	1	12/04/2023 15:32	WG2179081

Wet Chemistry by Method 420.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Total Phenols by 4AAP	U		0.00550	0.0100	1	12/01/2023 17:12	WG2180512

Wet Chemistry by Method 4500CN-E

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide	0.00858	J	0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 4500CN-G

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide,amenable	0.00858	J	0.00350	0.0100	1	11/29/2023 09:52	WG2178249

SAMPLE RESULTS - 09

Wet Chemistry by Method 1664A

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Oil & Grease (Hexane Extr)	U		0.357	5.10	1	11/30/2023 15:31	WG2179079
TPH - Oil & Grease	U		0.357	5.10	1	12/04/2023 15:32	WG2179081

Wet Chemistry by Method 420.1

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Total Phenols by 4AAP	U		0.00550	0.0100	1	12/01/2023 17:12	WG2180512

Wet Chemistry by Method 4500CN-E

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Wet Chemistry by Method 4500CN-G

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Cyanide,amenable	U		0.00430	0.0100	1	11/22/2023 17:23	WG2175755

Metals (ICPMS) by Method 200.8

Analyte	Result mg/l	Qualifier	MDL mg/l	RDL mg/l	Dilution	Analysis date / time	Batch
Aluminum	0.0502		0.00186	0.00250	1	11/24/2023 20:34	WG2174726
Antimony	0.000601	J	0.000580	0.00500	1	11/24/2023 20:34	WG2174726
Arsenic	0.00292		0.000100	0.000500	1	11/24/2023 20:34	WG2174726
Barium	0.0680		0.000440	0.00300	1	11/24/2023 20:34	WG2174726
Beryllium	U		0.0000600	0.000500	1	11/22/2023 20:19	WG2174726
Cadmium	U		0.000120	0.00100	1	11/22/2023 20:19	WG2174726
Chromium	0.000878	J	0.000510	0.00300	1	11/24/2023 20:34	WG2174726
Copper	0.00187	J	0.000900	0.00200	1	11/24/2023 20:34	WG2174726
Lead	U		0.000140	0.000500	1	11/24/2023 20:34	WG2174726
Molybdenum	0.0110		0.000530	0.00100	1	11/24/2023 20:34	WG2174726
Nickel	0.00188	J	0.000640	0.00200	1	11/24/2023 20:34	WG2174726
Selenium	0.000797	J	0.000740	0.00500	1	11/22/2023 20:19	WG2174726
Silver	U		0.0000800	0.000500	1	11/22/2023 20:19	WG2174726
Thallium	U		0.000190	0.000500	1	11/27/2023 15:57	WG2174726
Zinc	0.0154		0.00265	0.00500	1	11/24/2023 20:34	WG2174726

QUALITY CONTROL SUMMARY

L1679134-01,02,03,04,06,07,08,09

Method Blank (MB)

(MB) R4007000-1 11/30/23 15:31

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Oil & Grease (Hexane Extr)	U		0.350	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R4007000-2 11/30/23 15:31 • (LCSD) R4007000-3 11/30/23 15:31

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
Oil & Grease (Hexane Extr)	40.0	37.1	39.7	92.8	99.3	78.0-114			6.77	18

L1679336-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1679336-02 11/30/23 15:31 • (MS) R4007000-4 11/30/23 15:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
Oil & Grease (Hexane Extr)	40.0	5.90	47.5	104	1	78.0-114	

QUALITY CON[illegible]OL SUMMARY

L1679134-01,02,[illegible],06,07,08,09

Method Blank (MB)

(MB) R4007962-1 12/04/23 15:32

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
TPH - Oil & Grease	U		0.350	5.00

Laboratory Control Sample (LCS) • Laboratory Control Sample Duplicate (LCSD)

(LCS) R4007962-2 12/04/23 15:32 • (LCSD) R4007962-3 12/04/23 15:32

Analyte	Spike Amount mg/l	LCS Result mg/l	LCSD Result mg/l	LCS Rec. %	LCSD Rec. %	Rec. Limits %	LCS Qualifier	LCSD Qualifier	RPD %	RPD Limits %
TPH - Oil & Grease	20.0	19.7	17.1	98.5	85.5	64.0-132			14.1	34

L1679336-02 Original Sample (OS) • Matrix Spike (MS)

(OS) L1679336-02 12/04/23 15:32 • (MS) R4007962-4 12/04/23 15:32

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MS Rec. %	Dilution	Rec. Limits %	MS Qualifier
TPH - Oil & Grease	20.0	U	21.5	107	1	64.0-132	

QUALITY CONTROL SUMMARY

L1679134-01,02,03,04

Method Blank (MB)

(MB) R4005059-1 11/28/23 11:38

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Total Phenols by 4AAP	U		0.00550	0.0100

Laboratory Control Sample (LCS)

(LCS) R4005059-2 11/28/23 11:38

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Phenols by 4AAP	0.133	0.133	100	80.0-120	

L1680045-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1680045-01 11/28/23 11:38 • (MS) R4005059-3 11/28/23 11:38 • (MSD) R4005059-4 11/28/23 11:38

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Total Phenols by 4AAP	0.133	U	0.109	0.116	82.2	87.3	1	80.0-120			6.10	20

L1680045-05 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1680045-05 11/28/23 11:38 • (MS) R4005059-5 11/28/23 11:38 • (MSD) R4005059-6 11/28/23 11:38

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Total Phenols by 4AAP	0.133	U	0.199	0.186	149	140	1	80.0-120	J5	J5	6.55	20

QUALITY CON[illegible]OL SUMMARY

L1679134 [illegible] 7,08,09

Method Blank (MB)

(MB) R4007186-1 12/01/23 17:12

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Total Phenols by 4AAP	U		0.00550	0.0100

Laboratory Control Sample (LCS)

(LCS) R4007186-2 12/01/23 17:12

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Total Phenols by 4AAP	0.133	0.132	98.9	80.0-120	

L1680966-02 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1680966-02 12/01/23 17:12 • (MS) R4007186-3 12/01/23 17:12 • (MSD) R4007186-4 12/01/23 17:12

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Total Phenols by 4AAP	0.133	0.0231	0.130	0.137	80.1	85.7	1	80.0-120			5.50	20

QUALITY CONTROL SUMMARY

L1679134-01,02,03,04,06,07,08,09

Method Blank (MB)

(MB) R4003642-1 11/22/23 17:23

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Cyanide	U		0.00430	0.0100

Laboratory Control Sample (LCS)

(LCS) R4003642-2 11/22/23 17:23

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Cyanide	0.100	0.0934	93.4	85.0-115	

L1679134-06 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1679134-06 11/22/23 17:23 • (MS) R4003642-3 11/22/23 17:23 • (MSD) R4003642-4 11/22/23 17:23

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Cyanide	0.100	U	0.101	0.0966	101	96.6	1	85.0-115			4.08	20

L1680087-03 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1680087-03 11/22/23 17:23 • (MS) R4003642-5 11/22/23 17:23 • (MSD) R4003642-6 11/22/23 17:23

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Cyanide	0.100	0.00818	0.0950	0.0934	86.8	85.2	1	85.0-115			1.71	20

Method Blank (MB)

(MB) R4003272-1 11/21/23 21:10

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Antimony	U		0.000580	0.00500
Arsenic	0.000114	J	0.000100	0.000500
Barium	U		0.000440	0.00300
Beryllium	U		0.0000600	0.000500
Lead	U		0.000140	0.000500
Selenium	U		0.000740	0.00500
Silver	U		0.0000800	0.000500
Zinc	U		0.00265	0.00500

Method Blank (MB)

(MB) R4003923-1 11/22/23 18:45

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Cadmium	U		0.000120	0.00100
Chromium	U		0.000510	0.00300
Copper	U		0.000900	0.00200
Molybdenum	U		0.000530	0.00100
Nickel	U		0.000640	0.00200

Method Blank (MB)

(MB) R4004398-1 11/24/23 19:08

Analyte	MB Result mg/l	MB Qualifier	MB MDL mg/l	MB RDL mg/l
Aluminum	0.00456		0.00186	0.00250
Thallium	U		0.000190	0.000500

Laboratory Control Sample (LCS)

