

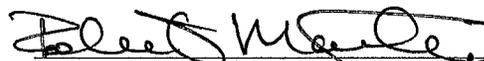
**TEXAS COMMISSION ON ENVIRONMENTAL QUALITY  
AGENDA ITEM REQUEST**

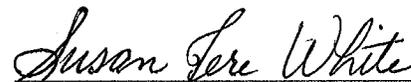
NAME & NUMBER OF PERSON TO CONTACT REGARDING CHANGES TO THIS REQUEST, IF NEEDED:

Ms. Susan Jere White or Mr. Dan Long, Environmental Law Division, MC 173, (512) 239-0600

**CAPTION:**

**Docket 2010-0069-IHW-US. Consideration of the application by the United States Department of the Navy for issuance of a corrective action order to authorize remedial measures to clean up hazardous waste releases to soil, groundwater, and sediments pursuant to Tex. Health & Safety Code Ch. 361; Tex. Water Code Ch. 7; the rules of the Texas Commission on Environmental Quality, including specifically 30 Tex. Admin. Code Chapters 335 related to industrial solid wastes and 350 related to the Texas Risk Reduction Program; and with federal regulations at 40 CFR §264.90(e) related to issuance of an enforceable document to address releases from solid waste management units. The facility is located in Dallas, in Dallas County, Texas. (Susan Jere White and Maureen Hatfield)**

  
Robert Martinez, Director  
Environmental Law Division

  
Susan Jere White  
Environmental Law Attorney

# Texas Commission on Environmental Quality

INTEROFFICE MEMORANDUM

**To:** Executive Summary to Commissioners **Date:** November 15, 2011

**Thru:** Bridget Bohac, Chief Clerk  
Mark R. Vickery, P.G., Executive Director

**From:** Brent Wade, Deputy Director  
Office of Waste

Stephanie Bergeron Perdue, Deputy Director  
Office of Legal Services

**Docket No.:** 2010-0069-IHW

**Subject:** Commission Issuance of Proposed Corrective Action Order (CAO) for Naval Weapons Industrial Reserve Plant (NWIRP) Dallas

## What is the Commission Being Asked to Consider?

The Commission is being asked to issue to the U.S. Navy a Corrective Action Order (CAO) which will authorize response actions and post-response action care for the remediation of contaminated soil, groundwater, and sediment for the NWIRP Dallas property.

The U.S. Navy seeks to substitute a Corrective Action Order (CAO) for the facility's current RCRA permit. NWIRP Dallas qualifies for a CAO because the facility no longer operates any permitted RCRA units. The Navy intends to sell the property during CY-2011. Issuance of the CAO in lieu of the RCRA permit would facilitate the sale and redevelopment of NWIRP Dallas by eliminating the need for the new owner to become a co-permittee with the Navy. In addition, issuance of a CAO would allow the Navy to implement a practical, cost-effective remedy for addressing contaminated sediments, a remedy which cannot be authorized under the existing RCRA permit.

## What is a Corrective Action Order?

A CAO is an enforceable form of authorization that includes the same corrective action, technical, and reporting provisions as those required under a RCRA permit. The CAO template is based on U.S. Environmental Protection Agency's 3008(h) orders and incorporates the current corrective action process of 30 TAC Chapter 350 related to the Texas Risk Reduction Program.

The Order and its technical requirements ensure that the Navy meets remediation goals and objectives, while implementing appropriate institutional controls to prevent public and ecological exposure.

### **What is TCEQ's Authority to Issue a CAO?**

The statutory authorities for issuing a PCO are:

**Texas Water Code §7.031**, which authorizes the issuance of orders for corrective action relating to hazardous waste releases from solid waste management units (SWMUs); and,

**Texas Health and Safety Code (THSC) §361.082(h)**, which provides the Commission with the authority to issue an order for the remediation of hazardous constituents released from SWMUs.

In addition, issuance of a CAO is consistent with federal law and regulations at 40 Code of Federal regulations (CFR) §264.90(e), which authorizes issuance of a post-closure permit or "an enforceable document" to address releases from SWMUs. The Executive Director interprets this provision to allow the issuance of a CAO as an enforceable document in lieu of the post-closure permit.

However, issuance of the CAO is not required by federal rule or state statute. Nor are there any legal deadlines by which any CAO must be proposed, adopted, or effective.

### **Public Comment:**

The City of Dallas sent a timely comment letter which does not oppose the proposed Order. However, the City does not accept the Navy's selection of remedy for groundwater contamination under the City's property. The comment letter also expressed the City's concerns about the Navy's remedy for contaminated sediments to be capped in place on property owned by the Navy.

### **Controversial Issues Related to this CAO:**

The City of Dallas, which owns adjacent property, must consent to the Navy's selected remedy of a plume management zone with its institutional controls. Without the City's consent, the Navy must select an alternative remedy which is consistent with TCEQ's Chapter 350 TRRP requirements.

In response to the City's comments, the Executive Director filed a Response to Comments (RTC). The RTC states that staff added 2 provisions to the CAO (one in the Order, one in the Attachment A: Technical Requirements) to address the City's concerns. These 2 provisions are:

1. Order Section II.E.2: In the event that the Navy does not secure consent for its proposed remedy from the affected landowner, then the Navy will be required under this Order to develop an alternative remedy for the contamination in the groundwater plume consistent with 30 TAC Section 350.32 related to Remedy Standard A or 350.33 related to Remedy Standard B;

2. Attachment A, Section I.D.: TCEQ has given preliminary approval of the Groundwater RAP. Final approval of the Groundwater RAP requires that the Navy provide proof of filing of deed notices and restrictive covenants (e.g., institutional controls) for the PMZ. If the Navy is unable to comply with the Institutional Controls (IC) requirements for off-site landowner concurrence within the required 120-day timeframe, then the Navy must submit a revised Groundwater RAP within the following 90-day period. The revised RAP must either propose use of a remedial technology that can successfully reduce the COCs on such off-site property to meet critical PCLs in a reasonable timeframe, or provide the information required for establishing a PMZ under the provisions of 30 TAC §§ 350.33(f)(3) and 350.111(d).

**Staff Recommendation:**

The Executive Director supports issuance of a CAO for NWIRP Dallas as a viable enforceable mechanism for the completion of all response actions at the site.

**Agency Contacts:**

Susan Jere White, Staff Attorney, Environmental Law Division, extension 0454  
Allan Posnick, Project Manager, Remediation Division, extension 2332  
Maureen Hatfield, Project Manager, Remediation Division, extension 2034

**GLOSSARY OF KEY TERMS**  
**For NWIRP DALLAS CORRECTIVE ACTION ORDER**

**Area of Concern (AOC)** - An area of a facility potentially impacted by a release of hazardous waste or hazardous constituents but not a known solid waste management unit (SWMU).

**Chemicals of Concern (COCs)** - Any chemical that has the potential to adversely affect ecological or human receptors due to its concentration, distribution, and mode of toxicity.

**Commercial/Industrial Land Use** - Any real property not used for human habitation or for other purposes with a similar potential for human exposure as defined for residential land.

**Control** - To apply physical or institutional controls to prevent exposure to chemicals of concern. Control measures must be combined with appropriate maintenance, monitoring, and any necessary further response action to be protective of human health and the environment.

**Corrective Action/Response Action** - Any activity taken to comply with the TRRP Rule to remove, decontaminate, and/or control COCs in excess of critical protective concentration levels (PCLs) in environmental media.

**Corrective Action Order** - An order issued by the TCEQ under Texas Health & Safety Code §361.082(h) and Section 7.031 of the Texas Water Code requiring corrective action or other response measures considered necessary to protect human health and the environment.

**Hazardous Waste** - Any solid waste identified or listed as a hazardous waste by the Administrator of the EPA pursuant to the federal Solid Waste Disposal Act, as amended by RCRA.

**Hazardous Waste Management Unit (HWMU)** - A landfill, surface impoundment, waste pile, industrial furnace, incinerator, cement kiln, injection well, container, drum, salt dome waste containment cavern, or land treatment unit, or other structure, vessel, appurtenance, or other improvement on land used to manage hazardous waste.

**Industrial Facility** - That parcel of land owned by the Navy comprising 314 acres upon which contractor-operated aircraft production facilities are situated at NWIRP Dallas

**Institutional Controls (IC)** – Those administrative controls which will be imposed via recorded deed notices, restrictive covenants, and specific provisions to be contained in transfer Deed(s) on the future use of land and groundwater on and around NWIRP Dallas in order to ensure protection of human health and the environment from potential exposure to residual contamination.

**NWIRP Dallas** – The Naval Weapons Industrial Reserve Plant located in Dallas County, Texas comprising approximately 424 acres consisting of both the Industrial Facility and Cottonwood Bay parcels.

**Permeable Reactive Barrier (PRB)** – A physical control at the Property boundary used to treat contaminated groundwater and prevent off-site migration of COCs above the critical PCL.

**Plume Management Zone** - Response action option under Remedy Standard B of the TRRP Rule, where the responsible party proposes to remove, decontaminate, and/or control contaminated groundwater so that the COC concentrations are protective of human and ecological receptors, as applicable, at a downgradient point (known as an alternate point of exposure).

**Protective Concentration Level (PCL)** - The concentration of a COC which may remain within the air, water, or soil and still be protective of human and ecological receptors.

**Protective Concentration Level Exceedence (PCLE) Zone** - Area of environmental contamination containing COC concentrations subject to TRRP Rule corrective action/response action.

**RCRA** – The Resource Conservation and Recovery Act, which was enacted by the United States Congress in 1976 and amended in 1984, directed EPA to develop and implement a program to protect human health and the environment from improper hazardous waste management practices. The statute is designed to control the management of hazardous waste from its generation to its disposal. The Texas equivalent is the Texas Solid Waste Disposal Act, Texas Health and Safety Code, Chapter 361.

**RCRA Facility Investigation (RFI)** - An investigation required under RCRA to sample and analyze potentially impacted media (e.g., air, water, soil, sediment) to determine the nature and extent of any potential releases of hazardous waste or hazardous constituents at or from a facility into the environment.

**RCRA-Permitted Unit** - A hazardous waste management unit (HWMU) which is permitted under Chapter 335, Subchapter F, to treat, store, or dispose of hazardous waste.

**Remediation** - The act of eliminating or reducing the concentration of COCs in the environment.

**Response Action Plan (RAP)** - A plan required under the TRRP Rule which proposes to remove, decontaminate, and/or control COCs which have been determined to pose an unacceptable risk to human health and the environment.

**Solid Waste Management Unit (SWMU)** - Includes any unit used for the collection, storage, transportation, transfer, processing, treatment, or disposal of solid waste, including hazardous wastes, whether such unit is associated with facilities generating such wastes or otherwise.

**Texas Risk Reduction Program (TRRP) Rule** - Regulates the assessment and cleanup of hazardous wastes and substances, referred to as COCs, which are released into the environment from regulated commercial and industrial facilities, and on the closure of waste management facility components (e.g., tanks, container storage areas, surface impoundments).

**IN THE MATTER OF CORRECTIVE  
ACTION CONCERNING U. S.  
DEPARTMENT OF THE NAVY,  
NAVAL WEAPONS INDUSTRIAL  
RESERVE PLANT DALLAS,  
DALLAS COUNTY, TEXAS  
CAO NO. 31268**

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**BEFORE THE  
  
TEXAS COMMISSION ON  
  
ENVIRONMENTAL QUALITY**

**CORRECTIVE ACTION ORDER  
DOCKET NO. 2010-0069-IHW-US**

**I. JURISDICTION AND STIPULATIONS**

This Corrective Action Order (CAO) is issued to U.S. Department of the Navy (the Navy, the Applicant), as owner of an active Naval Weapons Industrial Reserve Plant (NWIRP) in Dallas, Texas. The term NWIRP Dallas (the Property) applies to the 424-acre parcel which includes both the Industrial Facility parcel of 314 acres and the Cottonwood Bay parcel of 110 acres.

This CAO is issued pursuant to the authority vested in the Texas Commission on Environmental Quality (the Commission or TCEQ) under TEXAS HEALTH & SAFETY CODE §361.082(h) and TEX. WATER CODE §7.031. The Commission and the Navy agree that the Commission has jurisdiction to enter into this CAO and that the Navy is subject to the Commission's jurisdiction. Upon execution, the Navy consents to issuance of this CAO by voluntarily agreeing to comply with all the terms and conditions of this CAO and explicitly waives its right to request and participate in a hearing regarding CAO terms and conditions.

The Navy will complete Response Actions at NWIRP Dallas under this CAO, in lieu of under the current Resource Conservation and Recovery Act (RCRA) Hazardous Waste Permit No. 50279 which was renewed November 21, 2005. The renewed permit does not include any RCRA-permitted units since the Navy closed the sole remaining permitted hazardous waste unit at the site (i.e., the container storage area) prior to permit renewal.

The Navy is seeking to complete necessary remediation at NWIRP Dallas under a CAO as defined in TEX. WATER CODE, §7.031 and 30 Texas Administrative Code (TAC) §335.8, §335.167, and Chapter 350 related to Texas Risk Reduction Program. NWIRP Dallas qualifies for a CAO since the facility no longer operates any permitted units at the site.

The Executive Director determined that a CAO is preferable to a post-closure order to specify corrective action measures in this case since the CAO can include the Navy's proposed remedies to address all affected property, whereas a post-closure order and a permit are limited to including the proposed remedies to address contamination for only the Industrial Facility parcel of the site.

Upon issuance, this CAO will supersede RCRA Permit No. 50279. At that time, the Navy may apply for revocation of its RCRA hazardous waste permit pursuant to 30 TAC §305.67.

## II. STATEMENT OF PURPOSE

The purpose of this CAO is to set out the terms and conditions by which the Navy will conduct remediation of soil, groundwater, and sediment both on-site of the NWIRP Dallas property and off-site.

The contents of this CAO include: the **Order**; **Attachment A**: Technical Requirements; **Attachment B**: Facility Maps; **Attachment C**: Well Design, Construction, Installation, Certification, Plugging and Abandonment Procedures and Specifications; and **Attachment D**: Public Participation.

### A. Property Description

The NWIRP Dallas property (424 acres) includes both the Industrial Facility parcel (314 acres) and the Cottonwood Bay parcel (110). The Industrial Facility parcel of NWIRP Dallas is currently under lease to Vought Aircraft Industries Inc. (Vought). Vought produces military and commercial aircraft sub-assemblies. Vought is a large quantity generator of hazardous waste. The Cottonwood Bay parcel of NWIRP Dallas consists of largely unimproved property including the 75-acre water body known as Cottonwood Bay.

### B. Historic Waste Generation

Hazardous wastes generated as a result of historical manufacturing processes at the site include: solvents, fuels, petroleum, oils, and lubricants (POLs), herbicides, acids, alkaline solutions, paints and thinners, strippers, paint sludge, cyanide sludge, plating solutions, and firebricks containing cyanide.

### C. Releases to the Environment

In 1999, the Navy completed a RCRA Facility Investigation (RFI) for the Industrial Facility to determine the nature and extent of any contamination at the site. The RFI found that historic Navy operations resulted in unauthorized releases to soil, groundwater, and sediment.

The Navy has responsibility for the environmental cleanup of historical releases at NWIRP Dallas. The Navy initiated, and continues to conduct, response actions consistent with the requirements of its RCRA permit and with the requirements of 30 TAC Chapter 305 related to Consolidated Permits; Chapter 335 related to Industrial Solid Waste and Municipal Hazardous Waste; and, Chapter 350 related to the Texas Risk Reduction Program (TRRP).

The Navy identified multiple solid waste management units (SWMUs) and Areas of Concern (AOCs) as having releases to soils. The principal chemicals of concern (COCs)

include lead, chromium, polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs).

The Navy also identified six units as sources of a site-wide shallow groundwater plume which is designated as the Trichloroethene Area (AOC 18--TCE). Sampling results show that the groundwater contamination occurs both on and off the Property. The principal chemicals of concern (COCs) in groundwater include chlorinated VOCs and hexavalent chromium.

In addition to soil and groundwater contamination, the Navy is responsible for addressing releases that have contaminated sediments in Cottonwood Bay and discrete areas of Mountain Creek Lake. The Texas Department of State Health Services issued a ban in April 1996 on the possession of fish taken from Mountain Creek Lake due to elevated PCB concentrations in fish tissue. In 2010, the ban was replaced with a fish and shellfish consumption advisory. PCBs in sediment are a likely source of the PCBs detected in fish.

#### **D. Remedies Selected for Releases and Current Status of Clean up**

After its investigation of releases to the environment, the Navy prepared three Response Action Plans (RAPs) which identify remedies for the onsite and offsite contamination.

1. Soil – The Navy's Soil RAP proposes removal of contaminated surface soils that exceed TRRP protective concentration levels (PCLs). The Navy removed contaminated soils to a depth of 5 feet and disposed of the soils at an authorized disposal facility. The Navy documented completion of the cleanup of the contaminated surface soils and submitted a soils remedial action completion report (RACR). The Executive Director conditionally approved the Soil RACR on May 19, 2010.
2. Groundwater--The Navy submitted its Groundwater RAP in June 2009 to address the groundwater contamination known as the AOC 18-TCE plume. The Navy demonstrated that the AOC 18--TCE plume is currently stable and not increasing in concentration nor expanding in size. Therefore, the Navy has proposed a final remedy of a plume management zone (PMZ) and two permeable reactive barriers (PRBs). Through these remedies, the Navy will monitor the groundwater contamination to ensure the plume remains stable and confined within the PMZ. The Navy will use the groundwater data to determine whether leachate from contaminated subsurface soils is not resulting in increases in groundwater concentrations. This demonstration will be the basis for final closure for multiple SWMUs and AOCs. On May 26, 2010, the Executive Director gave preliminary approval of the Groundwater RAP.

3. Sediments – The Navy’s sediment investigation found contamination attributable to historic Navy operations in three areas: in Cottonwood Bay and in two discrete areas in adjacent Mountain Creek Lake. The remedy selected includes dredging the discrete areas in Mountain Creek Lake and some of Cottonwood Bay and then consolidating the contaminated sediments on a portion of Cottonwood Bay. The consolidated sediments are a new unit to be capped with an artificial liner and 12 inches of gravel. The Navy recommends this remedy to prevent future human or ecological exposures. The Executive Director gave preliminary approval of the sediment remedy on June 7, 2010.

### **E. Summary of Activities this CAO Requires**

Through this CAO, TCEQ requires the Navy to perform three main activities:

1. Implement and complete response actions and, where applicable, post-response actions for soil, groundwater, and sediment contamination associated with releases from the SWMUs and AOCs consistent with requirements specified in 30 TAC §335.8 related to Closure and Remediation, in §335.167 related to Corrective Action for Solid Waste Management Units Utilizing Remedy Standards, and in Chapter 350;
2. Implement the proposed plume management zone (PMZ) remedy which includes groundwater monitoring and institutional controls for the AOC 18—TCE plume area to verify compliance with TCEQ TRRP standards. To confirm the AOC-18 groundwater plume is stable and not expanding, the Navy must compare detected concentrations at the Attenuation Monitoring Points (AMPs) to the Attenuation Action Levels (AALs) and compare detected concentrations at the Alternate Point of Exposure (POE) monitor wells to the critical Protective Concentration Levels (PCLs). The Navy shall sample APOE wells to verify effectiveness of the PRB walls to control plume expansion off-site. The Executive Director’s approval for implementation of the proposed PMZ is contingent upon the Navy providing proof of filing of deed notices and restrictive covenants (e.g., institutional controls). In the event that the Navy does not secure consent for its proposed remedy from the affected landowner, then the Navy will be required under this Order to develop an alternative remedy for the contamination in the groundwater plume consistent with 30 TAC Section 350.32 related to Remedy Standard A or 350.33 related to Remedy Standard B; and
3. Dredge, consolidate, and cover contaminated sediments from Cottonwood Bay and from discrete areas of Mountain Creek Lake on a portion of Cottonwood Bay. The resulting unit will serve as a permanent remedy preventing exposure to contaminated sediment.

## **F. Potential Change in Ownership of and Remediation of NWIRP Dallas Property**

The Navy currently owns the real property at NWIRP Dallas. However, by letter of September 17, 2008, the Navy notified the Executive Director that the Navy intends to sell the Property via public auction. That letter also stated that the Navy intends to use the "Early Transfer" provisions under Section 120(h)(3)(C) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) to expedite sale of the Property. Under the "Early Transfer" provisions of CERCLA, the governor of the state in which the facility resides may defer the statutory requirement that contaminated federal property must be cleaned up prior to transfer, consistent with the specific conditions of CERCLA §120(h)(3)(C).

In support of the Navy's request, the Executive Director's staff worked with the Navy to prepare the "Early Transfer" Covenant Deferral Request (CDR) documentation. On January 6, 2010, the Navy submitted the CDR documentation to Governor Rick Perry for approval. By letter of March 25, 2010, Governor Perry approved the CDR which allows the Navy to pursue sale and transfer of the NWIRP Dallas property prior to completing all environmental response actions.

Issuance of the CAO may facilitate economic redevelopment by enhancing marketability of the NWIRP Dallas property. The Navy contemplates that the Property will continue to be used for commercial and/or industrial uses.

Any change in ownership of the NWIRP Dallas property will not affect the applicability or enforceability of this CAO. The Navy remains responsible for completion of remediation and post-response action care no matter whether it conducts the remediation and post-response action care directly or through a third-party agent acting on behalf of the Navy consistent with Provision III.5 below.

### **III. RESPONSIBILITIES OF APPLICANT/ORDERING PROVISIONS**

1. The Navy agrees to undertake all actions required by the terms and conditions of this CAO including any portions of this CAO incorporated by reference.
2. The Navy shall perform the technical requirements specified in Attachment A, Technical Requirements and Performance Objectives.
3. The Navy shall comply with the technical specifications in Attachment C: Well Design, Construction, Installation, Certification, Plugging and Abandonment Procedures and Specifications;
4. The Navy shall comply with requirements in Attachment D: Public Participation.

5. The Navy is responsible for ensuring that all of its contractors, subcontractors, laboratories, and consultants retained to conduct or monitor any portion of the work performed under this CAO will comply with the terms of this CAO.
6. The Navy agrees that the obligations set out in this CAO shall apply to and be binding upon the Navy, its officers, directors, employees, agents, trustees, receivers, successors, assigns, and all other persons including, but not limited to, firms, corporations, subsidiaries, contractors, or consultants acting under, or on behalf of, the Navy in connection with the implementation of this CAO.
7. No change in ownership, corporate status, or partnership status relating to the facility will alter in any way the status or responsibility of the Navy under this CAO. The Navy shall be responsible for and liable for completing all of its obligations under this CAO, regardless of whether the activities specified herein are to be performed by employees, agents, contractors, or consultants of the Navy, or by employees, agents, contractors, or consultants of any party to whom the property is transferred before or after the execution of this CAO.
8. Any documents transferring ownership and/or operations of the facility from the Navy to a successor-in-interest shall include written notice and a copy of this CAO. The Navy shall provide written confirmation of the notice and a copy of this CAO being provided to the new owner and/or operator and written notice of the transfer of ownership and/or operations of the facility to TCEQ no less than ninety (90) days prior to the transfer consistent with requirements set out in 30 TAC §305.64(g). Transfer of any of the obligations of the Navy under this CAO to any third party is subject to approval by the Executive Director.

#### **IV. APPLICATION MATERIALS**

This CAO is based on information submitted in the CAO Application dated June 9, 2009. The CAO Application is incorporated into this CAO by reference as if fully set out herein.

In cases where the provisions of this CAO conflict with the CAO Application, this CAO supersedes the CAO Application. The expressed incorporation of the CAO Application does not relieve the Navy of its obligation to comply with all laws or regulations which are applicable to the activities authorized by this CAO.

## **V. FINDINGS OF FACT**

### **Ownership-related Findings of Fact**

1. The Navy is owner of NWIRP Dallas, an approximately 424-acre property, consisting of both the Industrial Facility and Cottonwood Bay parcels. The industrial portion of the NWIRP Dallas property is a 314-acre GOCO facility constructed in 1940 to manufacture aircraft for use in World War II. The Property is located at 9314 West Jefferson Boulevard, which is approximately 12 miles west of downtown Dallas in Dallas County, Texas.
2. In 2009, the Navy purchased one hundred and ten (110) acres of adjoining property, including Cottonwood Bay, to facilitate implementation of a remedy to address contaminated sediments in the Bay and in discrete portions of Mountain Creek Lake that resulted from historic Navy activities.
3. The main body of Mountain Creek Lake lies adjacent to a power plant which is owned by Exelon Power Corporation.
4. The City of Dallas owns a 4-acre parcel on the eastern portion of Cottonwood Bay and of the Diversion Channel which connects Cottonwood Bay with Mountain Creek Lake.

### **Site-related Findings of Fact**

5. The Property lies over unconsolidated soils with three distinct stratigraphic zones collectively ranging from 12 to 72 feet in thickness across the site. A shallow aquifer lies within the three zones with groundwater surface contours at a depth of 6 to 20 feet. Groundwater flow of the shallow aquifer is generally from the northwest to the southeast toward Cottonwood Bay.
6. Lying below the top stratigraphic zones is the Eagle Ford shale formation which varies from approximately 80 to 217 feet in depth at NWIRP Dallas. The average thickness is approximately 120 feet. There is no evidence of fracturing in this shale layer.
7. Under the Eagle Ford shale is the Woodbine Aquifer. The Woodbine Aquifer has an average depth of approximately 188 feet across the site.
8. The Property lies adjacent to Cottonwood Bay. A diversion channel connects Cottonwood Bay to Mountain Creek Lake. Water depths in the Bay are relatively shallow, generally on the order of 5 feet or less. Neither Cottonwood Bay nor Mountain Creek Lake is used as a public drinking water source.

9. The Industrial Facility lies within the Trinity River Basin and outside the 100-year floodplain of the Trinity River and Mountain Creek. Surface runoff is to the south into Cottonwood Bay and hence into Mountain Creek Lake which discharges to Mountain Creek approximately three-quarters of a mile to the east of the Property.

### **Permitting and Contamination-related Findings of Fact**

10. From 1940 to the present, multiple Navy contractors have managed hazardous wastes at the Property. Currently, Vought operates the Industrial Facility and produces military and commercial aircraft sub-assemblies. Vought is a large quantity generator of hazardous wastes.
11. In 1994, the Executive Director issued to the Navy RCRA Permit No. 50279 which authorized operation of a hazardous waste storage area. On August 4, 2005, the Executive Director approved closure of the sole hazardous waste management unit (HWMU) in the Navy's RCRA permit. Since that date, the Navy has operated no RCRA-regulated units at the site.
12. Historic hazardous wastes managed at the site include: solvents, fuels, POLs, herbicides, acids, alkaline solutions, paints and thinners, strippers, paint sludge, cyanide sludge, plating solutions, and firebricks containing cyanide.
13. Starting in 1985, the Navy began investigating potentially contaminated areas and determined that its historical waste management operations resulted in releases of COCs from SWMUs and AOCs.
14. In 1999, the Navy completed a RFI for the Industrial Facility. Since 1999, the Navy has conducted ongoing investigation and cleanup of the Property under the TRRP.
15. The Navy's RFI concludes that COCs have contaminated soils, groundwater, and sediments on and off the Property.
16. The Navy submitted three RAPs to address the contaminated soil, groundwater, and sediments.

### **Soil Contamination**

17. The Navy completed its onsite investigation of soils at the Property and submitted a RAP and schedule for soil clean up in 2004. The Executive Director approved the Soil RAP in 2004.

18. The principal COCs found in soils at the site include metals, PCBs, VOCs, and SVOCs.
19. The Navy implemented the Soil RAP in 2008 by excavating and removing contaminated surface soils to a depth of 5 feet.
20. The Navy's Soil RACR documents that contaminated soils less than 5 feet in depth have achieved TRRP commercial/industrial clean up standards. On May 19, 2010, the Executive Director issued conditional approval of the Soil RACR.

### **Groundwater Contamination**

21. The Navy RFI delineates a shallow groundwater plume of 303 acres which encompasses nearly the entire property and part of adjacent off-site properties. This plume is designated as the AOC-18 trichloroethene (TCE) Area.
22. The primary COCs found in the AOC-18 TCE plume are chlorinated VOCs and hexavalent chromium.
23. The Navy's RFI documents that the AOC-18-TCE plume is wholly contained in the shallow aquifer above the Eagle Ford Shale and is not migrating deeper.
24. To address the groundwater contamination associated with the AOC 18--TCE plume, the Navy submitted a Groundwater RAP and schedule in June 2009.
25. The Groundwater RAP calls for:
  - a. installation of a groundwater monitoring system to monitor the COCs in the shallow groundwater both on and off the Property;
  - b. creation of a PMZ and two PRBs to monitor plume stability and control off-Property migration and plume expansion; and
  - c. implementation of institutional controls (e.g., deed notice for on-site and restrictive covenants for off-site property) to prevent human exposure to groundwater as part of the response action.
26. In 2008, the Navy completed installation of a groundwater monitoring system which currently includes 25 Alternate-Point-of-Exposure, and 3 Background monitoring wells.
27. In 2008, the Navy also installed two PRBs to prevent migration of COCs beyond the PMZ boundary.
28. On May 26, 2010, the Executive Director gave preliminary approval of the Navy's Groundwater RAP which requires the Navy to conduct groundwater

monitoring within the shallow aquifer as part of its post-response action care for the PMZ.

### **Sediment Contamination**

29. The Navy's investigation of sediment in Cottonwood Bay and adjacent Mountain Creek Lake found contamination which is attributable to historic Navy operations and which exceeds PCLs in three areas:
  - a. approximately 66 acres in Cottonwood Bay adjacent to the NWIRP Industrial Facility, and
  - b. two smaller areas of approximately 7.4 acres located adjacent to the former Dallas Naval Air Station (NAS).
30. The principal COCs in sediment are PCBs and metals (lead and chromium).
31. After the results of the RFI, the Navy contracted with the United States Geological Survey (USGS) to conduct fish tissue sampling in Cottonwood Bay and Mountain Creek Lake.
32. In April 1996, the Texas Department of Health (now the Texas Department of State Health Services [TDSHS]) issued a ban on the possession of fish taken from Mountain Creek Lake due to elevated PCB concentrations in fish tissue. PCBs in sediment are a likely a source of the PCBs detected in fish. In 2010, the ban was replaced with a fish and shellfish consumption advisory.
33. RCRA Permit No. 50279 requires the Navy to address offsite contamination, including contaminated sediments within Mountain Creek Lake and Cottonwood Bay.
34. In June 2009, the Navy submitted a Sediment RAP to address contaminated sediments within Mountain Creek Lake and Cottonwood Bay.
35. In the Sediment RAP, the Navy proposes to remove the contaminated sediments, deposit them in an area of Cottonwood Bay, and cover them with an artificial liner and 12 inches of gravel. The purpose of the sediment cap is to prevent direct human and ecological contact with the contaminated sediments. The Executive Director gave preliminary approval of this proposed remedy and the Sediment RAP on June 7, 2010.
36. Post-response action care for the sediment cap requires the Navy to conduct annual inspections of the cover system for the first five years following completion of sediment cap construction and inspections on a five-year interval thereafter.

37. As part of the post-response action care for Cottonwood Bay and Mountain Creek Lake, the Navy will collect fish tissue samples every three years to monitor concentrations of PCBs.
38. Table I of Attachment A to this CAO identifies the SWMUs and AOCs which require response action and post-response action care after issuance of this CAO.

### **Application and Notice-related Findings of Fact**

39. A CAO is a form of authorization developed under TEXAS HEALTH & SAFETY CODE §361.082(h) and TEX. WATER CODE § 7.031 for requiring corrective action to address contamination on and off a hazardous waste site.
40. This CAO is based upon information contained in the original CAO Application submitted on June 9, 2009. The CAO Application includes a legal description of the facility in Attachment B: Site Map. The Executive Director declared the application administratively complete November 2, 2009.
41. The Navy published its Notice of the Receipt of Application and the Intent to Obtain a CAO on March 6, 2010.
42. The Executive Director processed public comments following Notice of Receipt of Application and the Intent to Obtain a CAO consistent with 30 TAC §55.156.
43. The Navy provided notice of this Proposed CAO and Preliminary Decision to the public on July 16, 2011.
44. The Executive Director received one public comment from the City of Dallas regarding the Notice of a Proposed CAO and Preliminary Decision and prepared a Response to Comments in accordance with 30 TAC §55.156.
45. The Executive Director has prepared a compliance history of the Applicant, dated July 27, 2010, pursuant to the requirements of 30 TAC Chapter 60. NWIRP Dallas has a compliance history ranking of Average and a numerical rating of 12.3. The compliance history for NWIRP Dallas is incorporated into this CAO by reference.
46. By executing this CAO, the Navy consents to issuance of this CAO, voluntarily agrees to comply with all the terms and conditions of this CAO, and explicitly waives its right to request and participate in a hearing regarding those terms and conditions.

## **VI. CONCLUSIONS OF LAW AND DETERMINATIONS**

1. This CAO subjects the Navy to the jurisdiction of the TCEQ under the Texas Health & Safety Code §361.082(h) and the Texas Water Code, §7.031(a-c).
2. The Applicant is a "person" as defined in Texas Health & Safety Code §361.003(23).
3. The Applicant has demonstrated that the NWIRP Dallas Property meets the definition of "facility" provided in TAC §335.1(59)(b).
4. The Navy is the "owner" and "operator" of a portion of the Property which contains SWMUs and AOCs as those terms are defined at 30 TAC Chapter 335.
5. A CAO is the preferred legal form of authorization in this case to address contamination on and off the Navy's hazardous waste site because the Order may encompass all affected property, whereas a post-closure order and a permit would be limited to requiring clean up of contamination only at the industrial parcel of the site.
6. Certain wastes and constituents found at the facility are "hazardous wastes" or "hazardous constituents" as defined by 40 CFR Part 261, as adopted by reference in Tex. Health & Safety Code §361.003(12) and 30 TAC §335.1.
7. The Navy conducted a RFI consistent with the corrective action requirements of the RCRA permit and with the requirements of the Texas Risk Reduction Standards (RRS).
8. Since 1999, the Navy has conducted ongoing investigation and clean up of the Property consistent with the requirements of 30 TAC Chapter 350 related to the Texas Risk Reduction Program (TRRP).
9. Based on the findings in its RFI, the Navy has effectively demonstrated that hazardous wastes and/or hazardous constituents were released from SWMUs and AOCs which are subject to corrective action and/or groundwater monitoring requirements pursuant to 30 TAC §335.167 and 30 TAC Chapter 350 related to TRRP.
10. The Navy has taken responsible measures to ensure completion of appropriate response actions and post-response action care.
11. The Navy submitted acceptable RAPs in an effort to comply with the PCLs for:
  - a. Soils that exceed critical PCLs;

- b. Groundwater that exceeds critical PCLs; and
  - c. Sediment in Cottonwood Bay and discrete areas of Mountain Creek Lake that exceed critical PCLs.
12. Through the implementation of its Soil RAP, the Navy successfully remediated contaminated surface soils down to 5 feet on the Property in compliance with the requirements of 30 TAC Chapters 335 and 350.
  13. In its Groundwater RAP, the Navy has proposed adequate remedies (i.e., a PMZ and 2 PRBs) to control groundwater contamination.
  14. The Navy installed an adequate groundwater system to monitor the extent of the groundwater plume and the concentrations of hazardous constituents in the groundwater.
  15. Based on groundwater data, the Executive Director determined that the Navy successfully closed multiple SWMUs and AOCs at the Property.
  16. The Navy selected acceptable groundwater remedies (i.e., PMZ, two PBRs, and institutional controls) to ensure plume stability, to prevent further migration of contamination, and to prevent public exposure to COCs.
  17. The Navy's selected groundwater remedies are appropriate given the subsurface geology.
  18. The Navy has initiated appropriate closure activities for SWMUs and AOCs on the Property consistent with the requirements of 30 TAC Chapters 335 and 350.
  19. The contaminated groundwater plume is wholly contained in the shallow aquifer above a shale layer known as the Eagle Ford Shale. This layer acts as a confining unit to limit deeper migration of COCs .
  20. The Navy has proposed an adequate Sediment RAP by which it will establish a unit within Cottonwood Bay to serve as a permanent remedy for contaminated sediments dredged from Cottonwood Bay and Mountain Creek Lake.
  21. The Navy has proposed an adequate plan and schedule to address sediment contamination in Cottonwood Bay and Mountain Creek Lake. The proposed remedy of sediment removal is likely to result in the decline of PCB concentrations in fish tissue over time.
  22. The proposed response actions and post-response actions described in the Groundwater and Sediment RAPs are consistent with the TRRP requirements found at 30 TAC §350.33.

23. The Soil Response Action Completion Report (RACR) complies with the requirements specified in 30 TAC §335.8 related to Closure and Remediation, in §335.167 related to Corrective Action for Solid Waste Management Units Utilizing Remedy Standards, and in Chapter 350 related to TRRP.
24. The Navy submitted an administratively complete CAO Application consistent with 30 TAC §305.50(b).
25. The Navy fulfilled public notice requirements for the CAO consistent with 30 TAC §§39.806 and 39.807.
26. The Executive Director processed the original CAO Application consistent with all applicable TCEQ procedural requirements.
27. The Executive Director processed any public comments received consistent with 30 TAC §55.156.
28. This CAO supersedes the Navy's RCRA Permit, which was issued on November 21, 2005. Upon issuance, this CAO will govern the response actions, post-response action care, and groundwater monitoring requirements.
29. Pursuant to Finding of Facts Number 45, the Executive Director has satisfied the requirements of 30 TAC Chapter 60 and has provided a copy of the Navy's compliance history as part of this CAO for consideration by the Commission.

#### **VII. SUBMISSION/AGENCY APPROVAL**

1. The Applicant shall submit all reports, plans, specifications, schedules, attachments, and response documents for review and approval within the time frame(s) specified either by the Technical Requirements provided in Attachment A of this CAO or by the Executive Director.
2. The Executive Director shall notify Applicant in writing of TCEQ's approval or disapproval of reports, plans, specifications, schedules, attachments, and response documents or any part thereof as necessary. Reports, plans, specifications, schedules, attachments, and response documents approved by the Executive Director in writing shall be deemed incorporated into and a part of this CAO.
3. If the Executive Director does not approve any plan, report or other item required to be submitted to TCEQ for its approval pursuant to this CAO, the Applicant shall address any deficiencies as directed by the Executive Director and resubmit the plan, report, or other item within the time period specified by the Executive Director.

4. No informal advice, guidance, suggestion, or comments by the Executive Director regarding reports, plans, specifications, schedules, attachments, or any other written documents submitted by the Navy will be construed as relieving the Applicant of its obligations to obtain written approval, if and when required by this CAO.

### **VIII. FINANCIAL ASSURANCE**

Owners or operators which are state or federal governmental entities, such as the U.S. Department of the Navy, are exempt from providing financial assurance to the State of Texas. If the Navy seeks to transfer the responsibility to complete all remaining environmental response actions (including long-term operation and maintenance) to an entity which is neither a state nor federal governmental body (a non-exempt owner or operator), then such non-exempt owner or operator must provide an acceptable payment bond, letter of credit, or fully funded trust that meets the requirements of 30 TAC Chapter 37. The chosen financial assurance mechanism shall be in place and legally enforceable on the date of transfer of this CAO. These financial assurance provisions shall apply to any transfers from the Navy and any subsequent transfers under this CAO where the transferee assumes responsibility for the remaining environmental response actions.

### **IX. DISPUTE RESOLUTION**

This Section applies to any unresolved technical dispute between the TCEQ and Applicant arising under this CAO. Any dispute that arises under or with respect to this CAO shall first be subject to informal negotiations between the staff of the Executive Director and Applicant. The period of informal negotiations shall not exceed thirty (30) calendar days from the date Applicant notifies the TCEQ of the need for dispute resolution. The informal negotiation period may be extended at the discretion of the TCEQ. The TCEQ's decision regarding an extension of informal negotiations shall not be subject to dispute resolution or judicial review. Informal negotiations shall not postpone the deadlines for Applicant under this CAO and its Appendices and Attachments.

When informal negotiations end, the Applicant may refer the dispute to the TCEQ Deputy Director for the Office of Compliance and Enforcement in a letter briefly describing the issue(s) to be resolved. In its letter, Applicant shall describe the nature of the dispute and shall include a proposal for its resolution. The filing of a letter shall not, in itself, postpone the deadlines for Applicant under this CAO. In any dispute, Applicant shall have the burden of demonstrating that its position is consistent with this CAO, its Appendices and Attachments, and applicable state and federal law. Any unresolved issues will be responded to in writing.

Unless otherwise provided for in this CAO, the dispute resolution procedures of this Section shall be the exclusive mechanism to resolve technical disputes arising under or with respect to this CAO. The procedures set forth in this Section shall not apply to enforcement or compliance actions initiated by the TCEQ to enforce the failure by Applicant to comply with this CAO, its Attachments, or plans approved by the Executive Director of the TCEQ, or with obligations of Applicant that have not been disputed in accordance with this Section, or to prevent any imminent threat to the human health and the environment.

#### **X. RESERVATION OF RIGHTS**

1. TCEQ expressly reserves all statutory and regulatory powers, authorities, rights, remedies, both legal and equitable, which may pertain to Applicant's failure to comply with any of the requirements of this CAO. The CAO shall not be construed as a waiver or limitation of any rights, remedies, powers, and/or authorities that TCEQ has under the Texas Solid Waste Disposal Act or any other statutory, regulatory, or common law enforcement authority of the State of Texas. In addition, the Executive Director may, without further notice or hearing, refer this matter to the Office of the Attorney General of the State of Texas for further enforcement if the Executive Director determines that Applicant is noncompliant with the requirements set forth in this CAO.
2. This CAO shall not be construed to affect or limit in any way the obligation of Applicant to comply with all federal, state and local laws and regulations governing the activities required by this CAO. Nothing in this CAO is intended to release or waive any claim, cause of action, demand or defense in law or equity that any party to this Agreement may have against any person(s) or entity not a party to this Agreement.
3. TCEQ expressly reserves all rights and defenses that it may have, including the right both to disapprove of work performed by the Applicant pursuant to this CAO and to request that the Applicant perform tasks in addition to those stated in the Technical Requirements contained in Attachment A of this CAO.
4. Notwithstanding any other provision of this CAO, the Applicant shall remain responsible for obtaining any federal, state, or local permit for any activity at the Facility including those necessary for the performance of the work and for the operation or closure of the Facility.
5. Any noncompliance with such Executive Director-approved plans, reports, specifications, schedules, attachments, and response documents shall be construed as a violation of the terms of this CAO.