(LCS) R4003272-2 11/21/23 21:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Antimony	0.100	0.113	113	85.0-115	
Arsenic	0.100	0.112	112	85.0-115	
Barium	0.100	0.112	112	85.0-115	
Beryllium	0.100	0.107	107	85.0-115	
Lead	0.100	0.109	109	85.0-115	
Selenium	0.100	0.0981	98.1	85.0-115	

QUALITY CONTROL SUMMARY

L1679134-05,10

Laboratory Control Sample (LCS)

(LCS) R4003272-2 11/21/23 21:16

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Silver	0.0500	0.0546	109	85.0-115	
Zinc	0.100	0.112	112	85.0-115	

Laboratory Control Sample (LCS)

(LCS) R4003923-2 11/22/23 18:52

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Cadmium	0.100	0.100	100	85.0-115	
Chromium	0.100	0.102	102	85.0-115	
Copper	0.100	0.101	101	85.0-115	
Molybdenum	0.100	0.101	101	85.0-115	
Nickel	0.100	0.0998	99.8	85.0-115	

Laboratory Control Sample (LCS)

(LCS) R4004398-2 11/24/23 19:14

Analyte	Spike Amount mg/l	LCS Result mg/l	LCS Rec. %	Rec. Limits %	LCS Qualifier
Aluminum	1.00	1.07	107	85.0-115	
Thallium	0.100	0.0869	86.9	85.0-115	

L1674701-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1674701-01 11/21/23 21:23 • (MS) R4003272-3 11/21/23 21:29 • (MSD) R4003272-4 11/21/23 21:35

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Antimony	0.100	U	0.115	0.0925	115	92.5	1	70.0-130		J3	21.9	20
Beryllium	0.100	0.0000732	0.109	0.0993	108	99.3	1	70.0-130			8.85	20
Selenium	0.100	U	0.0998	0.0935	99.8	93.5	1	70.0-130			6.51	20
Silver	0.0500	U	0.0546	0.0447	109	89.5	1	70.0-130			19.9	20

L1674701-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1674701-01 11/22/23 18:59 • (MS) R4003923-3 11/22/23 19:05 • (MSD) R4003923-4 11/22/23 19:12

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Cadmium	0.100	U	0.0980	0.118	98.0	118	1	70.0-130			18.9	20

L1674701-01 Original Sample (OS) • Matrix Spike (MS) • Matrix Spike Duplicate (MSD)

(OS) L1674701-01 11/24/23 19:20 • (MS) R4004398-3 11/24/23 19:26 • (MSD) R4004398-4 11/24/23 19:31

Analyte	Spike Amount mg/l	Original Result mg/l	MS Result mg/l	MSD Result mg/l	MS Rec. %	MSD Rec. %	Dilution	Rec. Limits %	MS Qualifier	MSD Qualifier	RPD %	RPD Limits %
Aluminum	1.00	1.57	2.54	2.85	97.1	128	1	70.0-130			11.6	20
Arsenic	0.100	0.000727	0.0943	0.101	93.6	101	1	70.0-130			7.18	20
Barium	0.100	0.0402	0.134	0.146	94.1	106	1	70.0-130			8.29	20
Chromium	0.100	0.0497	0.148	0.165	98.7	115	1	70.0-130			10.6	20
Copper	0.100	0.0377	0.131	0.144	93.8	106	1	70.0-130			9.16	20
Lead	0.100	0.000461	0.0902	0.101	89.8	100	1	70.0-130			10.8	20
Molybdenum	0.100	0.0230	0.121	0.134	97.8	110	1	70.0-130			9.94	20
Nickel	0.100	0.171	0.265	0.290	94.3	119	1	70.0-130			8.88	20
Thallium	0.100	0.000828	0.0720	0.0795	71.1	78.7	1	70.0-130			9.94	20
Zinc	0.100	0.372	0.462	0.505	90.4	133	1	70.0-130		J5	8.86	20

GLOSSARY OF TERMS

Guide to Reading and Understanding Your Laboratory Report

The information below is designed to better explain the various terms used in your report of analytical results from the Laboratory. This is not intended as a comprehensive explanation, and if you have additional questions please contact your project representative.

Results Disclaimer - Information that may be provided by the customer, and contained within this report, include Permit Limits, Project Name, Sample ID, Sample Matrix, Sample Preservation, Field Blanks, Field Spikes, Field Duplicates, On-Site Data, Sampling Collection Dates/Times, and Sampling Location. Results relate to the accuracy of this information provided, and as the samples are received.

Abbreviations and Definitions

MDL	Method Detection Limit.
RDL	Reported Detection Limit.
Rec.	Recovery.
RPD	Relative Percent Difference.
SDG	Sample Delivery Group.
U	Not detected at the Reporting Limit (or MDL where applicable).
Analyte	The name of the particular compound or analysis performed. Some Analyses and Methods will have multiple analytes reported.
Dilution	If the sample matrix contains an interfering material, the sample preparation volume or weight values differ from the standard, or if concentrations of analytes in the sample are higher than the highest limit of concentration that the laboratory can accurately report, the sample may be diluted for analysis. If a value different than 1 is used in this field, the result reported has already been corrected for this factor.
Limits	These are the target % recovery ranges or % difference value that the laboratory has historically determined as normal for the method and analyte being reported. Successful QC Sample analysis will target all analytes recovered or duplicated within these ranges.
Original Sample	The non-spiked sample in the prep batch used to determine the Relative Percent Difference (RPD) from a quality control sample. The Original Sample may not be included within the reported SDG.
Qualifier	This column provides a letter and/or number designation that corresponds to additional information concerning the result reported. If a Qualifier is present, a definition per Qualifier is provided within the Glossary and Definitions page and potentially a discussion of possible implications of the Qualifier in the Case Narrative if applicable.
Result	The actual analytical final result (corrected for any sample specific characteristics) reported for your sample. If there was no measurable result returned for a specific analyte, the result in this column may state "ND" (Not Detected) or "BDL" (Below Detectable Levels). The information in the results column should always be accompanied by either an MDL (Method Detection Limit) or RDL (Reporting Detection Limit) that defines the lowest value that the laboratory could detect or report for this analyte.
Uncertainty (Radiochemistry)	Confidence level of 2 sigma.
Case Narrative (Cn)	A brief discussion about the included sample results, including a discussion of any non-conformances to protocol observed either at sample receipt by the laboratory from the field or during the analytical process. If present, there will be a section in the Case Narrative to discuss the meaning of any data qualifiers used in the report.
Quality Control Summary (Qc)	This section of the report includes the results of the laboratory quality control analyses required by procedure or analytical methods to assist in evaluating the validity of the results reported for your samples. These analyses are not being performed on your samples typically, but on laboratory generated material.
Sample Chain of Custody (Sc)	This is the document created in the field when your samples were initially collected. This is used to verify the time and date of collection, the person collecting the samples, and the analyses that the laboratory is requested to perform. This chain of custody also documents all persons (excluding commercial shippers) that have had control or possession of the samples from the time of collection until delivery to the laboratory for analysis.
Sample Results (Sr)	This section of your report will provide the results of all testing performed on your samples. These results are provided by sample ID and are separated by the analyses performed on each sample. The header line of each analysis section for each sample will provide the name and method number for the analysis reported.
Sample Summary (Ss)	This section of the Analytical Report defines the specific analyses performed for each sample ID, including the dates and times of preparation and/or analysis.

Qualifier	Description
J	The identification of the analyte is acceptable, the reported value is an estimate.
J3	The associated batch QC was outside the established quality control range for precision.
J5	The sample matrix interfered with the ability to make any accurate determination; spike value is high.

ACCREDITATIONS & LOCATIONS

Pace Analytical Services, LLC -Dallas 400 W. Bethany Drive Suite 190 Allen, TX 75013

Arkansas	88-0647	Kansas	E10388
Florida	E871118	Texas	T104704232-23-39
Iowa	408	Oklahoma	8727
Louisiana	30686		

[1] Drinking Water [2] Underground Storage Tanks [3] Aquatic Toxicity [4] Chemical/Microbiological [5] Mold [6] Wastewater n/a Accreditation not applicable

* Not all certifications held by the laboratory are applicable to the results reported in the attached report.

* Accreditation is only applicable to the test methods specified on each scope of accreditation held by Pace Analytical.

Company Name/Address:
City of Lubbock
1314 Ave K
Lubbock, TX 79401

Billing Information:
Martha Akers
1314 Ave K
Lubbock, TX 79401

Report to: Martha Akers

Email To: Makers@mylubbock.us

Project Description: Plant Sampling

City/State Collected: Lubbock/TX

Please Circle: PT MT CT ET

Phone: (806) 775-3237

Client Project #

Lab Project #

Collected by (print): IWMP

Site/Facility ID #: SEWWRP Q4

P.O. #

Collected by (signature): [signature]

Immediately Packed on Ice N ___ Y X

Rush? (Lab MUST Be Notified)
___ Same Day ___ Five Day
___ Next Day ___ 5 Day (Rad Only)
___ Two Day ___ 10 Day (Rad Only)
___ Three Day

Quote #

Date Results Needed

Analysis / Container / Preservative

Pres Chk

Chain of Custody Page 1 of 1

Pace
PEOPLE ADVANCING SCIENCE
12065 Lebanon Rd Mount Juliet, TN 37122
Phone: 615-758-5858 Alt: 800-767-5859
Submitting a sample via this chain of custody constitutes acknowledgment and acceptance of the Pace Terms and Conditions found at: https://info.pacelabs.com/hubfs/pas-standard-terms.pdf

SDG # U679134

Table #

Acctnum:

Template:

Prelogin:

PM:

PB:

Shipped Via:

Sample ID	Comp/Grab	Matrix*	Depth	Date	Time	No of Cntrs	ALLOHex/1L Amber Glass/HCl	ALLTPH HOG Hex/1L Amber Glass/ HCl	ALLCN/250mL HDPE/NaOH	ALLCNAM/250mL HDPE/NaOH	ALLPhenol/250mL Amber Glass/H2SO4	Metals*/250mL HDPE /NH03	Low Level Hg*/250mL Clear Glass/ None				Remarks	Sample # (lab only)
SEWRPInfluent12863,12867,12871	Grab	WW		11/14/23	10:00	3	X	X	X	X	X							01
SEWRPInfluent12864,12868,12872	Grab	WW		11/14/23	16:00	3	X	X	X	X	X							02
SEWRPInfluent12865,12869,12873	Grab	WW		11/14/23	22:00	3	X	X	X	X	X							03
SEWRPInfluent12866,12870,12874	Grab	WW		11/15/23	04:00	3	X	X	X	X	X							04
SEWRP Influent 12875,12876	Comp	WW		11/15/23	11:00	2						X	X					05
SEWRPEffluent12877,12881,12885	Grab	WW		11/15/23	0:100	3	X	X	X	X	X							06
SEWRPEffluent12878,12882,12886	Grab	WW		11/15/23	0:700	3	X	X	X	X	X							07
SEWRPEffluent12879,12883,12887	Grab	WW		11/15/23	13:00	3	X	X	X	X	X							08
SEWRPEffluent12880,12884,12888	Grab	WW		11/15/23	19:00	3	X	X		X	X							09
SEWRP Effluent 12889, 12890	Comp	WW		11/16/23	09:40	2						X	X					10

* Matrix:
SS - Soil AIR - Air F - Filter
GW - Groundwater B - Bioassay
WW - WasteWater
DW - Drinking Water
OT - Other_____

Remarks:
*See Metals List, *Preserve LLHg ASAP, sign COC

pH _____ Temp _____
Flow _____ Other _____

Samples returned via:
__ UPS __ FedEx __ Courier __ _____

Tracking # 7076 8106 7791

Sample Receipt Checklist
COC Seal Present/Intact: __NP __Y __N
COC Signed/Accurate: __Y __N
Bottles arrive intact: __Y __N
Correct bottles used: __Y __N
Sufficient volume sent: __Y __N
If Applicable
VOA Zero Headspace: __Y __N
Preservation Correct/Checked: __Y __N
RAD Screen <0.5 mR/hr: __Y __N

Relinquished by: (Signature)	Date:	Time:	Received by: (Signature)	Trip Blank Received: Yes / No HCL / MeoH TBR	If preservation required by Login: Date/Time
[signature]	11/16/23	15:00			
Relinquished by: (Signature) FedEx	11/17/23	0900	Received by: (Signature) PACE	Temp: °C Bottles Received:	
Relinquished by: (Signature)	Date:	Time:	Received for lab by: (Signature)	Date: Time:	Hold: Condition: NCF / OK

Metals	MAL ug/l	EPA Test Method
Aluminum	2.5	200.8
Antimony	5	200.7
Arsenic	0.5	200.8
Barium	3	200.8
Beryllium	0.5	200.8
Cadmium	1	200.8
Chromium	3	200.8
[redacted]		
[redacted]	[redacted]	[redacted]
Copper	0.5	200.8
[redacted]		
Lead	0.5	200.8
Mercury	0.005	245.7
Molybdenum	1	200.8
Nickel	0.5	200.8
Selenium	5	200.8
Silver	0.5	200.8
Thallium	0.5	200.8
Zinc	5	200.8

We still use 245 1 with the detection limit of 0 2 ppb

CITY OF LUBBOCK WATER UTILITIES LABORATORY
CHAIN OF CUSTODY AND ANALYSIS REQUEST

Report to
Company: City of Lubbock
Address: Water Reclamation
P O Box 2000
Lubbock TX 79457
Contact:
Phone: (806) 775-3221
Fax: (806) 775-3246

Invoice to
Company: SAME
Address:
Contact:
Phone:
Fax:

Project No.
Project Name: PLANT SAMPLING
** NWWRP SEWRP
Sampler's Name (printed): IWMP

Results by: Fax results ☐

Date: Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Yr. 2023

Sample Source	Laboratory Ident #	Date	Time	Composite	Grab	Blank	Glass	HDPE	VOA	Sterile	Liter	Water	Sludge	Soil	Sampler Iced	Iced during transport	HCl	H2SO4	HNO3	NaOH	None	FOG TPH	Cyanide Total	Cyanide Available	Field pH	Field Temp
Plant Influent	12863	14	10:00		X		X				X	X				X	X					X				
Plant Influent	12864	14	16:00		X		X				X	X				X	X					X				
Plant Influent	12865	14	22:00		X		X				X	X				X	X					X				
Plant Influent	12866	15	0400		X		X				X	X				X	X					X				
Plant Influent	12867	14	10:00		X			X			250 mL X	X				X				X			X			
Plant Influent	12868	14	16:00		X			X			250 mL X	X				X				X			X			
Plant Influent	12869	14	2200		X			X			250 mL X	X				X				X			X			
Plant Influent	12870 ~~12869~~ EV	15	0400		X			X			250 mL X	X				X				X			X			

Analyst

Remarks: All analyses must be done in accordance with 40 CFR Part 136

~~Please return all jars and ice chests ASAP. Thanks.~~ Sign COC

** NWWRP= Northwest Water Reclamation Plant, SEWRP= Southeast Water Reclamation Plant

Sample Condition: Cool Yes ☑ No ☐; Intact ☑ ☐
Checked By (Initials)

Sampler Relinquished: M. Akers — Date: 11-16-23 Time: 1510
Relinquished by: FedEx — Date: 11-17-23 Time: 0900
Relinquished by: — Date: Time:

Received by: — Date: Time:
Received by: PACE — Date: 11-17-23 Time: 0900
Received by: — Date: Time:
Received by — Date: Time:

X Dispose of sample after analysis
☐ Return residual sample to collector

2 of 4

CITY OF LUBBOCK WATER UTILITIES LABORATORY
CHAIN OF CUSTODY AND ANALYSIS REQUEST

Report to
Company: City of Lubbock
Address: Water Reclamation
P O Box 2000
Lubbock TX 79457
Contact:
Phone: (806) 775-3221
Fax: (806) 775-3246

Invoice to
Company: SAME
Address:
Contact:
Phone:
Fax:

Project No.:
Project Name: PLANT SAMPLING (SEWRP)
** NWWRP

Sampler's Name (printed): IWMP

Results by: Fax results ☐

Sample Source	Laboratory Ident #	Date (Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Yr 2023)	Time	Composite	Grab	Blank	Glass	HDPE	VOA	Sterile	~~1 liter~~ 250mL	Water	Sludge	Soil	Sampler Iced	Iced during transport	HCl (optima)	H2SO4	HNO3 (optima)	NaOH	None	Total Phenols	Low level Mercury	Total Metals: Al Ag As Ba Be Cd Cr Cu Mo Ni Pb Sb Se Tl Zn *	Field pH	Field Temp
Plant Influent	12871	14	1000		X			X			X	X				X		X				X				
Plant Influent	12872	14	1600		X			X			X	X				X		X				X				
Plant Influent	12873	14	2200		X			X			X	X				X		X				X				
Plant Influent	12874	15	0400		X			X			X	X				X		X				X				
Plant Influent	12875	14 15	1000 0930	X				X			X	X			X	X			X					X		
Plant Influent	12876	14 15	1000 0930	X			X				X	X			X	X	X				X		X			

Analyst

Remarks: All analyses must be done in accordance with 40 CFR Part 136

~~Please return all jars and ice chests ASAP. Thanks.~~ *Preserve LL Hg ASAP

*See Metal List.