## **XI. MODIFICATION OR AMENDMENT OF THE CORRECTIVE ACTION ORDER**

1. The Applicant may request that the Executive Director extend any deadline specified within any provision of CAO Attachment A. Upon a satisfactory demonstration of force majeure or good cause, the Executive Director may grant an extension not to exceed ninety (90) days for deadlines specified within CAO Attachment A. So long as any granted extension is for less than ninety (90) days, this CAO shall be deemed modified and duly enforceable with the new schedule without Commission approval of the extension.
2. Amendments to the CAO shall follow the application requirements in 30 TAC §305.50, the transfer modification process in 30 TAC §305.64, and the public notification requirements in 30 TAC §§39.809 and 55.156. All modifications or amendments require the approval of the Executive Director prior to implementation. The Executive Director may also initiate any modification or amendment if determined necessary for protection of human health and the environment. Any modification to the CAO Attachment A Technical Requirements and Performance Objectives shall be in writing and shall be effective on the date signed by the Executive Director.
3. Any reports, plans, specifications, schedules, attachments and modifications required by this CAO shall be incorporated into this CAO upon written approval by the Executive Director.

## **XII. REMEDIES FOR NONCOMPLIANCE**

1. The Applicant shall report to the Executive Director regarding any noncompliance with the requirements of Attachment A: Technical Requirements if the noncompliance may endanger human health or the environment. The noncompliance report shall meet the following requirements:
  - a. A report of such information shall be provided orally within twenty-four (24) hours from the time Applicant becomes aware of the noncompliance.
  - b. A written submission of such information shall also be provided within fifteen (15) days of the time Applicant becomes aware of the noncompliance. The written submission shall contain the following:
    - (1) a description of the noncompliance and its cause;
    - (2) the potential danger to human health or safety or the environment;

- (3) the period of noncompliance, including exact dates and times;
  - (4) if the noncompliance has not been corrected, the anticipated time it is expected to continue; and
  - (5) steps taken or planned to reduce, eliminate, and prevent the recurrence of the noncompliance and to mitigate its adverse effects, along with schedule of implementation.
- c. Noncompliance with any provisions of this CAO may subject the Applicant to enforcement action.

### **XIII. TERMINATION OF ORDER**

The provisions of this CAO shall be deemed satisfied upon the Applicant's receipt of written notice from TCEQ that the Applicant has demonstrated that the terms of this CAO, including any additional tasks determined by TCEQ to be required under this CAO, have been completed to the satisfaction of the TCEQ. This notice shall also affirm the Applicant's continuing obligation to recognize TCEQ's Reservation of Rights as required in Section X after all other requirements of the CAO are satisfied. The Applicant must provide public notice in consistent with 30 TAC §39.808 before the TCEQ issues a Notice of Termination.

### **XIV. INDEMNIFICATION OF THE STATE OF TEXAS**

The Navy, as a department of the Federal Government, is not subject to indemnification required by the State of Texas. If the Navy seeks to transfer the responsibility to complete all remaining environmental response actions (including long-term operation and maintenance) to a non-federal entity, such transferee is subject to indemnification requirements for the State of Texas. The prospective transferee must provide to the Executive Director an acceptable agreement to indemnify the State of Texas. Such agreement shall be in place and legally enforceable on the date of transfer of this CAO from the Navy to the private non-federal entity.

### **XV. FORCE MAJEURE**

1. The Applicant shall perform all the requirements of this CAO according to the time limits set unless this performance is prevented or delayed by events that constitute a force majeure.
2. For the purposes of this CAO, a force majeure is defined as any event that is

caused by an act of God, labor strike, work stoppage, or other circumstance beyond the Applicant's control that could not have been prevented by due diligence, and that makes substantial compliance with the applicable provision or provisions of this CAO impossible. Such events do not include increased costs of performance, economic hardship, changed economic circumstances, normal precipitation events, or failure to submit timely and complete applications for federal, state, or local permits. Title 30 TAC §70.7(a) states: "If a person can establish that an event that would otherwise be a violation of a statute, rule, order, or permit was caused solely by an act of God, war, strike, riot, or other catastrophe, the event is not a violation of that statute, rule, order, or permit."

3. The Applicant has the burden of proving by clear and convincing evidence that any delay is or will be caused by events reasonably beyond its control.
4. In the event of a force majeure, the time for performance of the activity delayed by the force majeure shall be extended for the period of the delay attributable to the force majeure plus reasonable additional time for resumption of activities. The time for performance of any activity dependent on the delayed activity shall be similarly extended, except to the extent that the dependent activity can be implemented in a shorter time. The Executive Director shall determine whether subsequent requirements are to be delayed and the time period granted for any delay. The Applicant shall adopt all reasonable measures to avoid or minimize any delay caused by a force majeure.
5. In the event of a force majeure, the Applicant shall immediately notify the Executive Director by telephone within twenty-four (24) hours after the Applicant becomes aware of the event and shall within ten (10) calendar days of becoming aware of the event, notify the Executive Director in writing of the cause and anticipated length of the delay. The notification shall also state the measures taken and/or to be taken to prevent or minimize the delay and the time table that the Applicant intends to follow to implement the delayed activity. Failure of the Applicant to comply with the force majeure notice requirements will be deemed a forfeiture of its right under this section.

#### **XVI. STATEMENT OF SEVERABILITY**

The provisions of this CAO are severable. If a court of competent jurisdiction or other appropriate authority deems any provision of this CAO to be unenforceable, the remaining provisions shall be valid and enforceable.

### **XVII. SURVIVABILITY/PERMIT INTEGRATION**

The requirements of this CAO shall not terminate upon the issuance of a RCRA permit or permit modification, air quality permit, or other form of permit or order, unless all of the requirements of this CAO are expressly integrated into or superseded by such permit or order to TCEQ's satisfaction.

### **XVIII. EFFECTIVE DATE**

The effective date of this CAO is the date of hand-delivery of the CAO to the Applicant, or three (3) days after the date on which the TCEQ mails notice of this CAO to the Applicant, whichever is earlier, under the Texas Government Code §2001.142.

After the effective date of the CAO, the Navy may apply for voluntary revocation of RCRA Permit No. 31268 to which the Property is subject. Any revocation of an RCRA permit must be consistent with Section 361.082 of the Texas Solid Waste Disposal Act, which requires a RCRA permit for the storage, processing, or disposal of hazardous waste. Termination of the Navy's RCRA permit, which had formerly applied to this Property, is authorized under 30 TAC § 305.67 which allows the Executive Director to revoke a permit when the permittee no longer needs a RCRA permit and consents to revocation. Upon revocation of the facility's RCRA permit, the Navy and all successors-in-interest agree that they shall not engage in the storage, processing, or disposal of hazardous wastes without first obtaining a RCRA permit.

DEPARTMENT OF THE NAVY, THE NAVY  
CAO No. 31268  
Docket No. 2010-0069-IHW-US

SIGNATURE PAGE

TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

\_\_\_\_\_  
For the Commission

\_\_\_\_\_  
Date

I, the undersigned, have read and understand the attached Corrective Action Order in the matter of the Navy. I am authorized to agree to this Corrective Action Order on behalf of the Navy, and do agree to the specified terms and conditions.

I understand that by entering into this Corrective Action Order, the Navy waives certain procedural rights, including, but not limited to, the right to formal notice of an evidentiary hearing, the right to an evidentiary hearing, and the right to appeal the terms and conditions of the Corrective Action Order. I agree to the terms of the Corrective Action Order.

\_\_\_\_\_  
Signature

\_\_\_\_\_  
Date

\_\_\_\_\_  
Printed Name

\_\_\_\_\_  
Title

Authorized Representative of the Navy

21 OCT 2011

**Attachment A: Technical Requirements and Performance Objectives**

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**CORRECTIVE ACTION ORDER**  
**ATTACHMENT A**

**TECHNICAL REQUIREMENTS AND PERFORMANCE OBJECTIVES**

**I. General Corrective Action Order Requirements**

**A. Facility Requirements**

The Corrective Action Order (CAO) prepared by the Executive Director incorporates the following technical requirements which specify the corrective action obligations for the Facility. Consistent with the TEXAS HEALTH & SAFETY CODE §361.082(h); TEX. WATER CODE §7.031; 30 TEX. ADMIN. CODE (TAC) Chapter 350; 30 TAC Chapter 335; 30 TAC §335.167; and 30 TAC §335.8, the Navy shall complete the following requirements:

1. Implement and complete response actions and post-response action care for the units and/or areas identified in Table I by this CAO and consistent with the approved Response Action Plan(s) referenced in the CAO Application submittals identified in Provision 4 of the CAO (Application Materials).
2. Upon completion of the sediment cap within Cottonwood Bay, maintain warning signs to prevent disturbance of the cap.
3. Ensure that the TCEQ has access to the facility by providing the contact information for an authorized agent located within the TCEQ Regional Office within which the facility is located.
4. Perform all groundwater monitoring and related activities specified in Attachment A of the CAO.
5. Prepare and submit the required reports consistent with the schedules in this CAO.
6. Maintain all reports, monitoring, testing, analytical, and inspection data obtained or prepared pursuant to the requirements of this CAO, including graphs and drawings, in the operating record located at the office of an authorized agent located within the TCEQ Region where the facility is located. The operating record for the facility shall be made available for review by the staff of the TCEQ upon request.
7. For the purpose of maintaining a historical record to verify the SWMUs and/or AOCs have met the corrective action objectives consistent with the CAO, update the Table I list of SWMUs and AOCs as part of the reporting

requirements of Table V of this Order to reflect the addition of new units and/or areas, the status/progress and dates of achieving remedy standards or no further action for all units/areas. SWMUs and AOCs shall not be deleted from this Table even though the corrective action objectives have been completed or a no-further-action determination has been approved for the SWMU and AOC.

8. Submit a compliance schedule consistent with Table II of this CAO.
9. Notify the local TCEQ Region Office at least ten (10) days prior to any sampling/drilling/plugging/ etc. activities required by the CAO in order to afford Region personnel the opportunity to observe these events and collect samples.
10. Submit and distribute all schedules, plans, and reports required by this CAO to the following distribution list:

An original and one copy to:

Voluntary Cleanup Program (VCP)-Corrective Action (CA)  
Section,  
Remediation Division  
Mail Code MC-127, P.O. Box 13087  
Austin, Texas 78711-3087

One copy to the TCEQ Regional Office:

TCEQ Region 4 Office  
Waste Program  
2309 Gravel Dr.  
Fort Worth, TX 76118-6951

B. Request for Corrective Action Order Modification or Amendment

1. The Navy shall submit a written request for modification or amendment to this CAO to authorize any changes in the approved Response Action Plan consistent with 30 TAC Chapter 305, Subchapter D and submitted consistent with the general instructions in a CAO Application. The written request shall include a copy of the amended Response Action Plan(s) for approval by the Executive Director.

Time Frames for Modification/Amendment Request

2. The Navy shall submit a written request for an Order modification or amendment to this CAO consistent with the time frames in 30 TAC Chapter 305, Subchapter D.

3. Pursuant to applicable rules, the Executive Director may change the frequency and constituents of concern (COCs) sampled for in response to an application for modification or amendment by the Navy. Any changes to the Corrective Action or Groundwater Monitoring Systems are subject to Executive Director's approval.
4. All dates in this CAO shall be referenced to the date of issuance of this CAO by the TCEQ unless otherwise specified. This Order was developed based on the CAO Application dated June 9, 2009, which contained a Sampling and Analysis Plan dated June 9, 2009.

C. Post-Response Action Care Notice and Certification Requirements

No later than sixty (60) days after completion of the established post-response action care for each unit/area listed in Table I, the Navy shall submit to the Executive Director a certification that the Navy performed post-response action care obligations for the unit/area consistent with the specifications of the approved Response Action Plan(s) and this CAO. The Navy shall send the certification by registered mail with a copy to the TCEQ Dallas/Fort Worth Regional Office. The Navy and a registered professional engineer or professional geoscientist shall sign the certification. The Navy must furnish documentation supporting the credentials of the registered professional engineer or geoscientist to the Executive Director upon request.

D. Deed Recordation Requirements

If the Executive Director approves waste and contaminated media to remain in place above health-based concentration levels after completion of the corrective action and/or groundwater monitoring programs, the Navy shall record an instrument in the county deed records for the facility to specifically identify the areas of contamination exceeding health-based values. The deed certification shall follow the requirements of 30 TAC §§335.560 and 335.569 or 30 TAC §350.111, where applicable. TCEQ has given preliminary approval of the Groundwater RAP. Final approval of the Groundwater RAP requires that the Navy provide proof of filing of deed notices and restrictive covenants (e.g., institutional controls) for the PMZ. If the Navy is unable to comply with the Institutional Controls (IC) requirements for off-site landowner concurrence within the required 120-day timeframe, then the Navy must submit a revised Groundwater RAP within the following 90-day period. The revised RAP must either propose use of a remedial technology that can successfully reduce the COCs on such off-site property to meet critical PCLs in a reasonable timeframe, or provide the information required for establishing a PMZ under the provisions of 30 TAC §§ 350.33(f)(3) and 350.111(d).

E. Implementation Schedule for the Sediment RAP and Projected Costs for Completion of All Response Actions

The date of Commission issuance of the CAO shall be the start date for complying with the implementation schedule in Worksheet No. 5, Implementation Schedule, in the Sediment RAP included in the CAO application.

The Navy commenced implementation of the response actions indicated in the Groundwater RAP included in the CAO application, including the installation of the two permeable reactive barriers (PRBs) in 2008 and installation of additional groundwater monitoring wells in 2009.

The currently projected budget requirements and schedule for the completion of all remaining Response Actions, including required long-term O&M activities, is estimated at \$26,561,000. The Navy shall use its best efforts and take all necessary steps to obtain sufficient and timely funding to perform these requirements, subject to Congressional appropriations.

F. Financial Assurance

Owners or operators which are state or federal government entities, such as the U.S. Department of the Navy, are exempt from providing financial assurance to the State of Texas. If the Navy seeks to transfer the responsibility to complete any remaining environmental response actions (including long-term operation and maintenance) to an entity that is neither a state nor a federal government body (a non-exempt owner or operator), then such non-exempt owner or operator must provide to the Executive Director an acceptable payment bond, letter of credit, or fully funded trust that meets the requirements of 30 TAC Chapter 37. The chosen financial assurance mechanism shall be in place and legally enforceable on the date of any transfer of this CAO. These financial assurance provisions shall apply to any transfers from the Navy and any subsequent transfers under this CAO where the transferee assumes responsibility for the remaining environmental response actions.

**II. Specific Corrective Action Order Requirements**

A. General Information (and Applicability)

1. The term "Uppermost Aquifer" as referenced in this CAO refers to the unconsolidated alluvial terrace deposits which consists of three identifiable fining-up sequences or zones designated as the "upper," "intermediate," and "lower" fining-up sequences. Each zone has the same basic structure but also has individually identifiable characteristics. The three (3) zones are typical of depositional environments that grade upward from relatively high energy to low energy.

A groundwater plume has developed from historical releases from SWMUs and AOCs at the site. The primary constituents of the plume are Trichloroethene (TCE) and Trichloroethane (TCA), and their degradation products. This plume is wholly contained in the "Uppermost Aquifer" (Zones 1, 2, and 3) above the Eagle Ford Shale. No evidence of fracturing in the Eagle Ford shale has been encountered and none has been reported. Therefore, this rock layer is considered to be a confining unit that restricts further vertical migration of hazardous constituents released from the SWMUs and/or AOCs.

2. The CAO is specific to the Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) listed in Table I and depicted in Figure 2 in Attachment B, for which investigation and necessary Corrective Action applies pursuant to 30 TAC §335.167, Chapter 350, and Provision II.H for releases from the SWMUs and/or AOCs. The Navy shall specify the completion of corrective action(s) and achievement of Remedy Standards for each unit/area listed in Table I. Updates to Table I shall be included in the groundwater monitoring reports consistent with the frequency specified in Column B, Table V of this CAO.
3. This CAO applies to any SWMU and AOC related to Navy historic activity that is discovered subsequent to issuance of this CAO. The Navy shall notify the Executive Director within fifteen (15) days of such a discovery. Within forty-five (45) days, or as otherwise agreed to by the Executive Director, of discovering a SWMU and/or AOC, the Navy shall complete the following:

Submit a Preliminary Assessment Report for that SWMU and/or AOC which shall be based on EPA RFA Guidance, October 1986, NTIS PB 87-107769 or subsequent revisions. The purpose of the preliminary assessment is to identify releases or potential releases of hazardous waste, hazardous constituents, or other constituents of concern from the SWMU and/or AOC that may require corrective action. If the preliminary assessment indicates there is no release, the Navy shall submit the Preliminary Assessment Report to TCEQ to document results and to demonstrate that the requirements of 30 TAC Chapter 350 shall not apply. However, if the preliminary assessment indicates that there is a release or a potential for release that warrants further investigation, the Navy shall conduct an investigation and necessary corrective action based on 30 TAC Chapter 350 requirements, applicable guidance, and the approved schedules consistent with Provision II.H. Upon written approval of the preliminary assessment, the Navy shall include the newly discovered SWMU and/or AOC with each groundwater report consistent with Table V, and include the newly discovered SWMU and/or AOC on Table I of this Order as appropriate, with the next CAO modification or amendment.

B. Authorized Components and Functions of Corrective Action Systems

Corrective Action Systems (CAS) are required for units and areas specified in Table I. The Navy is authorized to install and operate the Corrective Action System components specified in Provisions II.B.1 through II.B.8, subject to the limitations contained herein.

Corrective Action Systems:

1. The site's groundwater monitoring system may at a minimum consist of the following categories of wells listed in Table IV to monitor groundwater quality. An application to modify or amend the CAO is required to change the category or wells listed in Table IV.
  - a. Background Well(s) unaffected by the operation of the facility.
  - b. Point of Compliance (POC) Wells to demonstrate compliance with the Groundwater Protection Standard (GWPS), if applicable.
  - c. Point of Exposure (POE) Wells to demonstrate compliance with the GWPS and evaluate the effectiveness of the remediation program.
  - d. Alternate Point of Exposure (APOE) Wells to demonstrate compliance with the GWPS at a location other than the prescribed POE and to maintain a Plume Management Zone (PMZ) consistent with 30 TAC §350.33.
2. The Navy is authorized to install and operate the following additional corrective action system wells to monitor groundwater quality and hydrogeological conditions of the aquifer as depicted in Attachment B. The Navy may propose minor changes or new additions to the following corrective action system wells as part of the reporting requirements of the Groundwater RAP. Such changes or additions shall become part of the CAO if approved by the Executive Director. The purpose of this provision is to provide the Navy with the flexibility to alter the groundwater monitoring system and Corrective Action System designs, as necessary, to address changing environmental conditions.
  - a. Observation Wells to evaluate the lateral and vertical extent of groundwater contamination in the Uppermost Aquifer and

evaluate the effectiveness of the remediation program. The term "Uppermost Aquifer" as referenced in this CAO refers to shallow groundwater bearing Zones 1, 2, and 3.

- b. Corrective Action System (CAS) Wells to remediate and/or contain contaminated groundwater.
  - c. Attenuation Monitoring Point (AMP) Wells, located within the migration pathway of a chemical of concern which demonstrates that the GWPS will not be exceeded at the applicable point of exposure.
  - d. Supplemental Wells to gauge hydrogeologic conditions of the aquifer.
3. Groundwater Corrective Action System to withdraw, treat, and/or contain contaminated groundwater and non-aqueous phase liquids (NAPLs) using recovery wells, interceptor trenches, bioremediation, reactive walls, air sparging and/or another alternate Corrective Action System design. Any alternate Corrective Action System designs proposed by the Navy subsequent to issuance of this CAO that are equivalent to or exceed the performance of the Corrective Action Systems approved herein shall become part of the CAO if approved by the Executive Director. The Navy shall report the type of Corrective Action System in operation at the facility and an evaluation of system performance consistent with the Groundwater RAP.
4. Collection and conveyance system to store recovered groundwater and NAPLs, if found, prior to disposal at authorized facilities. If the recovered groundwater is characteristically hazardous and/or is contaminated with listed hazardous waste and the collection system does not meet the wastewater treatment unit exemption under 30 TAC §335.2(f) and §335.41(d), the collection system shall comply with the following regulations: 1) If the contaminated groundwater is stored for less than ninety (90) days without a permit or interim status, then the container and tank collection systems shall comply with provisions of 30 TAC §335.69(a)(1), as well as the federal equivalent requirements at 40 CFR Part 265, Subparts I and J; 2) If the contaminated groundwater is stored for more than ninety (90) days, then the container and tank collection system shall comply with the provisions of 30 TAC §335.152(a)(7) & (8), as well as the federal equivalent requirements at 40 CFR Part 264, Subparts I and J.