** NWWRP= Northwest Water Reclamation Plant, SEWRP= Southeast Water Reclamation Plant

* sign COC

Sample Condition	Sampler Relinquished	Date	Received by	Date
Cool ☑ Intact ☑ Yes ☐ No ☐	M. Akers	11/16/23 Time: 1500		
	Relinquished by: FedEx	Date: 11-17-23 Time: 0900	Received by: [signature] PACE	Date: 11-17-23 Time: 0900
Checked by: (initials)	Relinquished by:	Date: Time:	Received by:	Date: Time:
	X Dispose of sample after analysis ☐ Return residual sample co lector		Received by:	Date: Time:

CITY OF LUBBOCK WATER UTILITIES LABORATORY
CHAIN OF CUSTODY AND ANALYSIS REQUEST

Report to:
Company: City of Lubbock
Address: Water Reclamation
P O Box 2000
Lubbock TX 79457
Contact:
Phone: (806) 775-3221
Fax: (806) 775-3246

Invoice to:
Company: SAME
Address:
Contact:
Phone:
Fax:

Project No.:
Project Name: PLANT SAMPLING
** NWWRP SEWRP

Sampler's Name (printed): IWMP

Results by: Fax results ☐

Sample Source	Laboratory Ident. #	Date (Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Yr. 2023)	Time	Composite	Grab	Blank	Glass	HDPE	VOA	Sterile	1 Liter	Water	Sludge	Soil	Sampler Iced	Iced during transport	HCL	H2SO4	HNO3	NaOH	None		HCO_3 TPH	Cyanide Total	Cyanide Available								Field pH	Field Temp
Plant Effluent	12877	15	0100		X		X				X	X				X	X						X											
Plant Effluent	12878	15	0700		X		X				X	X				X	X						X											
Plant Effluent	12879	15	1300		X		X				X	X				X	X						X											
Plant Effluent	12880	15	1900		X		X				X	X				X	X						X											
Plant Effluent	12881	15	0100		X			X			250 ~~X~~ mL	X				X				X				X										
Plant Effluent	12882	15	0700		X			X			250 ~~X~~	X				X				X				X										
Plant Effluent	12883	15	1300		X			X			250 ~~X~~ mL	X				X				X				X										
Plant Effluent	12884	15	1900		X			X			250 ~~X~~ mL	X				X				X				X										
																						Analyst											

Remarks: All analyses must be done in accordance with 40 CFR Part 136

~~Please return all jars and ice chests ASAP. Thanks.~~ SIGN COC

** NWWRP= Northwest Water Reclamation Plant, SEWRP= Southeast Water Reclamation Plant

Sample Condition	Sampler Relinquished	Date: 11/16/23	Received by:	Date:
Cool: Yes ☑ No ☐ / Intact: ☑ ☐	M. Akers	Time: 1510		Time:
	Relinquished by: FedEx	Date: 11-17-23 Time: 0900	Received by: [illegible] PACE	Date: 11-17-23 Time: 0900
Checked by (Initials)	Relinquished by:	Date: Time:	Received by:	Date: Time:
	X Dispose of sample after analysis		Received by:	Date: Time:
	Return resadual sample to collector			

4 of 4

CITY OF LUBBOCK WATER UTILITIES LABORATORY
CHAIN OF CUSTODY AND ANALYSIS REQUEST

Report to:
Company: City of Lubbock
Address: Water Reclamation
P O Box 2000
Lubbock TX 79457
Contact:
Phone: (806) 775-3221
Fax: (806) 775-3246

Invoice to:
Company: SAME
Address:
Contact:
Phone:
Fax:

Project No.:
Project Name: PLANT SAMPLING — NWWRP / SEWRP
Sampler's Name (printed): IWMP

Results by: Fax results ☐

Sample Source	Laboratory Ident #	Date (Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec Yr 2024 2023)	Time	Composite	Grab	Blank	Glass	HDPE	VOA	Sterile	Size (250mL)	Water	Sludge	Soil	Sampler Iced	Iced during transport	HCl (optimal)	H2SO4	HNO3 (optimal)	NaOH	None		Total Phenols	Low level Mercury	Total Metals (Al Ag As Ba Be Cd Cr Cu Mo Ni Pb Sb Se Tl Zn) *								Field pH	Field Temp
Plant Effluent	12885	15	0100		X			X			X	X				X		X					X											
Plant Effluent	12886	15	0700		X			X			X	X				X		X					X											
Plant Effluent	12887	15	1300		X			X			X	X				X		X					X											
Plant Effluent	12888	15	1900		X			X			X	X				X		X					X											
Plant Effluent	12889	15 16	0100 0100	X				X			X	X			X	X			X						X									
Plant Effluent	12890	15 16	0100 0100	X			X				X	X			X	X	X				X			X										

Analyst

Remarks: All analyses must be done in accordance with 40 CFR Part 136

Please return all jars and ice chests ASAP. Thanks. * Preserve LL Hg

* See Metal List. ASAP.

NWWRP– Northwest Water Reclamation Plant, SEWRP– Southeast Water Reclamat Plant

* Sign COC

Sample Condition	Sampler Relinquished	Date	Received by:	Date
Cool: Yes ☑ No ☐ / Intact: ☑ ☐	M. Akers	11/16/23		
		Time: 1500		Time:
	Relinquished by: FedEx	Date: 11-17-23	Received by: [signature] PACE	Date: 11-17-23
		Time: 0900		Time: 0900
Checked By: (Initials)	Relinquished by:	Date:	Received by:	Date:
		Time:		Time:
	X Dispose of sample after analysis		Received by:	Date:
	☐ Return residual sample to collector			Time:

ORIGIN ID:DNEA (000) 000-0000
SAMPLE RECIEVING
PACE ANALYTICAL
400 W BETHANY STE 190

ALLEN , TX 75013
UNITED STATES US

SHIP DATE: 19OCT23
ACTWGT: 50.00 LB MAN
CAD: 0473989/CAFE3751

TO PACE ANALYTICAL
PACE ANALYTICAL
400 W. BETHANY DR #190

ALLEN TX 75013
(972) 727-1123 REF:
INV:
PO: DEPT:

RMA:

FedEx
Express

E

FedEx
TRK# 0221 7076 8106 7791

FRI - 17 NOV 10:30A
PRIORITY OVERNIGHT

AD DNEA

75013
TX-US DFW

*5174192 11/16 5B3J5/F032/9AE3

ORIGIN ID:DNEA (000) 000-0000
SAMPLE RECIEVING
PACE ANALYTICAL
400 W BETHANY STE 190

ALLEN , TX 75013
UNITED STATES US

SHIP DATE: 19OCT23
ACTWGT: 50.00 LB MAN
CAD: 0473989/CAFE3751

TO PACE ANALYTICAL
PACE ANALYTICAL
400 W. BETHANY DR #190

ALLEN TX 75013
(972) 727-1123
INV:
PO:
REF:
DEPT:

RMA:

FedEx
Express

E

FedEx
TRK# 7076 8106 7806
0221

FRI - 17 NOV 10:30A
PRIORITY OVERNIGHT

AD DNEA

75013
TX-US DFW

EXP 03/23

#5174102 11/16 503J5/F082/9AE3

27 5 10:30 D
7806
11.17

Pace Analytical	Document Name: Sample Condition Upon Receipt	Document Revised: 7/27/20 Page 1 of 1
	Document No.: F-DAL-C-001-rev.14	Issuing Authority: Pace Dallas Quality Office