The collection and conveyance system shall consist of the following components:

- a. A groundwater corrective action system,
  - b. A groundwater storage system, and
  - c. Appurtenances for the collection and conveyance of recovered contaminated groundwater and NAPLs, if applicable.
5. Treatment system to reduce the concentration of hazardous constituents in contaminated groundwater to the GWPS specified in Table III by means of biological, physical, and/or chemical treatment processes.
  6. Groundwater containment system to inhibit contaminated groundwater above Table III GWPS (or SWPS, where applicable) from migrating beyond the influence of the corrective action system.
  7. Recovered NAPLs, if found, shall be managed (treated, stored, and disposed) or recycled in an authorized on-site unit(s) or an off-site facility.
  8. The Navy is authorized to install and operate a cap (cover system) over the contaminated sediments that will be dredged and consolidated within Cottonwood Bay consistent with the response actions identified in the Sediment RAP included in the CAO application.
  9. The Corrective Action Program shall consist of the system components listed in Provisions II.B.1. through II.B.8., to be operated consistent with the plans and specifications as approved in Provision II.C.1. and the specifications of this CAO.

C. General Design and Construction Requirements

1. All plans submitted with the CAO Application referenced in Provisions I.B.4. and I.B.8., concerning the design, construction, and operation of the authorized components of the Corrective Action and Groundwater Monitoring Program are approved subject to the terms established by this CAO. All plans must comply with this CAO and TCEQ Rules. Any alternate Corrective Action System designs proposed by the Navy subsequent to issuance of this CAO that are equivalent to or exceed the performance of the Corrective Action Systems approved herein shall become part of the CAO upon approval by the Executive Director.
2. Well Design, Construction, Installation, Certification, Plugging and Abandonment Procedures and Specifications.

For all wells to be constructed after issuance of this CAO that do not meet the well construction specifications identified in Attachment C of this CAO, the Navy shall submit to the Executive Director the proposed well location and construction diagram for approval at least ninety (90) days in advance of the anticipated date of installation or consistent with an approved schedule for installation. These requirements may be met through submittal of a work plan by the Navy and subsequent approval by the Executive Director. Well installation shall commence upon written approval of the Executive Director. Wells constructed prior to issuance of this Order may be utilized as groundwater monitoring wells if they meet the standards of Attachment C or are otherwise authorized by issuance of the CAO.

Unless the Navy proposes an alternate well design that will result in wells of equivalent performance, each well installed after issuance of this Order shall follow the design specifications contained in Attachment C of this CAO. The Navy shall follow the certification and reporting requirements for installation of new, plugging/abandonment and replacement of existing wells as specified in Attachment A of this CAO and Table V.

3. The Navy shall not install or maintain any drinking water or supply wells that are screened within plumes of groundwater contamination at the facility.

D. Corrective Action Objectives and the Groundwater Protection Standard

Corrective Action Objectives for Units/Areas Specified in Table I

1. The GWPS defines the concentration limits of hazardous constituents, with respect to groundwater quality restoration in the Uppermost Aquifer and any lower interconnected aquifers, which are to be achieved at the POE (and APOE, if applicable) and beyond consistent with Provision II.E.1, by operation of the Corrective Action Program at this facility.
2. APOE wells are depicted in Figures 4a-d. in Attachment B and further defined for purposes of this CAO by Table IV, which also identifies POE Wells, if any, for which groundwater monitoring procedures will apply (Provision II.F.).
3. For Corrective Action, the hazardous constituents detected in groundwater are specified in Column A of Table III. Additional constituents shall be added to Table III and Table IIIA, which are specific to each AOC-18 Plume segment, through a CAO modification

or amendment consistent with Provision I.B. Groundwater analysis for each hazardous constituent shall utilize an analytical method, listed in the EPA SW-846 and as listed in the July 8, 1987 edition of the Federal Register and later editions, which is capable of measuring the concentration of the hazardous constituent at a level equal to or less than the corresponding value specified in Table III except when matrix interference prevents achievement of that level.

4. The GWPS are specified in Column B of Table III. The GWPS shall be the values for statistical comparisons unless Table III is amended consistent with current guidance and regulations, or if any other accepted levels are promulgated by the TCEQ or the EPA. The values in Table III will change as updates to 30 TAC §335.160 and Chapter 350 are promulgated. The Executive Director or the Navy may request to replace concentration limits through a modification or amendment to this CAO consistent with 30 TAC §305, Subchapter D.
5. Achieving the GWPS for Corrective Action Program.
  - a. Achieving the GWPS, consistent with Provision II.E.1., is defined by the results of the data evaluation of Provision II.F.4., wherein the concentrations of hazardous constituents have been reduced by the Corrective Action Program (Provision II.E.) to concentrations of hazardous constituents that do not exhibit a statistically significant increase or exceed the concentration limits when directly compared to the GWPS of Table III.
  - b. If the GWPS established in this CAO for SWMUs and AOCs listed in CAO Table I, have not been exceeded for three (3) consecutive years in all wells throughout the plume for that unit, and the performance standards of 30 TAC §335.8, §335.167, and §350 are met, then the Navy may apply for a modification or amendment to the CAO to terminate the Corrective Action Program for that unit and/or area.
6. Corrective Action Objective for Contaminated Sediments in Mountain Creek Lake (MCL)

The corrective action objective for contaminated sediments in MCL includes: a) The permanent removal of chemical of concerns (COCs) at concentrations greater than the critical Protective Concentration Levels (PCLs) from the two PCL exceedance zones in MCL, the Diversion Channel, the eastern portion of Cottonwood Bay (City of Dallas property) and the southwestern portion of Cottonwood Bay in

order to prevent direct human or ecological exposure. This objective is to be achieved through the dredging, consolidation and permanent capping of these contaminated sediments within a portion of Cottonwood Bay.

E. Corrective Action Program Performance Standards

The Corrective Action Program applies to units and areas specified in Table I. The Corrective Action Program shall remediate, recover, control and/or contain contaminated groundwater from the Uppermost Aquifer and any interconnected lower aquifers, if applicable. The Corrective Action Program for contaminated sediments in Cottonwood Bay includes the dredging, consolidation, and capping of contaminated sediments. The Corrective Action Program shall consist of the system components of Provision II.B., to be operated consistent with the specifications of this CAO. The Navy shall conduct the Corrective Action Program until the performance standards of Provision II.E.1. are met. The Navy shall initiate the Corrective Action Program immediately upon issuance of this CAO, except where other specific TCEQ response deadlines may apply.

1. Performance Standard for Soil, and Ground Water
2. The Navy shall conduct the Corrective Action Program to remedy the quality of groundwater by removing, recovering, controlling, and/or containing the hazardous constituents so as to achieve the concentration limits specified in the GWPS of Provision II.D. of this CAO consistent with the following:
  - a. At the APOE which may be located off-site or at the downgradient facility property line (see Figures 4a-d. in Attachment B and Table IV);
  - b. Beyond the facility boundary where necessary to protect human health and the environment, unless the Navy demonstrates to the satisfaction of the Executive Director that, despite the Navy's best efforts, the necessary permission from the property owner(s) was not received to undertake such action. The Navy is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied;
  - c. Operate the Corrective Action System to intercept, contain and/or treat the contamination in the Uppermost Aquifer unless the system is under repair or maintenance;

- d. Recommend changes to the configuration of the Corrective Action System at any time that it is determined that the contamination present in the Uppermost Aquifer, deeper zone, or any interconnected lower aquifers is not being effectively contained and/or remediated; and
- e. The Navy is required to actively remove NAPLs from the Uppermost Aquifer and any interconnected aquifers wherever found, to the extent technically practicable.

3. Performance Standard for Sediments

The Navy shall implement the sediment remedy consistent with the approved Mountain Creek Lake Sediment Response Action Plan (Sediment RAP). The approved RAP includes, at a minimum:

- a. Permanent removal of chemical of concerns (COCs) at concentrations greater than the critical Protective Concentration Levels (PCLs) from the two Protective Concentration Levels (PCLs) exceedance zones in Mountain Creek Lake, the Diversion Channel, the eastern portion of Cottonwood Bay (City of Dallas property) and the southwestern portion of Cottonwood Bay. Verification samples will be collected to confirm removal of chemical of concerns (COCs) greater than the critical PCLs at these locations;
- b. Maintenance of the cap at the specified thickness and maintained to prevent erosion (geotextile exposure or exposure of the underlying sediment) during storm events to eliminate the potential for any direct human or ecological receptors contact with affected underlying sediments;
- c. Conducting of annual inspections and more comprehensive 5-year review inspections. Annual inspections will include integrity inspection of the cover system consistent with the operation and maintenance activities indicated in the approved Sediment RAP; and
- d. Following cap construction, the collection and analysis of fish tissue samples every three years until such time as Fish Consumption Advisory 44 (ADV-44) is lifted by the Texas Department of State Health Services (TDSHS).

F. Groundwater Monitoring Program Requirements

The Navy shall install, operate, and maintain the Groundwater Monitoring System to evaluate the effectiveness of the Corrective Action Program for those units undergoing remediation, as applicable. The Groundwater Monitoring System shall consist of wells specified in Table IV and shall include at a minimum Alternate Point of Exposure (APOE) and other wells as necessary which have been approved by the Executive Director (e.g. POE, AMP, etc.).

1. Waste Management Area Specific Background Groundwater Quality

The Navy may submit to the Executive Director for review and approval a plan to determine site-specific background values of the naturally occurring hazardous constituents of Table III in lieu of the concentration limits given in these Tables. The plan shall include appropriate background well locations and screened intervals, well sampling schedules, and methodology for determining and expressing background values in a form appropriate for the statistical evaluation of the monitoring results. Once background values have been established, the Navy shall submit a modification or amendment, consistent with Provision I.B., to add background values.

2. Sampling and Analysis Plan

a. Wells shall be sampled consistent with the Sampling and Analysis Plan referenced in Provision I.B.4. The Sampling and Analysis Plan is hereby incorporated into the CAO by reference as if set out fully herein. The Navy or the Executive Director shall propose modifications to the plan, as necessary to reflect current methods in EPA SW-846 and ASTM Standard Test Methods or other methods accepted by the TCEQ. The laboratory methods utilized for groundwater analysis shall be capable of measuring the concentration of each hazardous constituent equal to or less than the GWPS values in Table III. Any and all revisions to the plan shall become conditions of this CAO at the beginning of the first quarter following approval by the Executive Director.

b. The Navy shall maintain an up-to-date and approved Sampling and Analysis Plan at the facility of an authorized agent located within the TCEQ region in which the facility is located and made available for inspection upon request.

3. Sampling and Analysis Frequencies and Parameters

- a. Frequency of sampling is defined below:
- (1) "Week" and "month" shall be based upon a calendar week and month;
  - (2) "Quarter" shall be based on divisions of the calendar year (i.e., January through March, April through June, July through September, October through December);
  - (3) "Semiannual" shall be based on divisions of the calendar year (i.e., January through June, July through December) and consist of two consecutive quarters;
  - (4) "Annual" or "Year" shall be four consecutive quarters, beginning with the first quarter. Years shall be designated consecutively, beginning with the "first year", "second year", etc; and
  - (5) "Calendar year" shall be based on divisions of the calendar (i.e. January through December).
- b. Sampling of wells shall commence during the first annual period after issuance of this CAO. Thereafter, samples shall be collected annually during either the months of April, May or June in the first half of the year. Data evaluations shall be completed within sixty (60) days of collection of the last sample unless QA/QC procedures show that data is unacceptable and re-analyses or re-sampling must be performed. In such cases, the Executive Director will be notified as soon as it becomes apparent that the sixty (60) day time limit will not be met.

In the first and subsequent years of groundwater monitoring, the Navy shall sample and analyze wells consistent with the following schedules for Corrective Action Monitoring for units and areas specified in Table I:

- (1) Each Background, POC, POE, and APOE Well listed in Table IV; and each AMP, if applicable, Observation Well, and CAS Well depicted in Attachment B shall be sampled and analyzed annually for the constituents of Table IIIA until the achievement of the GWPS for all wells consistent with Provision II.D.5.
- (2) Each Observation Well, AMP Well (if applicable) and CAS Well depicted in Attachment B shall continue to be

sampled, consistent with Provision II.D., until any changes to these groups of wells are approved by the Executive Director pursuant to Provision II.B.3.

- (3) Each Well of Table IV shall be sampled for the constituents of Table IIIA, consistent with Provision II.D.3., until analytical results satisfy the GWPS of Table IIIA for all wells of Table IV of that unit or area for two consecutive sampling events. All wells listed in Table IV shall then be sampled and analyzed annually for the constituents of Table III until all constituents of Table III are below the GWPS for all Table IV Wells of that unit or area consistent with Provision II.D.5.
- (4) If the GWPS is achieved in all wells (Background, POC, POE, APOE, AMP, Observation Well and CAS), consistent with Provision II.D.5.a., then the Navy may apply to modify or amend this Order consistent with Provisions II.D.5.b.
- (5) Any well with NAPLs detected in the wellbore shall be considered as non-compliant with the GWPS and is not required to be analyzed for the constituents of Table III or IIIA.

c. Field Determination Requirements - All Wells Specified in Table V (Item 12).

- (1) Water level measurements relative to Mean Sea Level shall be measured to within 0.01 ft and shall be performed during each sampling event effective immediately with issuance of this CAO. Measurements shall be taken in all monitoring wells specified in this CAO.
- (2) Field determinations of pH, temperature and Specific Conductivity are required for all wells on Table IV and wells depicted in Attachment B excluding wells containing NAPLs. Turbidity in nephelometric turbidity units is required if micropurging techniques are utilized during sample collection.
- (3) Field observations including descriptions of appearance (clarity, color, etc.) shall be recorded annually for all wells on Table IV and wells depicted in Attachment B,

excluding wells containing NAPL.

- (4) The total depth of each well which is not equipped with a dedicated pump shall be measured during each sampling event. Total depth of each well which is equipped with a dedicated pump shall be measured when: 1) pumps are removed for maintenance; or 2) the groundwater flow is inadequate for proper sampling. The measured total depth shall be compared to the total depth recorded on the well construction log. Should a comparison of the measured and the recorded total depth reveal that greater than 20% of the well screen has been silted in, the Navy shall perform such actions necessary (redevelopment, replacement, etc.) to enable the well to function properly.
- (5) All wells specified in Table V (Item 12) shall be inspected during each sampling event consistent with specifications in the approved Sampling and Analysis Plan. Repairs or a proposal for replacement for any affected well shall be performed within ninety (90) days of the routine sampling event inspection which identified the problem well.

#### 4. Data Evaluation Procedures

Data evaluation consistent with this provision shall be performed for all wells within sixty (60) days of collection of the last sample for the duration of the Corrective Action Monitoring program. When evaluating the monitoring results of each well, pursuant to Provision II.F., for the constituents of Tables III or IIIA of this Order for corrective action monitoring, the Navy shall either:

- a. [for corrective action monitoring of APOE wells] directly compare the value of each constituent to the respective concentration limit of Tables III or IIIA and for AMP wells, directly compare the value of each constituent to the calculated AAL for that AMP well. Based on these comparisons and determine if the values are less than, equal to, or greater than the respective concentration limits. If the values for all the constituents are less than or equal to the respective concentration limits, then the well shall be considered compliant with the Attenuation Action Levels (AALs) and GWPS for the sampling event. If one or more constituent value is greater than the respective concentration limit after re-

sampling of the well, then the well shall be considered non-compliant with the AAL and/or GWPS for the sampling event;  
or

- b. [for corrective action monitoring], compare the value of each constituent to its respective concentration limit on Table III or IIIA, using one of the following procedures:
  - (1) The Confidence Interval Procedure for the mean concentration based on a normal, log-normal, or non-parametric distribution. The 95 percent confidence coefficient of the t-distribution will be used in constructing the confidence interval (consistent with Section 6.2.1 of Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Interim Final Guidance, U.S. EPA, April 1989) and the Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities - Addendum to Interim Final Guidance (July 1992), and subsequent updates acceptable to the Executive Director. The confidence interval upper limit for each constituent shall be compared with the corresponding concentration limit in Table III or IIIA for corrective action monitoring. To be considered in compliance, the confidence interval upper limit for a well in question must not exceed the tabled concentration limit. A confidence interval upper limit above the tabled concentration limit shall be considered as evidence of statistically significant contamination; or,
  - (2) An alternative statistical method proposed by the Navy and approved by the TCEQ Executive Director. Any proposed alternative method must be appropriate with respect to distributional assumptions and must provide reasonable control of both false positive and false negative error rates.
- c. Within thirty (30) days of an initial data evaluation that determines concentration limits have been exceeded in a well, pursuant to Provisions II.F.4.a. or II.F.4.b., the Navy may resample and repeat the analysis to verify concentration limits have been exceeded. If the second analysis indicates that the sample does not exceed the concentration limits, then the well shall be considered compliant with the concentration limits for the sampling event.

G. Response and Reporting

1. As for Corrective Action Monitoring for units/areas specified in Table I,
  - a. if the Navy or the Executive Director determines that the Corrective Action Program required by this CAO no longer satisfies the requirements of 30 TAC §335.167 and 30 TAC Chapter 350, the Navy must, within ninety (90) days of either the Navy's determination or Executive Director's notification, submit an application for a CAO modification or amendment to make any appropriate changes to the Corrective Action Program which will satisfy the regulations; and
  - b. if the Executive Director determines that the lateral or vertical extent of groundwater contamination is not delineated, the Navy must, within ninety (90) days of the date of the Executive Director's notification unless otherwise directed, initiate an investigation consistent with the TRRP to determine the extent of the contamination based on the Practical Quantitation Limit (PQL) or Method Quantitation Limit (MQL) of 40 CFR Part 264, Appendix IX, or other applicable standard as required or approved by the Executive Director.
  - c. This section applies only if APOEs are defined in Table IV and a GWPS is assigned at the APOE and if an attenuation action level (if applicable) is assigned to its respective attenuation monitoring point. If during two (2) consecutive annual sampling events the GWPS is exceeded at the POE, or the attenuation action level (if applicable) is exceeded at its respective attenuation monitoring point, then within ninety (90) days of completing the data evaluation of the second annual sampling event, the Navy must:
    - (1) install groundwater recovery wells or alternate Corrective Action System design to mitigate the downgradient migration of the contaminant plume; and/or
    - (2) reevaluate the criteria originally used to establish the GWPS, consistent with Provision II.D.4., and submit an application to modify or amend the CAO to address the GWPS exceedance; and/or reevaluate the criteria originally used to establish the attenuation action level and submit an analysis to the Executive Director for

approval to request changes to the attenuation action level.

2. For the Corrective Action Program, the Navy shall submit groundwater monitoring reports every three (3) years consistent with the frequency specified in Column B, Table V, and contain the information listed in Table V required for the specific program(s) that are applicable.

H. Corrective Action and Interim Corrective Measures (ICMs) for Solid Waste Management Units

1. Corrective Action Obligations

The Navy shall conduct corrective action as necessary to protect human health and the environment for all releases of hazardous waste, of hazardous constituents listed in Appendix VIII and/or 40 CFR Part 264, Appendix IX, and/or of other COCs from any newly discovered SWMU and/or AOC which contain COCs related to Navy historical activities consistent with 30 TAC §335.167. Corrective action shall consist of an Affected Property Assessment (APA), determination of protective concentration levels, selection of a remedy standard (if necessary), development and implementation of a response action (if necessary), and submittal of required reports consistent with 30 TAC Chapter 350.

Upon the Executive Director's review of its corrective action obligations, the Navy may be required to perform any or all of the following:

- a. Conduct investigation(s);
- b. Provide additional information;
- c. Investigate additional SWMU(s) and AOC(s); and/or
- d. Submit an application for a modification/amendment to a CAO to implement corrective action.

Any additional requirements must be completed within the time frame(s) specified by the Executive Director.

2. The Navy shall conduct an RFI/APA for any new SMWU and AOC which contains COCs related to Navy historic activities and which are discovered after the issuance of this CAO consistent with Provision II.A.3.
3. Variance from Investigation

The Navy may elect to certify that no COCs are currently or never have been present or managed in a SWMU or AOC referenced in Provision II.H.2, in lieu of performing the investigation required in Provisions II.H.1. and II.H.4., provided that confirming data is submitted for the current and past waste(s) managed in the respective unit or area. The Navy shall submit such information and certification(s) on a unit-by-unit basis in the time frame required in Provision II.H.4. for review and approval by the Executive Director of the TCEQ. Should the Navy fail to demonstrate and certify that COCs are not or were not present in a particular unit, it shall perform the investigation required in Provisions II.H.1. and II.H.4. for the SWMU and/or AOC.

4. RCRA Facility Investigation (RFI)/Affected Property Assessment (APA)

If applicable, within sixty (60) days from the date of issuance of this CAO and/or approval of the Preliminary Assessment Report of Provision II.A.3., the Navy shall submit a schedule for completion of the RFI(s)/APA to the Executive Director for review and approval. The Navy shall initiate the investigations consistent with the approved schedule and guidance contained in the EPA publication EPA/520-R-94-004, OSWER Directive 9902.3-2A, RCRA Corrective Action Plan (Final), May 1994 and consistent with state regulations referenced in Provision II.H.1. The results of the RFI/APA must be appropriately documented in a report and submitted to the Executive Director for approval within the time frame established in the approved schedule. The Report shall be considered complete when the full nature and extent of the contamination, the QA/QC procedures and the Data Quality Objectives are documented to the satisfaction of the Executive Director. The Navy shall propose or conduct ICMs, as necessary, to protect human health and the environment.

5. Remedy Selection

Upon approval of RFI Report/APAR, if it is determined that there has been a release of COCs into the environment which poses a potential risk to human health and the environment, then the Navy shall propose a remedy consistent with the TCEQ TRRP rules, or as otherwise authorized by the Executive Director. This may require a RAP to be submitted for review and approval within the time frame(s) specified by the Executive Director. For projects conducted under TRRP, the risk assessment process shall be addressed in the APAR and the evaluation of corrective measures shall be conducted as part of the remedy standard selection process.

6. Corrective Measures Implementation/Remedial Action Plan (RAP)

If on the basis of the RFI, BLRA, CMS, or APA, the Executive Director determines that there is a risk to the human health and environment, then the Navy shall submit for approval a CMI Work Plan(s)/RAP or propose a response action (TRRP) within 180 days of receipt of approval of the RFI and/or BLRA/CMS Report or APAR unless otherwise extended by the Executive Director. The CMI Workplan/RAP shall address all of the applicable items contained in the EPA publications referenced in Provision II.H.4. or other guidance acceptable to the Executive Director. Response actions, including TRRP Remedy Standard (RS) A, cannot be self implemented as normally allowed by TRRP because under Hazardous Solid Waste Amendments (HSWA) corrective action and Order provisions requires the CMI Workplan to be reviewed prior to approval and public participation (see also Provision II.H.7.). For TRRP RSA and RSB, the Navy shall submit a RAP consistent with schedules and requirements of 30 TAC Chapter 350. The CMI Workplan or RAP shall contain detailed final proposed engineering design, monitoring plans and schedule to implement the selected remedy and assurances of financial responsibility for completing the corrective action. Upon completion of the response action, the Navy shall submit a CMI Report or Response Action Completion Report (RACR) to the TCEQ for review and approval. The CMI Report shall address all the applicable items in the EPA publications EPA/520-R-94-004, OSWER Directive 9902.3-2A, RCRA Corrective Action Plan (Final), May 1994 or other guidance acceptable to the Executive Director. The RACR shall address all the applicable items in Title 30 TAC Chapter 350 and applicable guidance.

Upon written approval of CMI Workplan or RAP, the Navy must within ninety (90) days submit a CAO modification or amendment consistent with Provision I.B. to establish corrective action to satisfy the requirements of 30 TAC §335.167 and Chapter 350. The Navy may propose an alternative schedule to be approved by the Executive Director to incorporate several approved CMI Workplans or RAPs into a single CAO modification or amendment when CMI Workplans or RAP schedules coincide. Implementation of the corrective measure(s) shall be addressed through issuance of a new or modified/amended CAO.

To report the progress of the corrective measures, the Navy shall submit to the Remediation Division its CMI Progress Reports, RAERs (TRRP), or Post-Response Action Completion Reports (PRACR) every three years as a section of the Report required by Table V of this CAO, or as otherwise directed.

If the Executive Director requires deed recordation and institutional controls as part of the final corrective action, the Navy shall submit the required proof of deed notice to the Executive Director for review and approval consistent with Provision I.D. The Navy shall submit this proof within ninety (90) days of approval for the final corrective action. To establish a plume management

zone (PMZ), the Navy shall submit proof of compliance with the institutional control requirements within 120 days of the approval of the RAP, which is concurrent with issuance of this CAO. The Navy must submit any request for an extension to the aforementioned timeframes to the Executive Director no less than 45 days prior to the deadline for submittal.

7. Public Notice

a. The Navy shall conduct public notice when:

- (1) it submits a CMI Work Plan or RAP to the Executive Director consistent with Provision II.H.6. when the Work Plan or RAP contains the proposed final corrective measures for SWMU(s) and/or AOC(s) from which a release has occurred and contains proposed institutional controls. This public notice process occurs through CAO modification/ amendment; or
- (2) on the basis of the RFI/BLRA or APAR required by Provision II.H.4. and II.H.5., the Executive Director determines that the release from SWMU(s) and/or AOC(s) meets the performance standards under TRRP (e.g., no remedy is needed, no risk to human health and environment exists, and the Navy seeks approval of a no-further-action determination by the Executive Director). This public notice process occurs through the corrective action process (see Attachment D).

b. TCEQ rules require no public notice when the Executive Director determines that no release from a SWMU and/or AOC occurred, based on the results of the Preliminary Assessment Report required by Provision II.A.3., or the RFI or APAR required by Provision II.H.4. (see Attachment D).

The purpose of the public notice is to give the members of the public the opportunity to submit written comments on the proposed corrective measure(s) or proposed no-further-action determination. Refer to Attachment D of this CAO for further guidance on public notice participation in HSWA corrective action.

8. Interim Corrective Measures (ICM)

a. The ICM apply to waste management units or AOCs under investigation for which a final Corrective Action Program has

not been authorized by the CAO and for which the Executive Director determines an ICM is necessary for protection of human health and the environment. ICM also apply to units/areas that are discovered after issuance of this CAO.

- b. The objectives of the ICM are to remove, decontaminate, and/or stabilize the source (i.e., waste and waste residues) and contaminated media to protect human health and the environment. The Navy shall modify the ICM, as necessary, to achieve these objectives.
- c. TCEQ rules require the Navy to design, construct, operate and maintain ICM for units/areas as necessary to protect human health and the environment. The Navy shall operate ICM until final corrective measures are established, consistent with Provision II.H.6., as authorized in the CAO. At a minimum, the ICM shall consist of the following:
  - (1) Specific performance goals to protect human health and the environment;
  - (2) A monitoring system to evaluate the ICM and determine if the Navy is meeting the objectives outlined in Provision II.H.8.b. All ICM wells must comply with the requirements of Provision II.C.2. and Attachment C, Well Design and Construction Specifications, of this Order;
  - (3) An implementation schedule to initiate ICMs;
  - (4) Submittal of a report specifying the design of the ICM upon installation. During implementation of the ICM, the Navy shall submit periodic ICM Status Reports to document that the Navy is achieving the objectives of Provision II.H.8.b. consistent with the reporting requirements indicated in the RAP.
  - (5) A procedure to modify the design, as necessary, to achieve the objectives outlined in Provision II.H.8.b. of this CAO.

**CORRECTIVE ACTION ORDER**  
**TABLE I**

**Response Action and Post-Response Action Care Summary for Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs)**  
 (See attached spreadsheet pages)

**CORRECTIVE ACTION ORDER**  
**TABLE IA**

**Summary for Solid Waste Management Units (SWMUs) and Areas of Concern (AOCs) Where Response Action is Complete**  
 (See attached spreadsheet pages)

**CORRECTIVE ACTION ORDER**  
**TABLE II**  
**COMPLIANCE SCHEDULE**

ITEM	COMPLIANCE SCHEDULE from the Date of Issuance of the CAO (unless otherwise specified)	REGULATORY CITATION	REQUIREMENT
A.	60 days	Corrective Action Order (CAO)	Submit to the Executive Director a schedule summarizing all activities required by the CAO. The schedule shall list the starting dates of all routine activities. As indicated in <u>Provision I.E.</u> , issuance of the CAO shall be the start date for initiating the activities in the Sediment RAP. The Navy shall include an updated schedule in the Groundwater Monitoring Report required by <u>Provision II.G.2.</u> The schedule shall list the activity or report, the CAO Section which requires the activity or report, and the calendar date the activity or a projected date the Navy will submit the report

B.	120 days	30 TAC §350.31(g)	Submit to the Executive Director proof of compliance with institutional control requirements which provides notice of the existence and location of the Plume Management Zone (PMZ) to prevent exposure to groundwater from this zone until constituents of concern are reduced to below the GWPS of Table III for the entire plume.
C.	120 days	30 TAC §350.31(g)	Within 120 days of Executive Director approval of the Final Mountain Creek Lake Sediment RACR, submit to the Executive Director proof of compliance with institutional control requirements
D.	Notify within 30 days	30 TAC §350.33(k)	During the post-response action period, notify the Executive Director in writing if any unexpected event occurs or condition is detected which indicates that additional response actions will be required at an affected property.

**CORRECTIVE ACTION ORDER**

**TABLE III – CORRECTIVE ACTION PROGRAM**

Table of Detected Hazardous and Solid Waste Constituents, Attenuation Action Levels and The Groundwater Protection Standard (GWPS)

COLUMN A Hazardous Constituents 1. AOC-18- Trichloroethene Area (includes entire facility plume area)	COLUMN B GWPS APOE Wells (See Table IV)	COLUMN C Surface Water Protection Standard (SWPS)
1,1,1-Trichloroethane	0.200 mg/L <sup>GWGW</sup> <sub>Ing</sub>	28.2 mg/L <sup>sGW</sup> <sub>Ing</sub>
1,1,2-Trichloroethane	0.005 mg/L <sup>GWGW</sup> <sub>Ing</sub>	
1,1-Dichloroethylene	0.007 mg/L <sup>GWGW</sup> <sub>Ing</sub>	7.73 mg/L <sup>sGW</sup> <sub>Ing</sub>
1,1-Dichloroethane	4.900 mg/L <sup>GWGW</sup> <sub>Ing</sub>	39 mg/L <sup>sGW</sup> <sub>Ing</sub>
1,2-Dichloroethane	0.005 mg/L <sup>GWGW</sup> <sub>Ing</sub>	0.49 mg/L <sup>sGW</sup> <sub>Ing</sub>
Aroclor (Total)	0.0005 mg/L <sup>GWGW</sup> <sub>Ing</sub>	
Benzene	0.005 mg/L <sup>GWGW</sup> <sub>Ing</sub>	
Benz-a-anthracene	0.00125 mg/L <sup>GWGW</sup> <sub>Ing</sub>	
Benzo-a-pyrene	0.0002 mg/L <sup>GWGW</sup> <sub>Ing</sub>	
Carbon tetrachloride	0.005 mg/L <sup>GWGW</sup> <sub>Ing</sub>	

Chlorobenzene	0.100 mg/L <sup>GWGW</sup> <sub>Ing</sub>	
cis-1,2-Dichloroethylene	0.070 mg/L <sup>GWGW</sup> <sub>Ing</sub>	93 mg/L <sup>SWG</sup> <sub>Ing</sub>
Ethylbenzene	0.700 mg/L <sup>GWGW</sup> <sub>Ing</sub>	
Hexavalent chromium	0.100 mg/L <sup>GWGW</sup> <sub>Ing</sub>	0.071 mg/L <sup>SWG</sup> <sub>Ing</sub>
Pentachlorophenol	0.001 mg/L <sup>GWGW</sup> <sub>Ing</sub>	
Tetrachloroethene	0.005 mg/L <sup>GWGW</sup> <sub>Ing</sub>	1.29 mg/L <sup>SWG</sup> <sub>Ing</sub>
Total Chromium	0.100 mg/L <sup>GWGW</sup> <sub>Ing</sub>	1.05 mg/L <sup>SWG</sup> <sub>Ing</sub>
Trans-1,2-Dichloroethene	0.100 mg/L <sup>GWGW</sup> <sub>Ing</sub>	93 mg/L <sup>SWG</sup> <sub>Ing</sub>
Trichloroethene	0.005 mg/L <sup>GWGW</sup> <sub>Ing</sub>	4.1 mg/L <sup>SWG</sup> <sub>Ing</sub>
Vinyl Chloride	0.002 mg/L <sup>GWGW</sup> <sub>Ing</sub>	2.78 mg/L <sup>SWG</sup> <sub>Ing</sub>

Foot Note:

POC: Point of Compliance; AMP: Attenuation Monitoring Points; APOE: Alternate Point of Exposure; ATTB: Attachment B

**CORRECTIVE ACTION ORDER**

**TABLE IIIA – CORRECTIVE ACTION PROGRAM**

Table of Indicator Parameters, Attenuation Action Levels (AALs), and Groundwater/Surface Water Protection Standard (GWPS)

COLUMN A Hazardous Constituents	COLUMN B AALs (mg/l)*	COLUMN C GWPS (mg/l)/SWPS(mg/l)
	AMP Wells See <u>Table IV</u>	APOE Wells See <u>Table IV</u>
1. AOC 18- Trichloroethene area ( Protective of Surface Water)		
Trichloroethene	N/A	4.1 mg/L <sup>SWG</sup> <sub>Ing</sub>
1,1-Dichloroethene	N/A	7.73 mg/L <sup>SWG</sup> <sub>Ing</sub>
1,1-Dichloroethane	N/A	0.239 mg/L <sup>SWG</sup> <sub>Ing</sub>
Vinyl Chloride	N/A	2.76 mg/L <sup>SWG</sup> <sub>Ing</sub>
1,2-Dichloroethane	N/A	0.49 mg/L <sup>SWG</sup> <sub>Ing</sub>
Cis-1,2-Dichloroethene	N/A	93 mg/L <sup>SWG</sup> <sub>Ing</sub>
Tetrachloroethene	N/A	2.15 mg/L <sup>SWG</sup> <sub>Ing</sub>
Trans-1,2-Dichloroethene	N/A	93 mg/L <sup>SWG</sup> <sub>Ing</sub>

Chromium	N/A	1.05 mg/L <sup>SWGWI</sup> ng
Hexavalent chromium	N/A	0.071 mg/L <sup>SWGWI</sup> ng
2. AOC 18- Trichloroethene area (Protective of Ground Water)		
Trichloroethene	2.500 <sup>AAL</sup>	0.005 mg/L <sup>GWGI</sup> ng
1,1,1-Trichloroethane	N/A	0.200 mg/L <sup>GWGI</sup> ng
1,1,2-Trichloroethane	N/A	0.005 mg/L <sup>GWGI</sup> ng
1,1-Dichloroethene	N/A	0.007 mg/L <sup>GWGI</sup> ng
1,1-Dichloroethane	N/A	4.900 mg/L <sup>GWGI</sup> ng
Vinyl Chloride	0.040 <sup>AAL</sup>	0.002 mg/L <sup>GWGI</sup> ng
1,2-Dichloroethane	N/A	0.005 mg/L <sup>GWGI</sup> ng
Cis-1,2-Dichloroethene	0.767 <sup>AAL</sup>	0.070 mg/L <sup>GWGI</sup> ng
Benzene	N/A	0.005 mg/L <sup>GWGI</sup> ng
Carbon tetrachloride	N/A	0.005 mg/L <sup>GWGI</sup> ng
Chlorobenzene	N/A	0.100 mg/L <sup>GWGI</sup> ng
Ethylbenzene	N/A	0.700 mg/L <sup>GWGI</sup> ng
Tetrachloroethene	N/A	0.005 mg/L <sup>GWGI</sup> ng
Trans-1,2-Dichloroethene	N/A	0.100 mg/L <sup>GWGI</sup> ng
<p>Foot Note:          POC: Point of Compliance; AMP: Attenuation Monitoring Points; APOE: Alternate Point of Exposure          ATTB: Attachment B          *Represents the highest Attenuation Action Level (AAL) for this plume segment. However, for demonstrating compliance with Section II.F.3. the AAL calculated for the specific AMP well will be used for comparison.</p>		

**CORRECTIVE ACTION ORDER**

**TABLE IV**

Designation of Wells

ALTERNATE POINT OF EXPOSURE (POE) WELLS

1. AOC-18: Trichloroethene Area (Downgradient of East PRB – Protective of Surface Water)  
Well Nos. DWP-2-9  
DWP-2-18  
DWP-2-19  
DWP-2-20
2. AOC-18: Trichloroethene Area (Protective of Surface Water)  
Well Nos. DWP-2-6  
DWP-1-11  
DWP-OFF-12  
DWP-2-22
3. AOC-18: Trichloroethene Area (Protective of Tier 1 GW PCLs)  
Well Nos. DWP-10-DW8  
DWP-10-DW9  
799E156UMW  
799E157UMW  
799E159LMW  
DWP-10-10  
79915MW  
799E160LMW  
DWP-2-DW1  
DWP-2-7  
DWP-2-21  
DWP-OFF-13  
DWP-BG-8  
DWP-OFF-9  
DWP-BG-5  
DWP-S6-6  
DWP-2-15

POINT OF EXPOSURE WELLS “Reserved”

BACKGROUND WELLS

DWP-L2-25  
DWP-S8-1  
DWP-BG-3

Note: Wells and piezometers identified on Attachment B Maps that are not listed in this Table are subject to change, upon approval by the Executive Director, as part of the reporting requirements of Provision II of this Order, without modification to the Corrective Action Order.

**CORRECTIVE ACTION ORDER**  
**TABLE V**  
**REPORTING REQUIREMENTS**

ITEM	PROGRAM	REPORTING FREQUENCY	REQUIREMENTS
1.	Corrective Action	Every three (3) years	Post-Response Action Care Report for the Groundwater Corrective Action System;
2.	Corrective Action	Annually for the first five (5) years following remedy construction	Annual inspection reports to document inspection results of the Mountain Creek Lake Sediment Cap Corrective Action System;
3.	Corrective Action	Every five (5) years	Post-Response Action Care Report for the Mountain Creek Lake Sediment Cap Corrective Action System;
4.	Corrective Action	Annual  January 21	A table of all modifications and amendments made to this Corrective Action Order (CAO) with their corresponding approval dates by the Executive Director or the Commission and a brief description of each action;
5.	Corrective Action	Every three (3) years for the Groundwater Corrective Action System; Every five (5) years for the Mountain Creek Lake Sediment Cap Corrective Action System;	A summary of any activity within an area subject to institutional control;
6.	Corrective Action	Every three (3) years	Tabulation of well casing elevations consistent with Attachment C;

7.	Corrective Action	Every three (3) years	Certification and well installation diagram for any new or replacement well installation and certification for any well plugging and abandonment;
8.	Corrective Action	Annual January 21	Recommendation for any changes to the program;
9.	Corrective Action	Annual January 21	Any other items requested by the Executive Director;
10.	Corrective Action	Every three (3) years	The Navy shall prepare water table maps from the ground-water data collected pursuant to <u>Provision II.F.</u> and shall evaluate by the following parameters: a. Development and maintenance of a cone of depression during operation of the system (if applicable); b. Direction and gradient of groundwater flow; c. Effectiveness of hydrodynamic control of the contaminated zone during operation (if applicable); d. Delineation of the radius of influence of the Corrective Action System; and, e. Estimation of the rate and direction of groundwater contamination migration (if applicable);
11.	Corrective Action	Every three (3) years for the Groundwater Corrective Action System; Every five (5) years for the Mountain Creek Lake Sediment Cap Corrective Action System;	The Navy shall submit a report to each recipient listed in <u>Provision I.A.11.</u> , and include information in Items 3 through 29 as determined since the previously submitted report, if those Items are applicable.