Sample Condition Upon Receipt

☑Dallas ☐Ft Worth ☐Corpus Christi ☐Austin

Client Name: City of Lubbock Project Work order (place label):

Courier: FedEX ☑ UPS ☐ USPS ☐ Client ☐ LSO ☐ PACE ☐ Other: _____

Tracking #: _____

Custody Seal on Cooler/Box: Yes ✓ No ☐

Received on ice: Wet ✓ Blue ☐ No ice ☐

Receiving Lab 1 Thermometer Used: IR17 Cooler Temp °C: 1.6 (Recorded) +0.1 (Correction Factor) 1.7 (Actual) 1.4 1.5

Receiving Lab 2 Thermometer Used: _____ Cooler Temp °C: _____ (Recorded) _____ (Correction Factor) _____ (Actual)

Temperature should be above freezing to 6 °C unless collected same day as receipt in which evidence of cooling is acceptable

Triage Person: OC Date: 11/17

Chain of Custody relinquished		Yes ☑ No ☐
Sampler name & signature on COC		Yes ☑ No ☐
Short HT analyses (<72 hrs)		Yes ☐ No ☑

Login Person: OC Date: 11/17

Sufficient Volume received		Yes ☑ No ☐
Correct Container used		Yes ☑ No ☐
Container Intact		Yes ☑ No ☐
Sample pH Acceptable pH Strips: 6306004 Residual Chlorine Present Cl Strips: 14-860 Sulfide Present Lead Acetate Strips: 14-862		Yes ☑ No ☐ NA ☐ Yes ☐ No ☑ NA ☐ Yes ☐ No ☑ NA ☐
Are soil samples (volatiles, TPH) received in 5035A Kits (not applicable to TCLP VOA or PST Program TPH)		Yes ☐ No ☐ NA ☑
Unpreserved 5035A soil frozen within 48 hrs		Yes ☐ No ☐ NA ☑
Headspace in VOA (>6mm)		Yes ☐ No ☐ NA ☑
Project sampled in USDA Regulated Area outside of Texas State Sampled: _____		Yes ☐ No ☐ NA ☑
Non-Conformance(s):		Yes ☐ No ☑

Labeling Person (if different than log-in): _____ Date: _____

Pace Analytical Services, LLC
7726 Moller Road
Indianapolis, IN 46268
(317)228-3100

December 01, 2023

Jimmy Huckaba
Pace National
12065 Lebanon Rd
Mt. Juliet, TN 37122

RE: Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

Dear Jimmy Huckaba:

Enclosed are the analytical results for sample(s) received by the laboratory on November 21, 2023. The results relate only to the samples included in this report. Results reported herein conform to the applicable TNI/NELAC Standards and the laboratory's Quality Manual, where applicable, unless otherwise noted in the body of the report.

The test results provided in this final report were generated by each of the following laboratories within the Pace Network:

- Pace Analytical Services - Indianapolis

If you have any questions concerning this report, please feel free to contact me.

Sincerely,

Randal Rastorfer

Randal Rastorfer
randal.rastorfer@pacelabs.com
(614)301-3304
Project Manager

Enclosures

cc: Pace National Subout Team, Pace National

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Indianapolis, IN 46268
(317)228-3100

CERTIFICATIONS

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

Pace Analytical Services Indianapolis
7726 Moller Road, Indianapolis, IN 46268
Illinois Accreditation #: 200074
Indiana Drinking Water Laboratory #: C-49-06
Kansas/TNI Certification #: E-10177
Kentucky UST Agency Interest #: 80226
Kentucky WW Laboratory ID #: 98019
Michigan Drinking Water Laboratory #9050
Ohio VAP Certified Laboratory #: CL0065
Oklahoma Laboratory #: 9204
Texas Certification #: T104704355
Wisconsin Laboratory #: 999788130
USDA Foreign Soil Permit #: 525-23-13-23119
USDA Compliance Agreement #: IN-SL-22-001

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SAMPLE SUMMARY

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

Lab ID	Sample ID	Matrix	Date Collected	Date Received
50360211001	**SEWRP INFLUENT12875,12876**	Water	11/15/23 11:00	11/21/23 09:35
50360211002	**SEWRP EFFLUENT12889,12890**	Water	11/16/23 09:40	11/21/23 09:35

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SAMPLE ANALYTE COUNT

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

Lab ID	Sample ID	Method	Analysts	Analytes Reported	Laboratory
50360211001	**SEWRP INFLUENT12875,12876**	EPA 1631E	WJW	1	PASI-I
50360211002	**SEWRP EFFLUENT12889,12890**	EPA 1631E	WJW	1	PASI-I

PASI-I = Pace Analytical Services - Indianapolis

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SUMMARY OF DETECTION

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

Lab Sample ID Method	Client Sample ID Parameters	Result	Units	Report Limit	Analyzed	Qualifiers
50360211001	**SEWRP INFLUENT12875,12876**					
EPA 1631E	Mercury	22.2	ng/L	5.2	11/30/23 15:04	
50360211002	**SEWRP EFFLUENT12889,12890**					
EPA 1631E	Mercury	1.04	ng/L	0.52	11/30/23 13:38	

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ANALYTICAL RESULTS

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

Sample: SEWRP INFLUENT12875,12876 **Lab ID: 50360211001** Collected: 11/15/23 11:00 Received: 11/21/23 09:35 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
1631E Mercury, Low Level	Analytical Method: EPA 1631E Preparation Method: EPA 1631E Initial Volume/Weight: 5 mL Final Volume/Weight: 52 mL Pace Analytical Services - Indianapolis							
Mercury	**22.2**	ng/L	5.2	1	11/29/23 09:05	11/30/23 15:04	7439-97-6	

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ANALYTICAL RESULTS

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

Sample: SEWRP EFFLUENT12889,12890 **Lab ID: 50360211002** Collected: 11/16/23 09:40 Received: 11/21/23 09:35 Matrix: Water

Parameters	Results	Units	Report Limit	DF	Prepared	Analyzed	CAS No.	Qual
1631E Mercury, Low Level	Analytical Method: EPA 1631E Preparation Method: EPA 1631E Initial Volume/Weight: 50 mL Final Volume/Weight: 52 mL Pace Analytical Services - Indianapolis							
Mercury	**1.04**	ng/L	0.52	1	11/29/23 09:05	11/30/23 13:38	7439-97-6	

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QUALITY CONTROL DATA

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

QC Batch: 765271
QC Batch Method: EPA 1631E
Analysis Method: EPA 1631E
Analysis Description: 1631E Mercury
Laboratory: Pace Analytical Services - Indianapolis
Associated Lab Samples: 50360211001, 50360211002

METHOD BLANK: 3507071 Matrix: Water
Associated Lab Samples: 50360211001, 50360211002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ng/L	ND	0.50	11/30/23 11:59	

METHOD BLANK: 3507072 Matrix: Water
Associated Lab Samples: 50360211001, 50360211002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ng/L	ND	0.50	11/30/23 12:43	

METHOD BLANK: 3507073 Matrix: Water
Associated Lab Samples: 50360211001, 50360211002

Parameter	Units	Blank Result	Reporting Limit	Analyzed	Qualifiers
Mercury	ng/L	ND	0.50	11/30/23 15:20	

LABORATORY CONTROL SAMPLE: 3507074

Parameter	Units	Spike Conc.	LCS Result	LCS % Rec	% Rec Limits	Qualifiers
Mercury	ng/L	5	5.08	102	80-120	

MATRIX SPIKE & MATRIX SPIKE DUPLICATE: 3507075 3507076

Parameter	Units	50360231001 Result	MS Spike Conc.	MSD Spike Conc.	MS Result	MSD Result	MS % Rec	MSD % Rec	% Rec Limits	RPD	Max RPD	Qual
Mercury	ng/L	ND	2.5	2.5	2.58	2.59	97	97	71-125	0	24	

Results presented on this page are in the units indicated by the "Units" column except where an alternate unit is presented to the right of the result.

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QUALIFIERS

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

DEFINITIONS

DF - Dilution Factor, if reported, represents the factor applied to the reported data due to dilution of the sample aliquot.

ND - Not Detected at or above adjusted reporting limit.

TNTC - Too Numerous To Count

J - Estimated concentration above the adjusted method detection limit and below the adjusted reporting limit.

MDL - Adjusted Method Detection Limit.

PQL - Practical Quantitation Limit.

RL - Reporting Limit - The lowest concentration value that meets project requirements for quantitative data with known precision and bias for a specific analyte in a specific matrix.

S - Surrogate

1,2-Diphenylhydrazine decomposes to and cannot be separated from Azobenzene using Method 8270. The result for each analyte is a combined concentration.

Consistent with EPA guidelines, unrounded data are displayed and have been used to calculate % recovery and RPD values.

LCS(D) - Laboratory Control Sample (Duplicate)

MS(D) - Matrix Spike (Duplicate)

DUP - Sample Duplicate

RPD - Relative Percent Difference

NC - Not Calculable.

SG - Silica Gel - Clean-Up

U - Indicates the compound was analyzed for, but not detected.

N-Nitrosodiphenylamine decomposes and cannot be separated from Diphenylamine using Method 8270. The result reported for each analyte is a combined concentration.

Reported results are not rounded until the final step prior to reporting. Therefore, calculated parameters that are typically reported as "Total" may vary slightly from the sum of the reported component parameters.

Pace Analytical is TNI accredited. Contact your Pace PM for the current list of accredited analytes.

TNI - The NELAC Institute.

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Indianapolis, IN 46268
(317)228-3100

QUALITY CONTROL DATA CROSS REFERENCE TABLE

Project: SEWRP Plant/ WG2174852
Pace Project No.: 50360211

Lab ID	Sample ID	QC Batch Method	QC Batch	Analytical Method	Analytical Batch
50360211001	**SEWRP INFLUENT12875,12876**	EPA 1631E	765271	EPA 1631E	765760
50360211002	**SEWRP EFFLUENT12889,12890**	EPA 1631E	765271	EPA 1631E	765760

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CHAIN-OF-CUSTODY / Analytical Request Do

The Chain-of-Custody is a LEGAL DOCUMENT. All relevant fields must be

WO# : 50360211

50360211

Section A
Required Client Information:

Company	Pace Analytical
Address	400 W Bethany Drive Suite 190
Allen, TX 75013	
Email	MTJLSubcutTeam@pacelabs.com
Phone	(972) 727-1123 Fax
Requested Due Date	4-Dec

Section B
Required Project Information:

Report To	Pace Analytical Subcut Team
Copy To	
Purchase Order #	L1679134
Project Name	SEWRP Plant Sampling Q4
Project #	SEWRP PLANT SAMPLING

Section C
Invoice Information:

Attention	Martha Akers
Company Name	
Address	
Pace Quote	
Pace Project Manager	Randal Rastorfer
Pace Profile #.	38076

Regulatory Agency
State / Location
TX

Requested Analysis Filtered (Y/N)

ITEM #	SAMPLE ID (One Character per box. (A-Z, 0-9 / , -) Sample Ids must be unique)	MATRIX CODE (see valid codes to left)	SAMPLE TYPE (G=GRAB C=COMP)	COLLECTED START DATE	COLLECTED START TIME	COLLECTED END DATE	COLLECTED END TIME	SAMPLE TEMP AT COLLECTION	# OF CONTAINERS	Unpreserved	H2SO4	HNO3	HCl	NaOH	Na2S2O3	Methanol	Other	Analyses Test Y/N	Low Level Hg	Residual Chlorine (Y/N)	
1	SEWRP INFLUENT12875,12876	WT				15-Nov	11 00		1								1		X		Added ALLHG per DR
2	SEWRP EFFLUENT12889,12890	WT				16-Nov	9 40		1								1		X		Added ALLHG per DR
3																					
4																					
5																					
6																					
7																					
8																					
9																					
10																					
11																					
12																					

MATRIX CODE: Drinking Water DW; Water WT; Waste Water WW; Product P; Soil/Solid SL; Oil OL; Wipe WP; Air AR; Other OT; Tissue TS

ADDITIONAL COMMENTS	RELINQUISHED BY / AFFILIATION	DATE	TIME	ACCEPTED BY / AFFILIATION	DATE	TIME	SAMPLE CONDITIONS			
	Alyson Ramos / PACE	11/20/23	1700	FEDEX	11/20/23	1700				
Pace Analytical Batch: WG2174852	FEDEX	11/21/23	0935	[illegible]	11/21/23	0935	16.8	N	Y	Y
Pace Analytical SDGs: L1679134										
Location: Indianapolis, IN 46268										

SAMPLER NAME AND SIGNATURE		TEMP in C	Received on Ice (Y/N)	Custody Sealed Cooler (Y/N)	Samples Intact (Y/N)
PRINT Name of SAMPLER:					
SIGNATURE of SAMPLER:	DATE Signed:				

F-IN-Q-290-rev.23, 26Jun2023

Pace

SAMPLE CONDITION UPON RECEIPT FORM

Date/Time and Initials of person examining contents: 11/21/23 1515 LL

1. **Courier:** ☒ FED EX ☐ UPS ☐ CLIENT ☐ PACE ☐ NOW/JETT ☐ OTHER _____
2. **Custody Seal on Cooler/Box Present:** ☒ Yes ☐ No
   (If yes)Seals Intact: ☒ Yes ☐ No **(leave blank if no seals were present)**
3. **Thermometer:** 1 2 3 4 5 6 (7) 8 A B C D E F G H
4. **Cooler Temperature(s):** 16.8/16.8 | | | |
   (Initial/Corrected) **RECORD TEMPS OF ALL COOLERS RECEIVED (use Comments below to add more)**
5. **Packing Material:** ☒ Bubble Wrap ☒ Bubble Bags ☐ None ☐ Other _____
6. **Ice Type:** ☐ Wet ☐ Blue ☒ None
7. **If temp. is over 6°C or under 0°C, was the PM notified?:** ☐ Yes ☐ No
   Cooler temp should be above freezing to 6°C

All discrepancies will be written out in the comments section below.

	Yes	No		Yes	No	N/A
USDA Regulated Soils? (HI, ID, NY, WA, OR,CA, NM, TX, OK, AR, LA, TN, AL, MS, NC, SC, GA, FL, or Puerto Rico)		X	All containers needing acid/base preservation have been pH CHECKED?: **Exceptions: VOA, coliform, LLHg, O&G, RAD CHEM, and any container with a septum cap or preserved with HCl.** **Circle:** **HNO3 (<2) H2SO4 (<2) NaOH (>10) NaOH/ZnAc (>9)** Any non-conformance to pH recommendations will be noted on the container count form			X
Short Hold Time Analysis (48 hours or less)? Analysis:		X				
Time 5035A TC placed in Freezer or Short Holds To Lab	Time:			Present	Absent	N/A
			Residual Chlorine Check (SVOC 625 Pest/PCB 608)			X
Rush TAT Requested (4 days or less):		X	Residual Chlorine Check (Total/Amenable/Free Cyanide)			X
Custody Signatures Present?	X		Headspace Wisconsin Sulfide?			X
Containers Intact?:	X		Headspace in VOA Vials (>6mm): See Containter Count form for details	Present	Absent	No VOA Vials Sent X
Sample Label (IDs/Dates/Times) Match COC?: Except TCs, which only require sample ID	X		Trip Blank Present?		X	
Extra labels on Terracore Vials? (soils only)		X	Trip Blank Custody Seals?:			X

COMMENTS:

COC PAGE 1 of 1

Sample Container Count

** Place a RED dot on containers that are out of conformance **

COC Line Item	WGFU	WGKU BG1U	MeOH (only) SBS DI R	DG9H VG9H	VOA VIAL HS >6mm	VG9U DG9U	VG9T	AMBER GLASS AG0U	AG1H	AG1U	AG3U	AG3S	AG3SF	AG3B	PLASTIC BP1U	BP1N	BP2U	BP3U	BP3N	BP3F	BP3S	BP3B	BP3Z	OTHER CG3H	CG3F	Syringe Kit		Matrix	Nitric Red HNO3 <2	Sulfuric Yellow H2SO4 <2	Sodium Hydroxide Green NaOH >10	Sodium Hydroxide/ ZnAc Black NaOH/Zn Ac >9
1																								1				WT				
2																								1				WT				
3																																
4																																
5																																
6																																
7																																
8																																
9																																
10																																
11																																
12																																