12.	Corrective Action	Every three (3) years for the Groundwater Corrective Action System; Every five (5) years for the Mountain Creek Lake Sediment Cap Corrective Action System;	The Navy shall implement the Corrective Action System(s) authorized under <u>Provision II.B.3.</u> in operation during the reporting period and submit a narrative summary of the evaluations made consistent with <u>Provisions II.E, II.F., and II.G.</u> of this Order for the preceding reporting period (if applicable).
13.	Corrective Action	Every three (3) years	The Navy shall provide an updated table and map of all monitoring and corrective action system wells. The Navy shall sample those wells proposed in the CAO Application referenced in <u>Provision I.B.4.</u> consistent with any changes to the monitoring and remediation systems which the Executive Director may have subsequently approved pursuant to <u>Provision II.B.3.</u> The Navy shall provide, in chronological order, a list of those wells which it has added to or deleted from the groundwater monitoring and remediation systems since original issuance of this CAO. The Navy shall include the date of the Commission's approval for each entry.
14.	Corrective Action	Every three (3) years	The Navy shall submit a tabulation of all data evaluation results pursuant to <u>Provision II.F.4.,</u> as well as the status of each well with regard to compliance with the Corrective Action objectives and compliance with the GWPS; The Navy shall provide copies of the original laboratory report for chemical analyses showing detection limits and quality control and quality assurance data if requested by the Executive Director;
15.	Corrective Action	Every three (3) years	The Navy shall submit a tabulation of all water level elevations required in <u>Provision II.F.3.d.(1).</u> depth to water measurements, and total depth of well measurements collected since the last tabulation of data reflected in the previous monitoring report ;

16.	Corrective Action	Every three (3) years for the Ground Water Corrective Action System; Every five (5) years for the Mountain Creek Lake Sediment Cap Corrective Action System;	The Navy shall submit an updated summary as required by <u>Table II</u> (if applicable);
17.	Corrective Action	Every three (3) years for the Ground Water Corrective Action System; Every five (5) years for the Mountain Creek Lake Sediment Cap Corrective Action System;	The Navy shall submit a summary of any changes made to the monitoring/corrective action program and a summary of well inspections, repairs, and any operational difficulties;
18.	Corrective Action	Every three (3) years	The Navy shall submit a notation of the presence or absence of non-aqueous phase liquids (NAPLs), both light and dense phases, in each well during each sampling event since the last event covered in the previous monitoring report and since the last tabulation of depth and thickness of NAPLs, if detected;

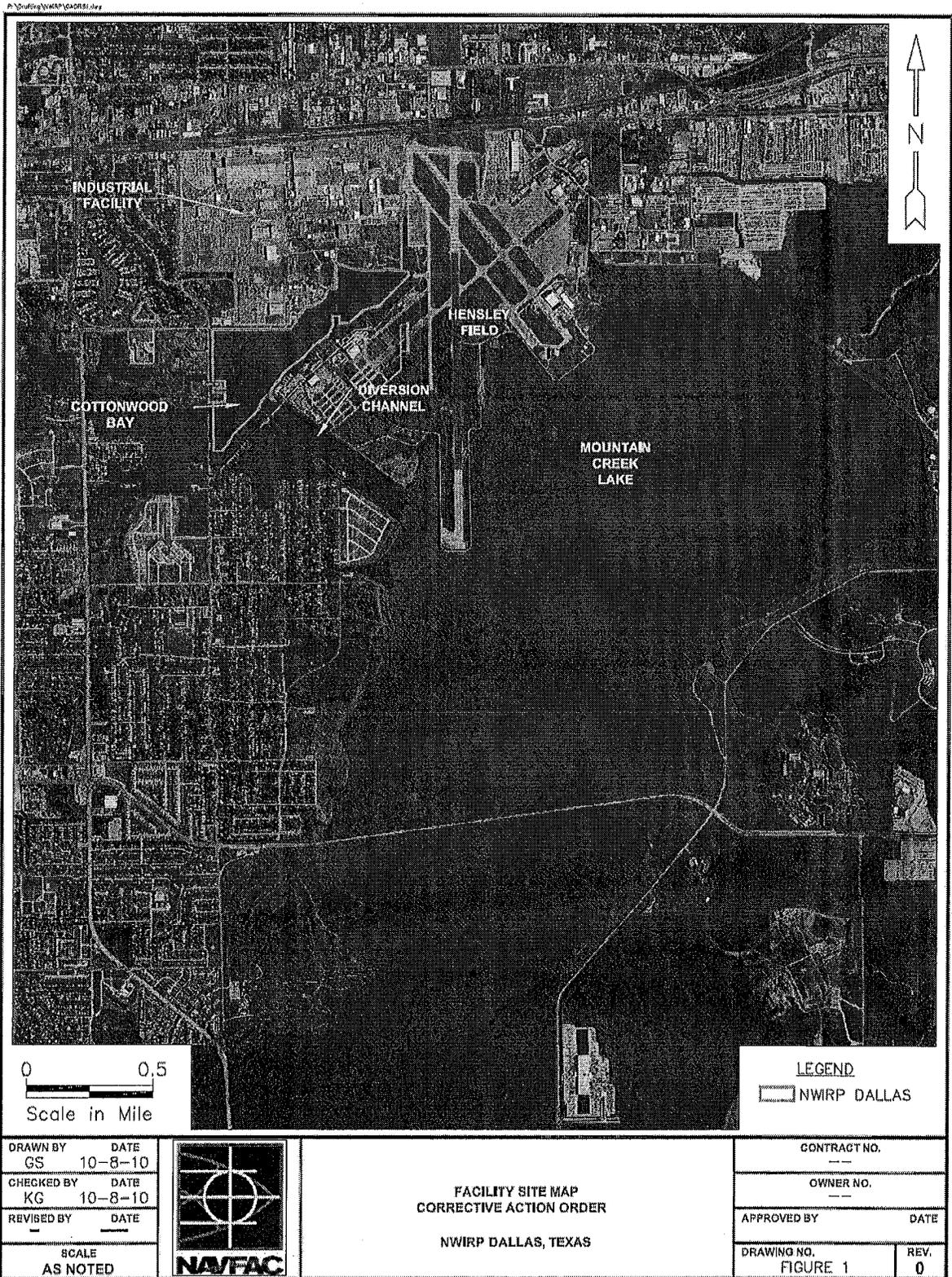
19.	Corrective Action	Semiannual	The Navy shall submit maps of the contaminated area where GWPSs are exceeded depicting concentrations of <u>Table IIIA</u> constituents and any newly detected <u>Table III</u> constituents as isopleth contours or discrete concentrations if isopleth contours cannot be inferred. The Navy shall clearly delineate areas where concentrations of constituents exceed the GWPS and shall depict the boundary of the plume management zone (PMZ), if applicable;
20.	Corrective Action	Every three (3) years	The Navy shall submit maps and tables indicating the extent and thickness of the NAPLs both light and dense phases, if detected;
21.	Corrective Action	Every three (3) years for the Ground Water Post-Response Action Care Report; Every five (5) years for the Mountain Creek Lake Sediment Cap Corrective Action System Post-Response Action Care Report;	The Navy shall submit the Corrective Measures Implementation (CMI) Progress Report, Response Action Effectiveness Report, Response Action Completion Report, or Post-Response Action Care Report, as applicable. The Navy will include a narrative summary of the status of the approved final corrective measures conducted consistent with the approved CMI Work Plan or RAP. The summary shall include an evaluation of whether the attenuation action levels are not exceeded at their respective attenuation monitoring points pursuant to 30 TAC §350.33(f)(4)(A) and §350.33(f)(4)(D)(ii), if applicable, and a statement that it is meeting the requirements of <u>Provisions I.A.8 and II.H.7.</u> In addition, the Navy shall provide an updated version of Table I to reflect current status/progress of SWMUs and/ or AOCs undergoing corrective action as specified above.
22.	Corrective Action	Every three (3) years	The Navy shall include a narrative summary of the status of each Solid Waste Management Unit (SWMU) and/or Area of Concern (AOC) subject to the requirements of <u>Provision II.H.</u> and shall include an ICM Program for a SWMU and/or AOC which documents that the Navy is not achieving the objectives of <u>Provision II.H.8.b.</u> This summary shall be included as a section of the Groundwater Post-Response Action Care Report.

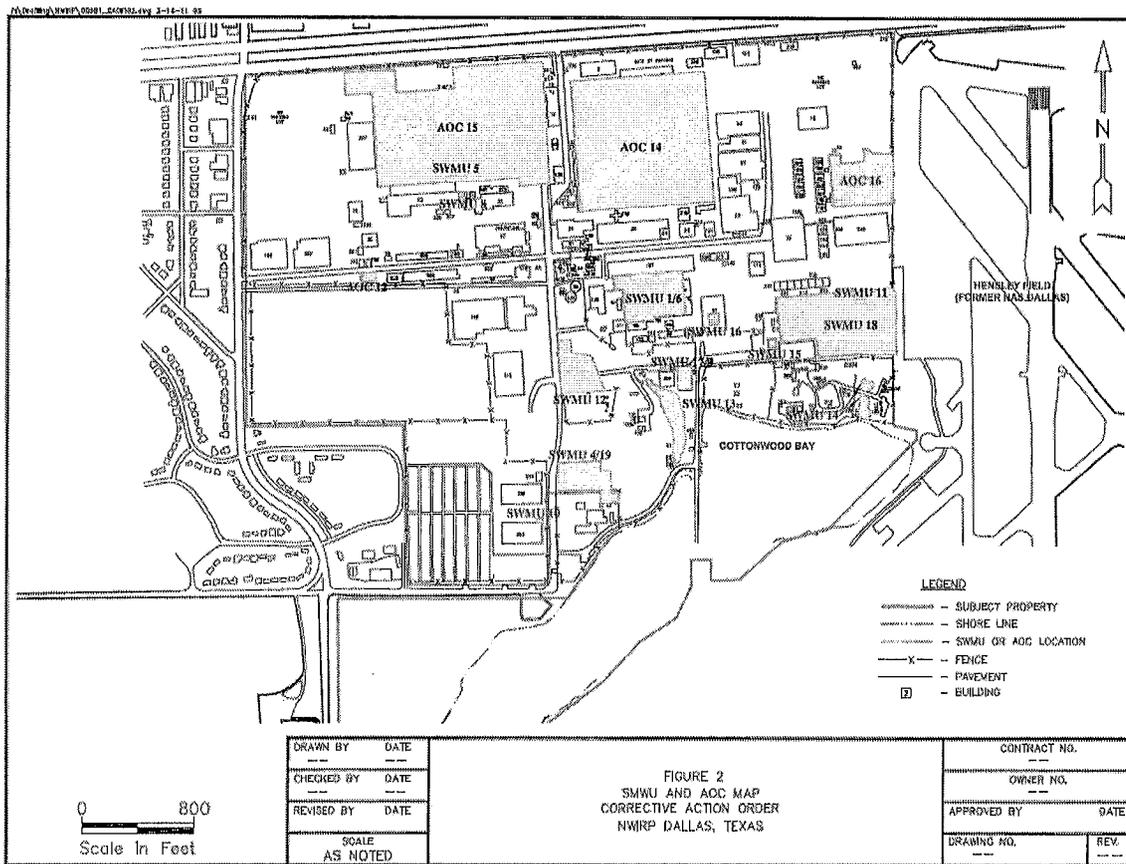
23.	PMZ	Every three (3) years	The Navy shall submit an estimate of the percentage of the response action which has been completed within the PMZ, if applicable;
24.	PMZ	Every three (3) years	The Navy shall submit an estimate in years of the additional time necessary to complete the response actions for the PMZ, if applicable;
25.	PMZ	Every three (3) years	The Navy shall submit a determination as to whether it is making sufficient progress to achieve the selected remedy standard within a reasonable time frame given the circumstance of the affected property in the PMZ, if applicable.

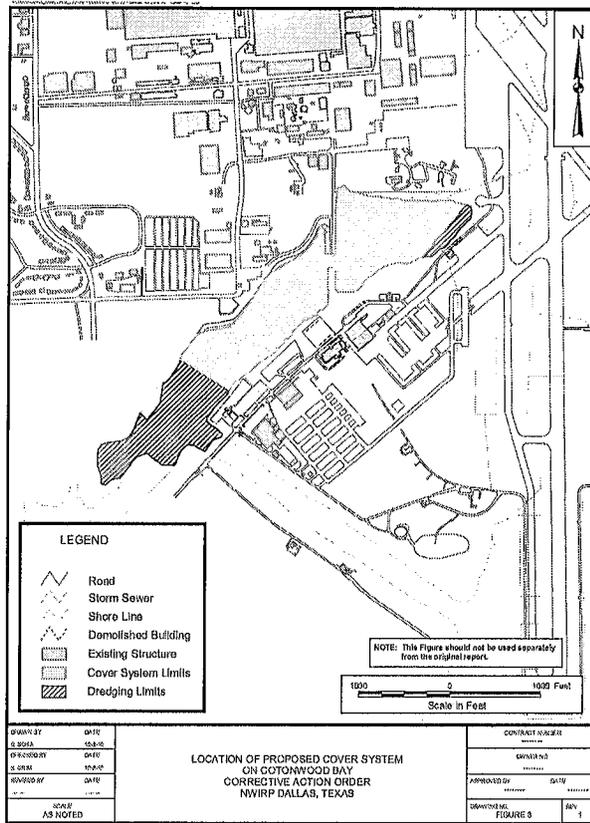
**CORRECTIVE ACTION ORDER**

**ATTACHMENT B**

**FACILITY MAPS**

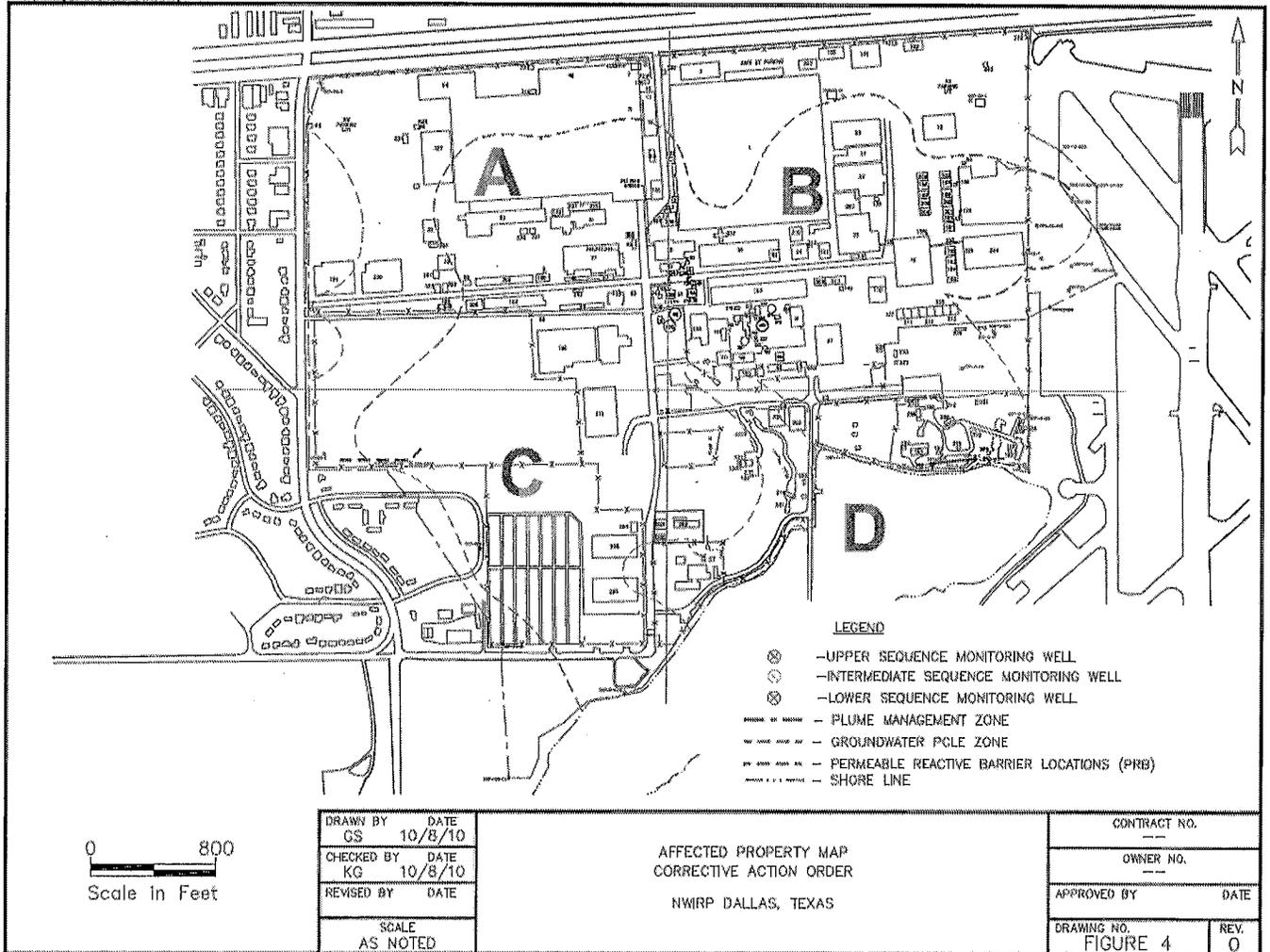


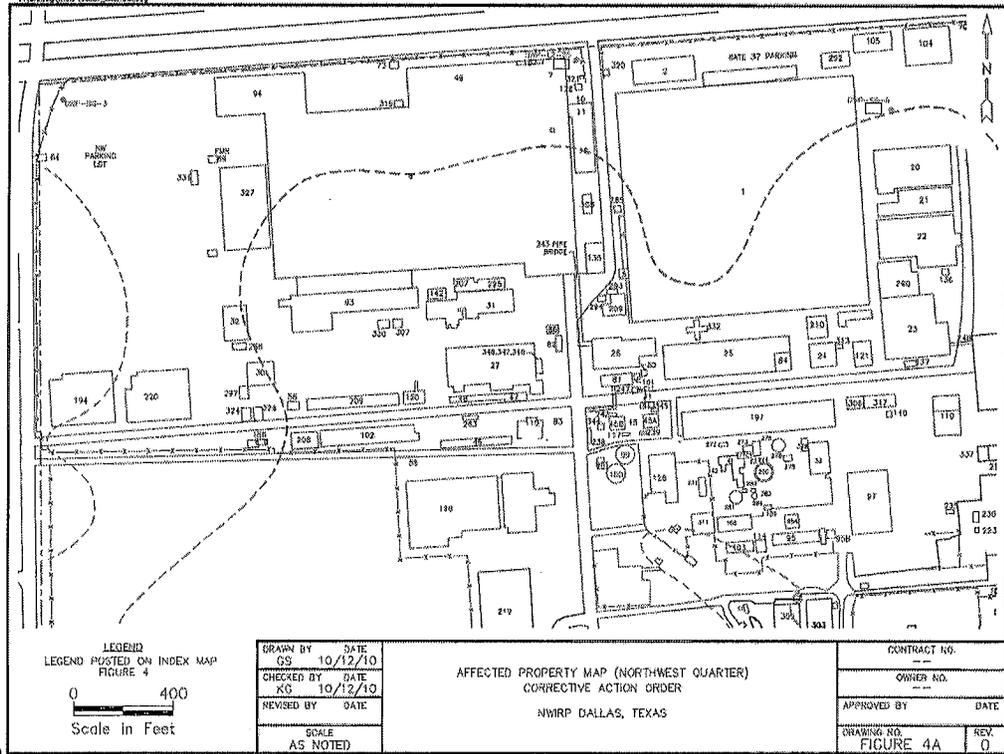




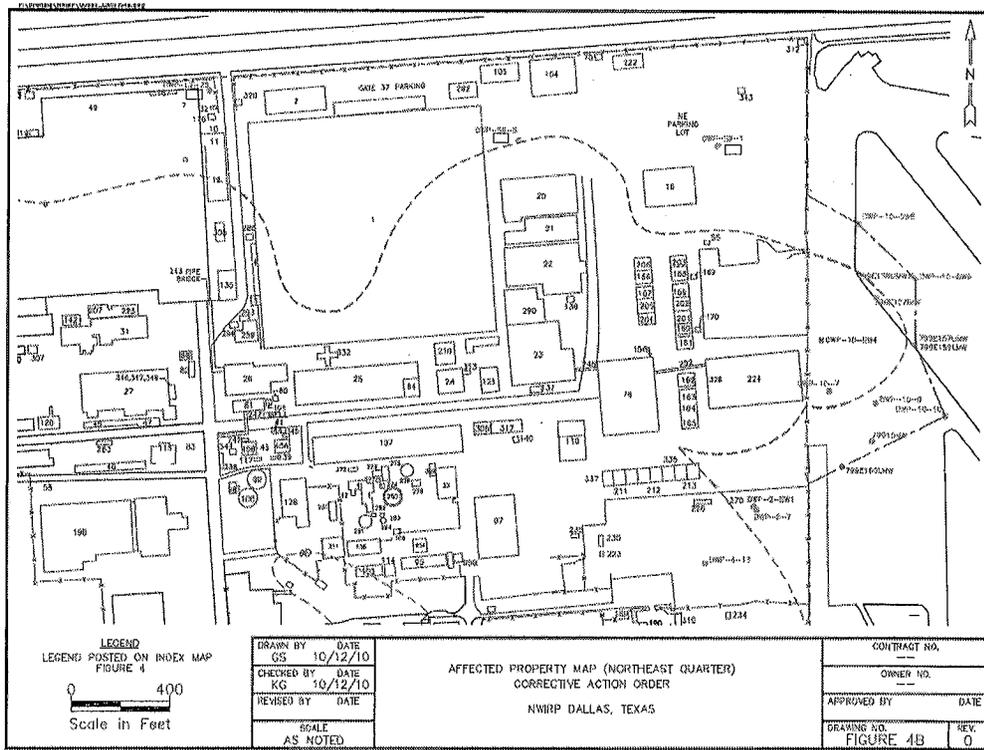
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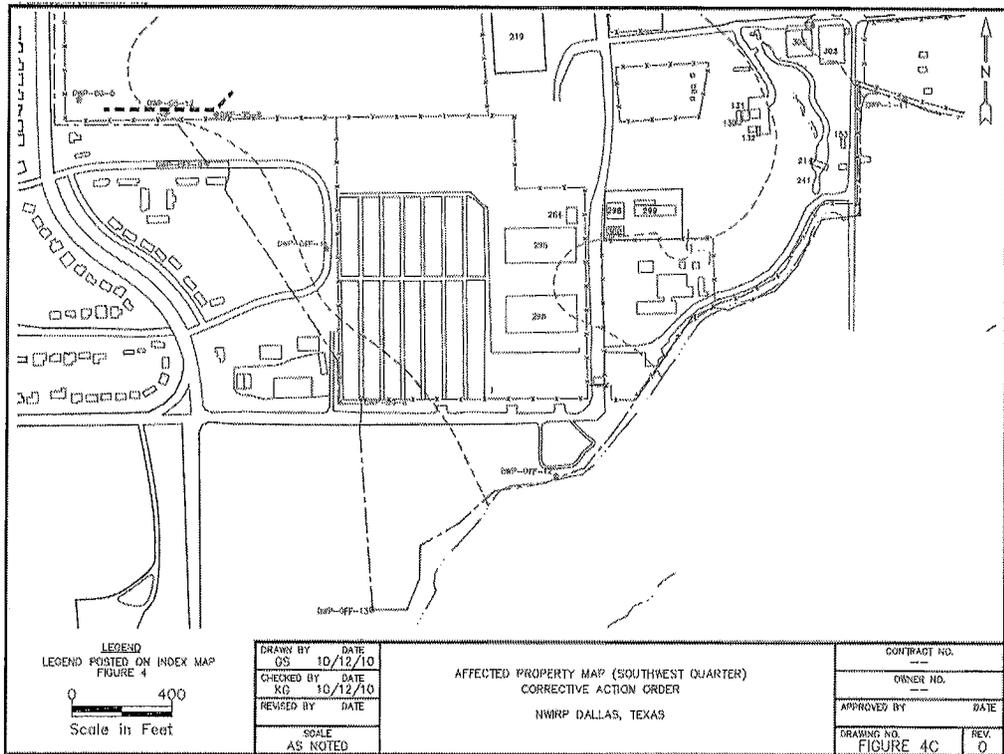


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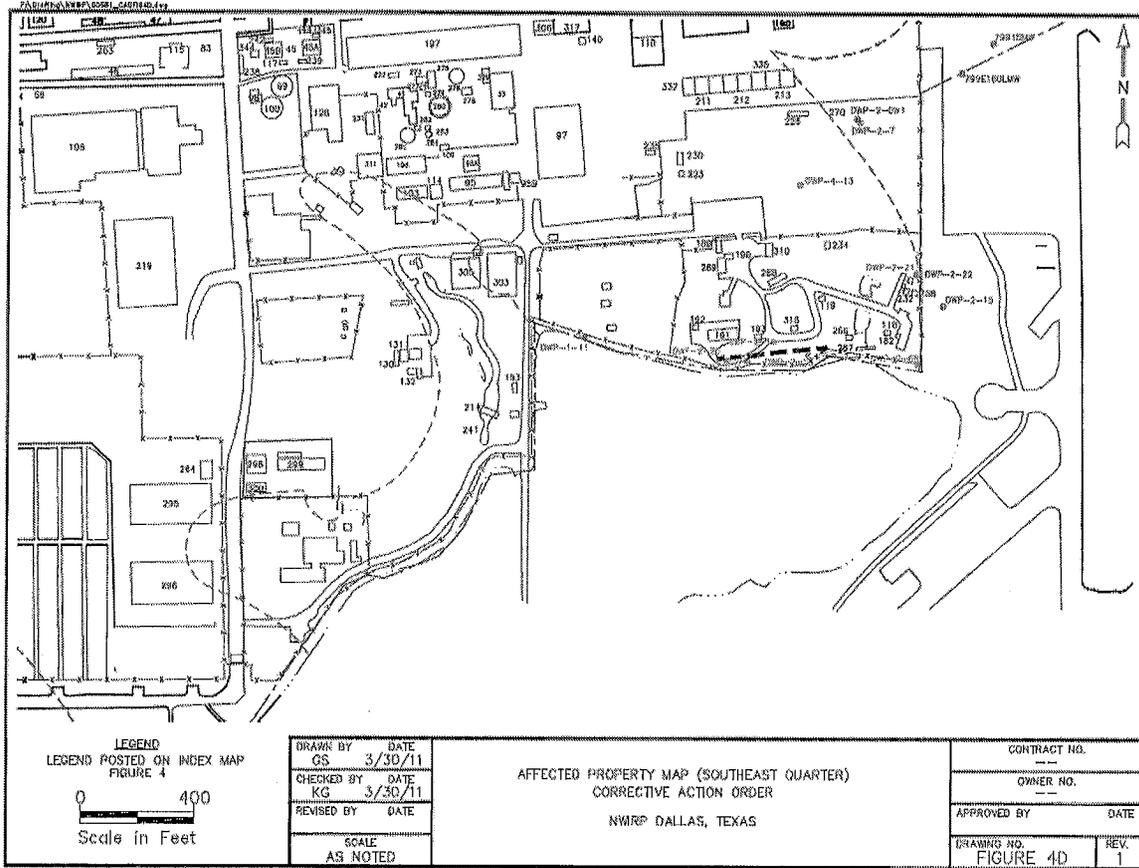
DRAWN BY	DATE
GS	10/12/10
CHECKED BY	DATE
KG	10/12/10
REVISED BY	DATE
SCALE AS NOTED	

AFFECTED PROPERTY MAP (NORTHEAST QUARTER)  
 CORRECTIVE ACTION ORDER  
 NWIRP DALLAS, TEXAS

CONTRACT NO.	
OWNER NO.	
APPROVED BY	DATE
DRAWING NO.	REV.
FIGURE 4B	0



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**CORRECTIVE ACTION ORDER**  
**ATTACHMENT C**

**WELL DESIGN, CONSTRUCTION, INSTALLATION, CERTIFICATION,  
PLUGGING AND ABANDONMENT PROCEDURES AND SPECIFICATIONS**

1. The Navy shall use well drilling methods that minimize potential adverse effects on the quality of water samples withdrawn from the well and that minimize or eliminate the introduction of foreign fluids into the borehole.
2. The Navy shall construct all wells to meet the terms of this Corrective Action Order (CAO) such that the wells can be routinely sampled with a pump, bailer, or alternate sampling device. NAVFAC SE shall fit the piping associated with recovery wells with sample ports or an acceptable alternative sampling method to facilitate sampling of the recovered groundwater on a well-by-well basis.
3. Above the saturated zone, The Navy may use the well casing two (2)-inch in diameter, use larger schedule 40 or 80 polyvinyl chloride (PVC) rigid pipe or stainless steel or polytetrafluoroethylene (PTFE or "teflon") or an approved alternate material. The PVC casing must bear the National Sanitation Foundation logo for potable water applications (NSF-pw). The Navy shall not use solvent cementing compounds to bond joints and shall use flush-threaded connections. In and below the saturated zone, the well casing shall be stainless steel or PTFE.

The Navy may use PVC or fiberglass reinforced resin as an alternate well casing material in and below the saturated zone provided that it yields samples for groundwater quality analysis that are unaffected by the well casing material.

4. The Navy shall replace any well that has deteriorated due to incompatibility of the casing material with the groundwater contaminants or due to any other factors. Replacement of the damaged well shall be completed within ninety (90) days of the date of the inspection that identified the deterioration.
5. Well casings and screens shall be steam cleaned prior to installation to remove all oils, greases, and waxes. Well casings and screens made of fluorocarbon resins shall be cleaned by detergent washing.
6. For wells constructed after the date of issuance of this CAO, the screen length shall not exceed ten (10) feet within a given transmissive zone unless otherwise approved by the Executive Director. Screen lengths exceeding ten (10) feet may be installed in groundwater recovery or injection wells to optimize the groundwater remediation process consistent with standard

engineering practice.

7. The Navy shall design and construct the intake portion of a well so as to allow sufficient water flow into the well for sampling purposes and minimize the passage of formation materials into the well during pumping. The intake portion of a well shall consist of commercially manufactured stainless steel or PTFE screen or approved alternate material. The annular space between the screen and the borehole shall be filled with clean siliceous granular material (i.e., filter pack) that has a proper size gradation to provide mechanical retention of the formation sand and silt. The well screen slot size shall be compatible with the filter pack size as determined by sieve analysis data. The filter pack should extend no more than three (3) feet above the well screen. A silt trap, no greater than one (1) foot in length, may be added to the bottom of the well screen to collect any silt that may enter the well. The bottom of the well casing shall be capped with PTFE or stainless steel or approved alternate material.

Groundwater recovery and injection wells shall be designed consistent with standard engineering practice to ensure adequate well production and accommodate ancillary equipment. Silt traps exceeding one (1) foot may be utilized to accommodate ancillary equipment. Well heads shall be fitted with mechanical wellseals, or equivalent, to prevent entry of surface water or debris.

8. A minimum of two (2) feet of pellet or granular bentonite shall immediately overlie the filter pack in the annular space between the well casing and borehole. Where the saturated zone extends above the filter pack, pellet or granular bentonite shall be used to seal the annulus. The bentonite shall be allowed to settle and hydrate for a sufficient amount of time prior to placement of grout in the annular space. Above the minimum two (2)-foot thick bentonite seal, the annular space shall be sealed with a cement/bentonite grout mixture. The grout shall be placed in the annular space by means of a tremie pipe or pressure grouting methods equivalent to tremie grouting standards.

The cement/bentonite grout mixture or TCEQ approved alternative grout mixture shall fill the annular space to within two (2) feet of the surface. A suitable amount of time shall be allowed for settling to occur. The annular space shall be sealed with concrete, blending into a cement apron at the surface that extends at least two (2) feet from the outer edge of the monitor well for above-ground completions. Alternative annular-space seal material may be proposed with justification and must be approved by the Executive Director prior to installation.

In cases where flush-to-ground completions are unavoidable, a protective

structure such as a utility vault or meter box should be installed around the well casing and the concrete pad design should prevent infiltration of water into the vault. In addition, The Navy must ensure that 1) the well/cap juncture is watertight; 2) the bond between the cement surface seal and the protective structure is watertight; and 3) the protective structure with a steel lid or manhole cover has a rubber seal or gasket.

9. Water added as a drilling fluid to a well shall contain no bacteriological or chemical constituents that could interfere with the formation or with the chemical constituents being monitored. For groundwater recovery and injection wells, drilling fluids containing freshwater and treatment agents may be utilized consistent with standard engineering practice to facilitate proper well installation. In these cases, the water and agents added should be chemically analyzed to evaluate their potential impact on in-situ water quality and to assess the potential for formation damage. All such additives shall be removed to the extent practicable during well development.
10. Upon completion of installation of a well, the well must be developed to remove any fluids used during well drilling and to remove fines from the formation to provide a particulate-free discharge to the extent achievable by accepted completion methods and by commercially available well screens. Development shall be accomplished by reversing flow direction, surging the well or by air lift procedures. No fluids other than formation water shall be added during development of a well unless the aquifer to be screened is a low-yielding water-bearing aquifer. In these cases, the water to be added should be chemically analyzed to evaluate its potential impact on in-situ water quality, and to assess the potential for formation damage.

For recovery and injection wells, well development methods may be utilized consistent with standard engineering practice to remove fines and maximize well efficiency and specific capacity. Addition of freshwater and treatment agents may be utilized during well development or re-development to remove drilling fluids, inorganic scale or bacterial slime. In these cases, the water and agents added should be chemically analyzed to evaluate their potential impact on in-situ water quality and to assess the potential for formation damage. All such additives shall be removed to the extent practicable during well development.

11. The Navy shall secure and design each well to maintain the integrity of the well borehole and groundwater.
12. The Navy shall protect the above-ground portion of the well by bumper guards and/or metal outer casing protection when wells are located in traffic areas or outside the secured plant area.

13. The Navy shall keep on site copies of drilling and construction details demonstrating compliance with the items of this provision. This record shall include the following information:
  - . name/number of well (well designation);
  - . intended use of the well(sampling, recovery, etc.);
  - . date of construction;
  - . drilling method and drilling fluid used;
  - . well location (+ 0.5 ft.);
  - . bore hole diameter and well casing diameter;
  - . well depth (+ 0.1 ft.);
  - . drilling and lithologic logs;
  - . depth to first saturated zone;
  - . casing materials;
  - . screen materials and design;
  - . casing and screen joint type;
  - . screen slot size/length;
  - . filter pack material/size;
  - . filter pack volume (how many bags, buckets, etc.);
  - . filter pack placement method;
  - . sealant materials;
  - . sealant volume (how many bags, buckets, etc.);
  - . sealant placement method;
  - . surface seal design and construction;
  - . well development procedure;
  - . type of protective well cap;
  - . ground surface elevation (+ 0.01 ft. MSL);
  - . top of casing elevation (+ 0.01 ft. MSL); and,
  - . detailed drawing of well (include dimensions).
14. The Navy shall clearly mark and maintain the well number on each well at the site.
15. The Navy shall measure and keep a record of the elevation of the top of each well casing in feet above mean sea level to the nearest 0.01 foot and permanently mark the measuring point on the well. THE NAVY shall compare old and new elevations from previously surveyed wells and determine a frequency of surveying not to exceed five (5) year intervals.
16. The Navy shall appropriately design and install a screened interval for each well to meet the well's specific objective (i.e., either DNAPL, LNAPL, both, or other objective of the well). The Navy shall drill all wells designed to detect, monitor, or recover DNAPL to intercept the bottom confining layer of the aquifer. The screened interval to detect DNAPL must extend from the top of the lower confining layer to above the portion of the aquifer saturated with

DNAPL. The screened interval for all wells designed to detect, monitor, or recover LNAPL must extend high enough into the vadose zone to provide for fluctuations in the seasonal water table. In addition, the sandpacks for the recovery or monitoring well's screened interval shall be coarser than surrounding media to ensure the movement of NAPL to the well.

#### Certification, Plugging and Abandonment Procedures

17. Prior to installation of a Point of Compliance (POC), Point of Exposure (POE), Alternate Point of Exposure (APOE) or Background replacement well listed in Table IV, the Navy shall submit for Executive Director approval the replacement well specifications and an explanation of why the well is being replaced. For any such well to be considered as a replacement well and not as a new well, the Executive Director must determine that the well has no substantive design changes from the well being replaced, as determined by the Executive Director. The Navy shall drill the well within fifteen (15) feet of the well being replaced unless location the Executive Director authorizes an alternate location. The Navy shall submit a replacement well certification to the Executive Director consistent with Table V and Attachment C, Provision 19 of the CAO.
18. Plugging and abandonment of a Background, POC, FBOC, POE, and/or APOE wells are subject to the modification provisions in 30 TAC Chapter 305, Subchapter D. Plugging and abandonment of Observation wells, Corrective Action System wells, and/or Attenuation Monitoring Point wells shall commence upon written approval of the Executive Director. The Navy shall plug and abandon the well consistent with requirements of Attachment C. The Navy shall certify proper plugging and abandonment consistent with Table V and Attachment C, Provision 19 of the CAO.
19. The Navy shall complete construction or plugging and abandonment of each well consistent with the requirements of this CAO and 16 TAC Chapter 76 and shall certify such proper construction or plugging and abandonment in the first report submitted pursuant to Table V following installation or plugging and abandonment. The Navy shall include well completion logs for each newly installed or replaced well with the report. A qualified geologist or geotechnical engineer shall prepare the certification. Each well certification shall be accompanied by a certification report, including an accurate log of the soil boring which thoroughly describes and depicts the location, elevations, material specifications, construction details, and soil conditions encountered in the boring for the well. The Navy shall keep a copy of the certification and certification report on-site and shall submit a second copy to the Executive Director. Required certification shall be in the following format, edited as appropriate, and shall specify the CAO Number as indicated:

"This is to certify that installation [or plugging and abandonment] of the following facility components authorized or required by TCEQ CAO No. 31268 has been completed, and that construction [or plugging] of said components has been performed consistent with and in compliance with the design and construction specifications of this CAO No.: 31268. [Add description of facility components with reference to applicable CAO provisions.]"

20. The Navy may replace wells at any time the Navy or the Executive Director determines that the well integrity, materials of construction, or well placement no longer enables the well to yield samples representative of groundwater quality.
21. After issuance of the CAO, the Navy shall plug soil test borings and wells removed from service with a cement or bentonite grout mixture so as to prevent the preferential migration of fluids in the area of the borehole. The Navy shall report the certification of each plugging consistent with Attachment C, Provision 19 of the CAO. The plugging of wells shall be consistent with 16 TAC Chapter 76 dealing with Well Drilling, Completion, Capping and Plugging.

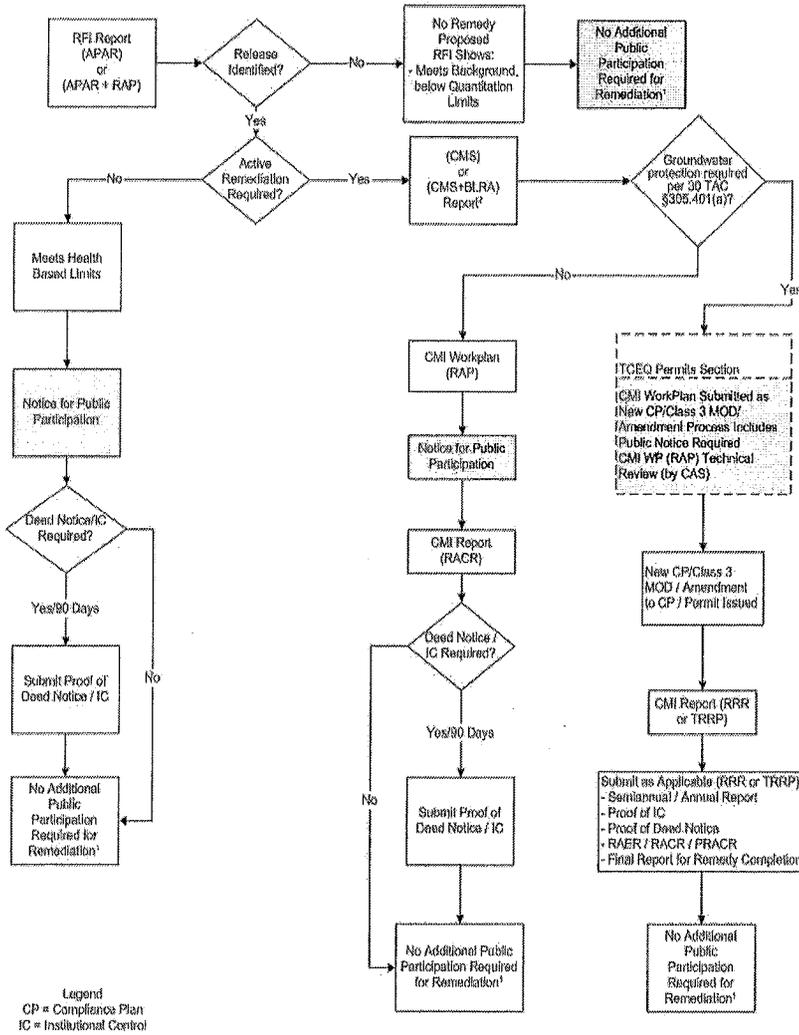
**CORRECTIVE ACTION ORDER**

**ATTACHMENT D**

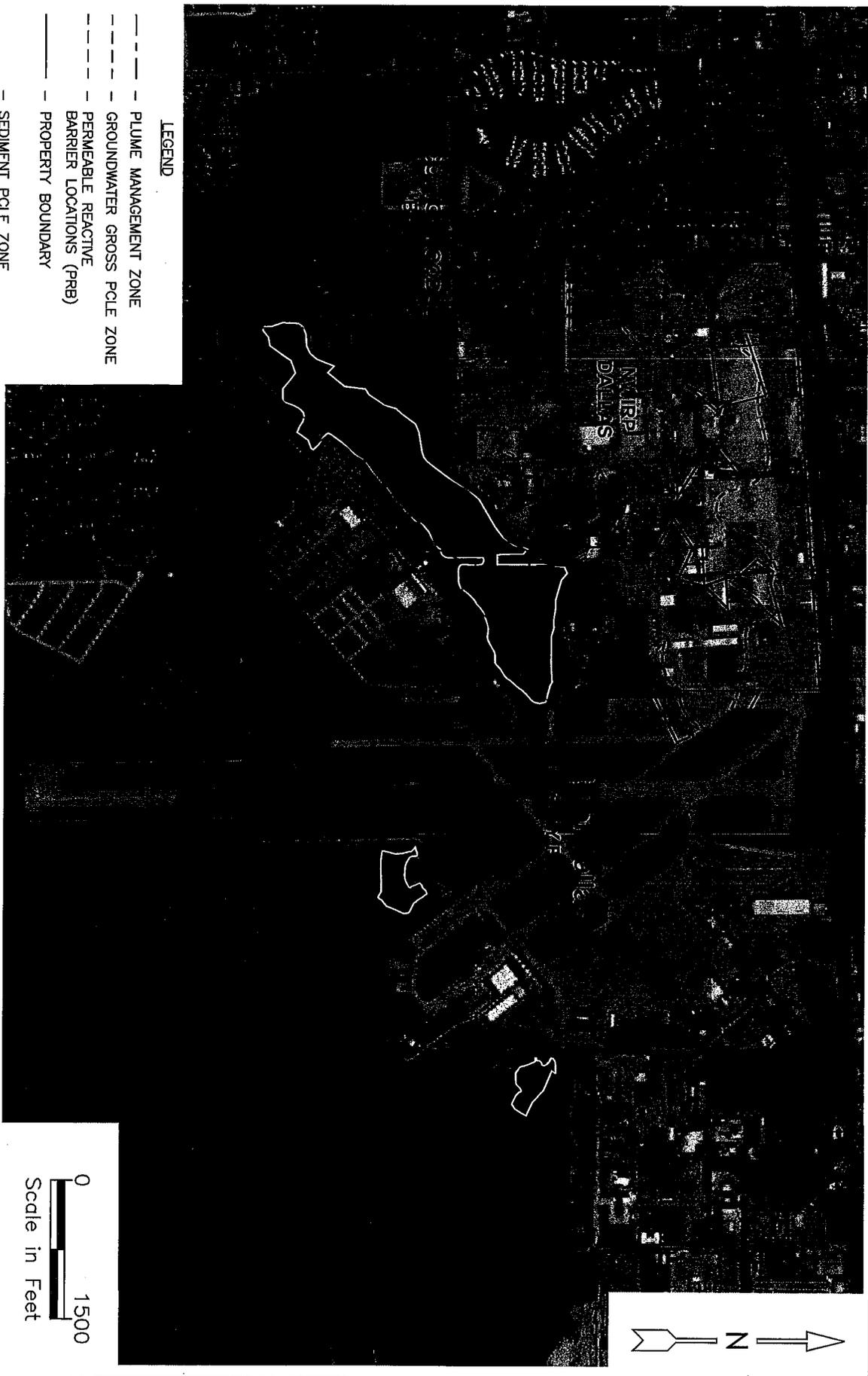
**FLOW CHART SHOWING PROCESS FOR  
PUBLIC PARTICIPATION IN HSWA  
CORRECTIVE ACTION**