Container Codes

Glass

DG9H	40mL HCl amber voa vial	BG1T	glass
DG9P	40mL TSP amber vial	BG1U	1L unpreserved glass
DG9S	40mL H2SO4 amber vial	CG3U	250mL Unpres Clear Glass
DG9T	40mL Na Thio amber vial	AG0U	100mL unpres amber glass
DG9U	40mL unpreserved amber vial	AG1H	1L HCl amber glass
VG9H	40mL HCl clear vial	AG1S	1L H2SO4 amber glass
VG9T	40mL Na Thio. clear vial	AG1T	1L Na Thiosulfate amber glass
VG9U	40mL unpreserved clear vial	AG1U	1liter unpres amber glass
I	40mL w/hexane wipe vial	AG2N	500mL HNO3 amber glass
WGKU	8oz unpreserved clear jar	AG2S	500mL H2SO4 amber glass
WGFU	4oz clear soil jar	AG2U	500mL unpres amber glass
JGFU	4oz unpreserved amber wide	AG3S	250mL H2SO4 amber glass
CG3H	250mL clear glass HCl	AG3SF	250mL H2SO4 amb glass -field filtered
CG3F	250mL clear glass HCl, Field Filter	AG3U	250mL unpres amber glass
BG1H	1L HCl clear glass	AG3B	250mL NaOH amber glass
BG1S	1L H2SO4 clear glass		

Plastic

BP1B	1L NaOH plastic	BP4U	125mL unpreserved plastic
BP1N	1L HNO3 plastic	BP4N	125mL HNO3 plastic
BP1S	1L H2SO4 plastic	BP4S	125mL H2SO4 plastic
BP1U	1L unpreserved plastic		
BP1Z	1L NaOH, Zn, Ac		
BP2N	500mL HNO3 plastic		
BP2C	500mL NaOH plastic		
BP2S	500mL H2SO4 plastic		
BP2U	500mL unpreserved plastic		
BP2Z	500mL NaOH, Zn Ac		
BP3B	250mL NaOH plastic		
BP3N	250mL HNO3 plastic		
BP3F	250mL HNO3 plastic-field filtered		
BP3U	250mL unpreserved plastic		
BP3S	250mL H2SO4 plastic		
BP3Z	250mL NaOH, ZnAc plastic		
BP3R	250mL Unpres. FF SO4/OH buffer		

Miscellaneous

Syringe Kit	LL Cr+6 sampling kit
ZPLC	Ziploc Bag
R	Terracore Kit
SP5T	120mL Coliform Sodium Thiosulfate
GN	General Container
U	Summa Can (air sample)
WT	Water
SL	Solid
OL	Oil
NAL	Non-aqueous liquid
WP	Wipe

F-IN-Q-270-rev.18, 26Jun2023

Analytical Report

Southeast Water Reclamation Plant Laboratory
3603 Guava Avenue, Lubbock TX, 79404
Phone: 806-775-3244; Fax 806-775-3250

Project Name: SEWRP Daily Plant Samples
Collection Date: 1/2/24
Collected By: LP/DS

Sample Condition: Cool & Intact
Received Date: 1/2/24
Received By: MA

Sample Source	Lab ID Log #	Sample Type	TSS mg/L	CBOD mg/L	BOD mg/L	Ammonia mg/L	Total Phos mg/L
Pump Station 1	PS1C	Composite	4	-	2	-	-
Outfall 007	007C	Composite	2	< 2	-	0.354	0.123
Sample Preservation:			Refrigeration	Refrigeration	Refrigeration	H_2SO_4	H_2SO_4
Analysis Date:			1/2/24	1/2/24	1/2/24	1/2/24	1/9/24
Analyst(s):			MA	JR/BM	JR/BM	JR	JR
Standard Recovery (%):			105	102	98.0	100, 101	95.6, 96.9
Spike Recovery (%):			-	-	-	101, 101	95.5, 96.6
Dup Deviation (%):			0.00	0.00	0.00	0.282, 2.60	0.707, 0.957
Analytical Method:			SM 2540D 2016	SM 5210B 2016	SM 5210B 2016	EPA 350.1 Rev 2.0 Aug 1993	EPA 365.4 1974
Method Detection Limit:			1mg/L	2mg/L	2mg/L	0.028mg/L	0.032mg/L

2-28-24
Laboratory Chemist / Date

2/28/24
Laboratory Services Coordinator / Date

City of Lubbock Texas

SEWRP Wastewater Laboratory

Sampling Chain of Custody (COC): Daily Plant Samples

Project Name: **Daily Samples**

Project Location: **Southeast Water Reclamation Plant**

Collection Date: 1/2/23

Collected by: Frick Scott

Send Results to: SEWRP Operations

Date Results Requested:

Analysis Requested (X)

Sample Source	Lab ID #	Time	Type: Composite	Type: Grab	Container: Glass	Container: HDPE	Container: VOA	Container: Sterile	Container: Volume	Matrix: Water	Matrix: Sludge	Matrix: Soil	Preservative: Ice	Preservative: H2SO4	Preservative: HNO3	Preservative: None		pH & Temperature	Dissolved Oxygen (DO)		Total Sus Solids (TSS)	Volatile S Solids (VSS)	Total Dis Solids (TDS)	Conductivity		Coliforms (E Coli)	BOD5	CBOD5		Total Phosphorus (TP)	Total Phos (TP) TNT	Ammonia (NH3)	Ammonia (NH3) TNT	Total K Nitrogen (TKN)	Nitrate (NO3)				
Effluent Pump Station #1 Grab	PS1G	8:40		X		X			1 L	X						X		X	X																					
Effluent Pump Station #2 Grab	PS2G	8:45		X		X			1 L	X						X		X						X																
007 Grab	007G	8:50		X		X			1 L	X						X			X																					
Plant 4 UV & Dup Grab (100ml x 2)	P4UV	9:05		X				X	200ml	X						X										X														
Effluent Pump Station #1	PS1C	8:55	X			X			8 L	X			X								X		X				X			X		X		X	X					
Jones	Jones	9:00	X			X			4 L	X			X								X						X													
007	007C	9:05	X			X			8 L	X			X								X	X						X		X	X	X	X	X						
Effluent Pump Station #2	PS2C	9:10	X			X			8 L	X			X								X	X	X				X			X		X		X	X					
Wilson	Wilson	915	X			X			4 L	X			X								X						X													
Plant 3 Final	F3	NSR	X			X			4 L	X			X								X						X													
Plant 4 Final	F4	835	X			X			2 L	X			X								X						X													
Raw Influent	Raw	9:25	X			X			4 L	X			X								X						X			X		X		X						
Plant 3 Basin	P3 BAS	850		X		X			250ml	X						X					X																			
Plant 3 Return East	P3 RAS East	848		X		X			250ml	X						X					X																			
Plant 3 Return West	P3 RAS West	846		X		X			250ml	X						X					X																			
Plant 4 Train #1 Basin	P4T1 BAS	857		X		X			250ml	X						X					X																			
Plant 4 Train #1 Return	P4T1 RAS	854		X		X			250ml	X						X					X																			
Plant 4 Train #2 Basin	P4T2 BAS	900		X		X			250ml	X						X					X																			
Plant 4 Train #2 Return	P4T2 RAS	859		X		X			250ml	X						X					X																			
Plant 4 Train #3 Basin	P4T3 BAS	903		X		X			250ml	X						X					X																			
Plant 4 Train #3 Return	P4T3 RAS	854		X		X			250ml	X						X					X																			
Secondary Outfall 1	T1	906		X		X			500ml	X						X															X	X								
Secondary Outfall 2	T2	909		X		X			500ml	X						X															X	X								
Secondary Outfall 3	T3	912		X		X			500ml	X						X															X	X								

Notes:

TDS on PS1C & PS2C weekly

Conductivity on PS2G weekly

TP, NH3, TKN, NO3 performed weekly

VSS on PS2C Weekly for Farm

Total Solids (TS) on PS2C Monthly for Farm

TNT Analyses for Process Control Use Only

Must be complete, accurate, and legible

Submitted By:	Time:	Received By:	Date:	Time:
Frick Scott	9:35	Mary Ann	1/2/24	9:57

X Dispose of sample after analysis

Return residual sample to collector

23 samples received

Analytical Report

Southeast Water Reclamation Plant Laboratory
3603 Guava Avenue, Lubbock TX, 79404
Phone: 806-775-3244; Fax 806-775-3250

Project Name: SEWRP Daily Plant Samples
Collection Date: 2/21/24
Collected By: CP/IP

Sample Condition: Cool & Intact
Received Date: 2/21/24
Received By: MA

Sample Source	Lab ID Log #	Sample Type	Nitrate mg/L	TKN mg/L	Chloride mg/L	Sulfate mg/L	
Pump Station 1	PS1C	Composite	2.44	15.1	358	160	
		Sample Preservation:	Refrigeration	H_2SO_4	Refrigeration	Refrigeration	
		Analysis Date:	2/21/24	2/27/24	2/22/24	2/22/24	
		Analyst(s):	SL	JR	SL	SL	
		Standard Recovery (%):	101, 105, 105	104, 101	97.3, 102, 106	103, 103, 104	
		Spike Recovery (%):	101, 102	101, 104	103, 103	103, 102	
		Dup Deviation (%):	0.452	1.23, 0.290	0.054	0.233	
		Analytical Method:	EPA 300.0 Rev 2.1 Aug 1993	EPA 351.1 EPA 351.2 1978/1993	EPA 300.0 Rev 2.1 Aug 1993	EPA 300.0 Rev 2.1 Aug 1993	
		Method Detection Limit:	0.002mg/L	0.052mg/L	0.141mg/L	0.017mg/L	
		Ordinance Limit:	-	-	-	-	

2-27-24
Laboratory Chemist / Date

2/27/24
Laboratory Services Coordinator / Date

Analytical Report

Southeast Water Reclamation Plant Laboratory
3603 Guava Avenue, Lubbock TX, 79404
Phone: 806-775-3244; Fax 806-775-3250

Project Name: SEWRP Daily Plant Samples
Collection Date: 2/21/24
Collected By: CP/IP

Sample Condition: Cool & Intact
Received Date: 2/21/24
Received By: MA

Sample Source	Lab ID Log #	Sample Type	Conductivity µS/cm	TDS mg/L	Alkalinity mg/L $CaCO_3$		
Pump Station 1	PS1C	Composite	1949	1062	258		
		Sample Preservation:	Refrigeration	Refrigeration	Refrigeration		
		Analysis Date:	2/21/24	2/21/24	2/23/24		
		Analyst(s):	MA	BM/MA	JR		
		Standard Recovery (%):	101	97.6	96.9		
		Spike Recovery (%):	-	-	-		
		Dup Deviation (%):	0.078	0.279	0.00		
		Analytical Method:	SM 2510B 2011	SM 2540C 2015	SM 2320B 2011		
		Method Detection Limit:	1µS/cm	1mg/L	20mg/L		

2-27-24
Laboratory Chemist / Date

2/27/24
Laboratory Services Coordinator / Date

City of Lubbock

SEWRP Wastewater Laboratory

Sampling Chain of Custody (COC): Daily Plant Samples

Project Name: **Daily Samples**

Project Location: **Southeast Water Reclamation Plant**

Collection Date: 2/21/24

Collected by: Volk / Perez

Send Results to: SEWRP Operations

Date Results Requested:

Sample Source	Lab ID #	Time	Type: Composite	Type: Grab	Container: Glass	Container: HDPE	Container: VOA	Container: Sterile	Volume	Matrix: Water	Matrix: Sludge	Matrix: Soil	Preservative: Ice	Preservative: H2SO4	Preservative: HNO3	Preservative: None		Analysis Requested (X): pH & Temperature	Dissolved Oxygen (DO)		Total Sus Solids (TSS)	Volatile S. Solids (VSS)	Total Dis Solids (TDS)	Conductivity		Coliforms (E.Coli)	BOD5	CBOD5		Total Phosphorus (TP)	Total Phos (TP) TNT	Ammonia (NH3)	Ammonia (NH3) TNT	Total K. Nitrogen (TKN)	Nitrate (NO3)				
Effluent Pump Station #1 Grab	PS1G	8:37		X		X			1 L	X						X		X	X																				
Effluent Pump Station #2 Grab	PS2G	8:40		X		X			1 L	X						X		X						X															
007 Grab	007G	NSR		X		X			1 L	X						X			X																				
Plant 4 UV & Dup Grab (100ml x 2)	P4UV	8:57		X				X	200ml	X						X										X													
Effluent Pump Station #1	PS1C	8:45	X			X			8 L	X			X								X		X				X			X		X		X	X				
Jones	Jones	8:48	X			X			4 L	X			X								X						X												
007	007C	NSR	X			X			8 L	X			X								X	X						X		X	X	X	X	X					
Effluent Pump Station #2	PS2C	8:51	X			X			8 L	X			X								X	X	X				X			X		X		X	X				
Wilson	Wilson	8:54	X			X			4 L	X			X								X						X												
Plant 3 Final	F3	NSR	X			X			4 L	X			X								X						X												
Plant 4 Final	F4	8:57	X			X			2 L	X			X								X						X												
Raw Influent	Raw	9:00	X			X			4 L	X			X								X						X			X		X		X					
Plant 3 Basin	P3 BAS	8:37		X		X			250ml	X						X					X																		
Plant 3 Return East	P3 RAS East	8:40		X		X			250ml	X						X					X																		
Plant 3 Return West	P3 RAS West	8:40		X		X			250ml	X						X					X																		
Plant 4 Train #1 Basin	P4T1 BAS	8:43		X		X			250ml	X						X					X																		
Plant 4 Train #1 Return	P4T1 RAS	8:55		X		X			250ml	X						X					X																		
Plant 4 Train #2 Basin	P4T2 BAS	8:43		X		X			250ml	X						X					X																		
Plant 4 Train #2 Return	P4T2 RAS	8:55		X		X			250ml	X						X					X																		
Plant 4 Train #3 Basin	P4T3 BAS	8:43		X		X			250ml	X						X					X																		
Plant 4 Train #3 Return	P4T3 RAS	8:55		X		X			250ml	X						X					X																		
Secondary Outfall 1	T1	8:52		X		X			500ml	X						X															X	X							
Secondary Outfall 2	T2	8:48		X		X			500ml	X						X															X	X							
Secondary Outfall 3	T3	8:48		X		X			500ml	X						X															X	X							

Notes:

TDS on PS1C & PS2C weekly

Conductivity on PS2G weekly

TP, NH3, TKN, NO3 performed weekly

VSS on PS2C Weekly for Farm

Total Solids (TS) on PS2C Monthly for Farm

TNT Analyses for Process Control Use Only

Must be complete, accurate, and legible

Submitted By:	Time:	Received By:	Date:	Time:
[signature]	9:13	Mary A	2/21/24	10:26

X Dispose of sample after analysis

Return residual sample to collector

21 samples received

Analytical Report

Southeast Water Reclamation Plant Laboratory
3603 Guava Avenue, Lubbock TX, 79404
Phone: 806-775-3244; Fax 806-775-3250

Project Name: Plant Sampling
Collection Date: 5/8/24
Collected By: Operations

Sample Condition: Cool & Intact
Received Date: 5/8/24
Received By: MA

Sample Source	Lab ID Log #	Sample Type	Flouride mg/L	Nitrate mg/L			
SEWRP Inf.	-	Comp	1.67	0.062			
SEWRP Eff.	-	Comp	2.01	7.00			
Sample Preservation:			Refrigeration	Refrigeration			
Analysis Date:			5/8/24	5/8/24			
Analyst(s):			SL	SL			
Standard Recovery (%):			97.2, 103, 105	104, 109, 105			
Spike Recovery (%):			103, 103	104, 104			
Dup Deviation (%):			0.244	0.115			
Analytical Method:			EPA 300.0 Rev. 2.1 Aug 1993	EPA 300.0 Rev. 2.1 Aug 1993			
Method Detection Limit:			0.003mg/L	0.002mg/L			

5/9/24
Laboratory Chemist / Date

5/9/24
Laboratory Services Coordinator / Date