Public Participation in HSWA Corrective Action

01/22/2005



251658240  
 1 To Incorporate a Status Change to RFI unit(s) in the Permit or CP Requires Modification and Public Notice through the Permits Section  
 2 As Required by Rule, Permit, or CP

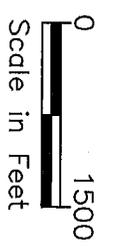


**LEGEND**

- PLUME MANAGEMENT ZONE
- GROUNDWATER GROSS PCLE ZONE
- PERMEABLE REACTIVE BARRIER LOCATIONS (PRB)
- PROPERTY BOUNDARY
- SEDIMENT PCLE ZONE
- FORMER <sup>TOT</sup>SOIL <sub>COUP</sub> ZONES
- <sup>CH</sup>SOIL <sub>ING</sub> PCLE ZONES

DRAWN BY	DATE
GS	3/31/11
CHECKED BY	DATE
KG	3/31/11
REVISED BY	DATE
SCALE AS NOTED	

SOIL, GROUNDWATER, AND SEDIMENT MAP  
REMEDIAL ACTION AREAS  
NWIRP DALLAS, TEXAS



CONTRACT NO.	112600581
OWNER NO.	CTO 0057
APPROVED BY	DATE
DRAWING NO.	REV.
FIGURE 1	0

TABLE I

RESPONSE ACTION AND POST-RESPONSE ACTION CARE SUMMARY FOR SOLID WASTE MANAGEMENT UNITS (SWMUS) AND AREAS OF CONCERN (AOCs)

SWMU or AOC	Site Name	Remedial Action Tasks	Residual Contaminants of Concern (COCs)	Response Action Status	Response Action Goals	Post-Response Action Care Goals	Reference
AOC 18	TCE Area	<p>Three groundwater pump and treat systems were installed in 1996 to stop offsite migration of contaminated groundwater and operated until 2008 when the three systems were decommissioned and two of them were replaced by two zero valent iron permeable reactive barriers. The migration of the VOC plume in the area of AOC 16 (described above) is limited by the downgradient direction by existing geologic barriers. Also, soil exceeding PCLs were excavated to a depth of 5 feet below ground surface in source areas and backfilled with clean soil in 2007-2008.</p>	<p><b>Groundwater:</b>                      1,1,1-Trichloroethane - 8.0 mg/L                      1,1,2-Trichloroethane - 0.011 mg/L                      1,1-Dichloroethane - 10mg/L                      1,1-Dichloroethylene - 20 mg/L                      1,2-Dichloroethane - 0.13 mg/L                      Aroclor (total) - 0.016 mg/L                      Benzene - 0.015 mg/L                      Benzo(a)anthracene - 0.004 mg/L                      Benzo(e)pyrene - 0.003 mg/L                      Carbon Tetrachloride - 0.009 mg/L                      Chlorobenzene - 0.480 mg/L                      Chromium (hexavalent) - 0.8 mg/L                      Chromium (total) - 0.81 mg/L                      cis-1,2-Dichloroethylene - 3.8 mg/L                      Ethylbenzene - 0.96 mg/L                      Pentachlorophenol - 0.002 mg/L                      Tetrachloroethylene - 0.13 mg/L                      Trans-1,2-Dichloroethane - 0.430 mg/L                      Trichloroethylene - 29 mg/L                      Vinyl Chloride - 0.49 mg/L</p>	<p>Analytical data and other studies indicate the plume shape is currently stable and not increasing in concentration or expanding downgradient. Per the Groundwater RAP, a Plume Management Zone (PMZ) will be established to prevent access to groundwater in the affected area. Two Zero Valent Iron (ZVI) Permeable Reactive Barrier (PRB) walls have been installed as physical control measures to prevent migration of COCs beyond the PMZ toward residential properties and Cottonwood Bay to the south. Per the RAP, the remedy includes annual groundwater monitoring for thirty years and maintenance of PRBs approximately every 10-15 years. The RAP was approved by the TCEQ in May 2010.</p>	<p>• Establishment of a PMZ that will prohibit shallow groundwater extraction and installation of wells for potable use or irrigation on the Subject Property.                      • Restrict land use to commercial and/or industrial use only.                      • Document use of physical controls (the ZVI PRBs and monitoring) to control migration of COCs beyond the PMZ boundary.  <b>Groundwater (30"GW<sub>mg</sub>):</b>                      1,1,1-Trichloroethane - 0.2 mg/L                      1,1,2-Trichloroethane - 0.005 mg/L                      1,1-Dichloroethane - 4.9 mg/L                      1,1-Dichloroethylene - 0.007 mg/L                      1,2-Dichloroethane - 0.005 mg/L                      Aroclor (total) - 0.0005 mg/L                      Benzene - 0.005 mg/L                      Benzo(a)anthracene - 0.00125 mg/L                      Benzo(a)pyrene - 0.0002 mg/L                      Carbon Tetrachloride - 0.005 mg/L                      Chlorobenzene - 0.100 mg/L                      Chromium (hexavalent) - 0.1 mg/L                      Chromium (total) - 0.1 mg/L                      cis-1,2-Dichloroethylene - 0.070 mg/L                      Ethylbenzene - 0.700 mg/L                      Pentachlorophenol - 0.001 mg/L                      Tetrachloroethylene - 0.005 mg/L                      Trichloroethylene - 0.005 mg/L                      Vinyl Chloride - 0.002 mg/L</p>	<p>Annual GW monitoring of the PMZ</p>	<ul style="list-style-type: none"> <li>RFI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>Soil RAP (EnSafe, 2004)</li> <li>RACR for Soil (CH2M HILL, 2009)</li> <li>Stabilization Effectiveness Report No. 11 (TRNUS, 2009)</li> <li>Groundwater RAP (TRNUS, 2009)</li> <li>Approval of Groundwater RAP (TCEQ, 2010)</li> </ul>

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TABLE I

RESPONSE ACTION AND POST-RESPONSE ACTION CARE SUMMARY FOR SOLID WASTE MANAGEMENT UNITS (SWMUS) AND AREAS OF CONCERN (AOCS)

SWMU or AOC	Site Name	Remedial Action Tasks	Residual Contaminants of Concern (COCs)	Response Action Status	Response Action Goals	Post-Response Action Care Goals	Reference
SWMU 18	Rubble Fill Area	Soil exceeding PCLs excavated to a depth of 5 feet below ground surface and backfilled with clean soil in 2007-2008.	<p><b>Soil (greater than 5 ft. bags):</b>                      Antimony - 13.6 mg/kg                      Lead - 31.1 mg/kg                      Mercury - 0.52 mg/kg                      Silver - 3.8 mg/kg</p>	Elevated levels of metals were detected in soil and groundwater samples from this site. PCB contamination above PCLs was found in soil in one location in the Rubble Fill Area. The soil less than 5 feet bgs was remediated by the Navy in 2008. The soil removal and backfill activities are reported in the RACR (CH2M HILL, 2009). A conditional approval of NFA determination by TCEQ was issued on 19 May 2010. VOCs were also detected in groundwater, but the Rubble Landfill is not believed to be a source of groundwater contamination.	<ul style="list-style-type: none"> <li>Restrict land use to commercial and/or industrial use only.</li> <li>Soil (<sup>ew</sup>Soil<sub>mg</sub>):                              Antimony - 5.41 mg/kg                              Lead - 17.5 mg/kg                              Mercury - 0.008 mg/kg                              Silver - 0.48 mg/kg</li> </ul>	N/A	<ul style="list-style-type: none"> <li>RFI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>Soil RAP (EnSafe, 2004)</li> <li>RACR for Soil (CH2M HILL, 2009)</li> </ul>
Cottonwood Bay	Contaminated Lake Sediment	The contaminated sediment has been delineated to human health and ecological criteria. The Navy plans to dredge, consolidate, and cap the contaminated sediments in the Northeast and central portions of Cottonwood Bay.	<p><b>Sediment (0-6 inch):</b>                      Aroclor-1242 - 0.01 mg/kg                      Aroclor-1254 - 0.24 mg/kg                      Aroclor-1260 - 0.68 mg/kg                      Antimony - 2.44 mg/kg                      Cadmium - 7.0 mg/kg                      Chromium (total) - 420 mg/kg                      Copper - 94.35 mg/kg                      Lead - 108 mg/kg                      Mercury - 0.44 mg/kg                      Nickel - 108.1 mg/kg                      Zinc - 448 mg/kg</p> <p><b>Sediment (0-1 foot):</b>                      Benz-a-anthracene - 17.6 mg/kg                      Benzo-a-pyrene - 14.4 mg/kg                      Benzo-b-fluoranthene - 20.7 mg/kg                      Dibenzo-a,h-anthracene - 3.06 mg/kg</p>	<p>Inorganics, SVOCs, polychlorinated biphenyls (PCBs), and pesticides were identified in the lake sediments of Mountain Creek Lake and Cottonwood Bay originating from the historical runoff of NWIRP Dallas and Former NAS Dallas. The Navy issued a draft RAP for Mountain Creek Lake Sediments in 2007. The regulators issued comments and the replacement pages were submitted to the TCEQ in 2009. The RAP was approved by TCEQ on June 7, 2010.</p>	<ul style="list-style-type: none"> <li>Restrict usage of the Cottonwood Bay area to prohibit disturbing the sediment cap.</li> <li>Placement and maintenance of signs located around Cottonwood Bay identifying the presence of a submerged cover system.</li> <li><b>Sediment (Ecological - 0-6 inch):</b>                              Aroclor-1242 - 0.0049 mg/kg                              Aroclor-1254 - 0.01 mg/kg                              Aroclor-1260 - 0.025 mg/kg                              Antimony - 2.14 mg/kg                              Cadmium - 0.74 mg/kg                              Chromium (total) - 170 mg/kg                              Copper - 35 mg/kg                              Lead - 37.5 mg/kg                              Mercury - 0.16 mg/kg                              Nickel - 69 mg/kg                              Zinc - 170 mg/kg</li> <li><b>Sediment (Human Health - 0-1 foot):</b>                              Benz-a-anthracene - 16.6 mg/kg                              Benzo-a-pyrene - 1.6 mg/kg                              Benzo-b-fluoranthene - 16 mg/kg                              Dibenzo-a,h-anthracene - 1.6 mg/kg</li> </ul>	Inspections of cap/ Fish tissue sampling	<ul style="list-style-type: none"> <li>APAR for Mountain Creek Lake (EnSafe, 2001)</li> <li>Sediment Background Analyses (Newfields, 2003).</li> <li>Draft Final RAP for Sediment (TINUS, 2009)</li> <li>Approval of Lake Sediment RAP (TCEQ, 2010)</li> </ul>

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TABLE IA

SUMMARY OF SOLID WASTE MANAGEMENT UNITS (SWMUs) AND AREAS OF CONCERN (AOCs) WHERE RESPONSE ACTIONS ARE COMPLETE

SWMU or AOC	Site Name	Remedial Action Tasks	Residual Contaminants of Concern (COCs)	Response Action Status	Response Action Goals	Post-Response Action Care Goals	Reference
SWMU 1/6	Industrial Wastewater Treatment Plant and Cyanide Treatment Eductor	Soil exceeding PCLs excavated to a depth of 5 feet below ground surface and backfilled with clean soil in 2007-2008.	<p><b>Soil (greater than 5 ft. bgs):</b>                      Trichloroethylene - 0.057 mg/kg                      Benzo-a-pyrene - 13 mg/kg                      Antimony - 35.5 mg/kg                      Arsenic - 39.9 mg/kg                      Barium - 2040 mg/kg                      Cadmium - 226 mg/kg                      Cobalt - 71.6 mg/kg                      Copper - 6740 mg/kg                      Lead - 3520 mg/kg                      Mercury - 6.3 mg/kg                      Nickel - 1190 mg/kg                      Silver - 131 mg/kg  <b>Groundwater:</b> Addressed in AOC 18</p>	<p>Polychlorinated biphenyls (PCBs), volatile organic compounds (VOCs) and lead were identified in soil above Protective Concentration Levels (PCLs) near SWMUs 1/6. This soil contamination was addressed in the Soil Remedial Action Plan (RAP). The soil less than 5 feet below ground surface (bgs) was remediated by the Navy in 2008. The soil removal and backfill activities are reported in the Response Action Completion Report (RACR) (CH2M HILL, 2009). TCEQ letter of February 11, 2011, approved closure to TRRP Remedy Standard B - Commercial/Industrial land use. Response actions and post-response action care for VOCs detected in groundwater at the site will be addressed under AOC-18, Trichloroethene Area.</p>	<ul style="list-style-type: none"> <li>Establishment of a PMZ that will prohibit shallow groundwater extraction and installation of wells for potable use or irrigation on the Subject Property (see AOC 18).</li> <li>Restrict land use to commercial and/or industrial use only.</li> </ul> <p><b>Soil (<sup>ew</sup>Soil<sub>na</sub>):</b>                      Trichloroethylene - 0.034 mg/kg                      Benzo-a-pyrene - 7.64 mg/kg                      Antimony - 5.4 mg/kg                      Arsenic - 12.1 mg/kg                      Barium - 443.8 mg/kg                      Cadmium - 5 mg/kg                      Cobalt - 29.7 mg/kg                      Copper - 1042 mg/kg                      Lead - 17.5 mg/kg                      Mercury - 0.008 mg/kg                      Nickel - 470 mg/kg                      Silver - 0.48 mg/kg</p>	N/A	<ul style="list-style-type: none"> <li>RFI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>Soil RAP (EnSafe, 2004)</li> <li>RACR for Soil (CH2M HILL, 2009)</li> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>
SWMU 4/19	Salvage Yard and Former Crushed Drum and Firebrick Burial Site	Soil exceeding PCLs excavated to a depth of 5 feet below ground surface and backfilled with clean soil in 2007-2008.	<p><b>Soil (greater than 5 ft. bgs):</b>                      Lead - 138 mg/kg                      Mercury - 0.02 mg/kg</p>	<p>A small area of semi-volatile organic compounds (SVOCs) contamination above PCLs was identified east of the salvage yard. It was likely associated with an oil/water separator used to treat storm water runoff from the salvage yard. This soil contamination was addressed in the Soil RAP. No evidence of the reported drum or firebrick burial sites was found. The soil less than 5 feet bgs was remediated by the Navy in 2008. The soil removal and backfill activities are reported in the RACR (CH2M HILL, 2009).</p> <p>Based on groundwater plume maps and site history, neither SWMU is thought to have been a significant source of groundwater contamination.</p>	<ul style="list-style-type: none"> <li>Restrict land use to commercial and/or industrial use only.</li> </ul> <p><b>Soil (<sup>ew</sup>Soil<sub>na</sub>):</b>                      Lead - 17.5 mg/kg                      Mercury - 0.008 mg/kg</p>	N/A	<ul style="list-style-type: none"> <li>RFI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>Soil RAP (EnSafe, 2004)</li> <li>RACR for Soil (CH2M HILL, 2009)</li> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>

TABLE IA

SUMMARY OF SOLID WASTE MANAGEMENT UNITS (SWMUS) AND AREAS OF CONCERN (AOCs) WHERE RESPONSE ACTIONS ARE COMPLETE

SWMU or AOC	Site Name	Remedial Action Tasks	Residual Contaminants of Concern (COCs)	Response Action Status	Response Action Goals	Post-Response Action Care Goals	Reference
SWMU 12	Closed Incinerator and Old Drum Storage Area	Soil exceeding PCLs excavated to a depth of 5 feet below ground surface and backfilled with clean soil in 2007-2008.	Soil (greater than 5 ft. bgs): Trichloroethylene - 0.350 mg/kg Groundwater: Addressed in AOC 18	VOC, SVOC and PCB contamination above PCLs was identified in sludge and soils beneath SWMU 12 and/or adjacent former western unnamed stream. This soil contamination was addressed in the Soil RAP. The soil less than 5 feet bgs was remediated by the Navy in 2008. The soil removal and backfill activities are reported in the RACR (CH2M HILL, 2009). TCEQ letter of February 11, 2011, approved closure to TRRP Remedy Standard B - Commercial/Industrial land use. A former unpaved drum storage area that was associated with and just south of the incinerator has been identified as a source of VOC contamination in groundwater. Response actions and post-response action care for VOCs detected in groundwater will be addressed under AOC-18, Trichloroethene Area.	<ul style="list-style-type: none"> <li>Establishment of a PMZ that will prohibit shallow groundwater extraction and installation of wells for potable use or irrigation on the Subject Property (see AOC 18).</li> <li>Restrict land use to commercial and/or industrial use only.</li> </ul> Soil ( <sup>ew</sup> Soil <sub>mg</sub> ): Trichloroethylene - 0.034 mg/kg	N/A	<ul style="list-style-type: none"> <li>REI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>Soil RAP (EnSafe, 2004)</li> <li>RACR for Soil (CH2M HILL, 2009)</li> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>
SWMU 13	West Drainage Lagoon	Soil exceeding PCLs either excavated to a depth of 5 feet below ground surface and backfilled with clean soil or covered with 5 feet of clean soil in 2007-2008.	Soil (greater than 5 ft. bgs): Carbazole - 13 mg/kg Chlorobenzene - 1.9 mg/kg 3,3-Dichlorobenzidine - 0.26 mg/kg Benzo-a-pyrene - 21 mg/kg Antimony - 8.8 mg/kg Arsenic - 21.6 mg/kg Barium - 874 mg/kg Cadmium - 112 mg/kg Chromium (total) - 4820 mg/kg Lead - 585 mg/kg Mercury - 4 mg/kg Silver - 141 mg/kg	SVOCs, metals, total petroleum hydrocarbons (TPH) and pesticide/PCBs were found in soils, sludge and/or sediment beneath the West Drainage Lagoon, with VOC and PCB contamination above PCLs. The soil less than 5 feet bgs was remediated by the Navy in 2008. The soil removal and backfill activities are reported in the RACR (CH2M HILL, 2009). TCEQ letter of February 3, 2011, approved closure to TRRP Remedy Standard A - Commercial/Industrial land use. This area is not believed to be a source of groundwater contamination.	<ul style="list-style-type: none"> <li>Restrict land use to commercial and/or industrial use only.</li> </ul> Soil ( <sup>ew</sup> Soil <sub>mg</sub> ): Carbazole - 10.2 mg/kg Chlorobenzene - 1.09 mg/kg 3,3-Dichlorobenzidine - 0.14 mg/kg Benzo-a-pyrene - 7.64 mg/kg Antimony - 5.4 mg/kg Arsenic - 12.1 mg/kg Barium - 43.8 mg/kg Cadmium - 5 mg/kg Chromium (total) - 2400 mg/kg Lead - 17.5 mg/kg Mercury - 0.008 mg/kg Silver - 0.48 mg/kg	N/A	<ul style="list-style-type: none"> <li>REI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>Soil RAP (EnSafe, 2004)</li> <li>RACR for Soil (CH2M HILL, 2009)</li> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>

TABLE IA

SUMMARY OF SOLID WASTE MANAGEMENT UNITS (SWMUs) AND AREAS OF CONCERN (AOCs) WHERE RESPONSE ACTIONS ARE COMPLETE

SWMU or AOC	Site Name	Remedial Action Tasks	Residual Contaminants of Concern (COCs)	Response Action Status	Response Action Goals	Post-Response Action Care Goals	Reference
SWMU 14	East Drainage Lagoon	Soil exceeding PCLs either excavated to a depth of 5 feet below ground surface and backfilled with clean soil or covered with 5 feet of clean soil in 2007-2008.	<b>Soil (greater than 5 ft. bgs):</b> Benz-a-anthracene - 270 mg/kg Benzo-a-pyrene - 210 mg/kg Benzo-b-fluoranthene - 210 mg/kg Carbazole - 88 mg/kg Dibenz-a,h-anthracene - 22 mg/kg Arsenic - 37.8 mg/kg Barium - 974 mg/kg Beryllium - 2.7 mg/kg Cadmium - 24.8 mg/kg Chromium (total) - 3140 mg/kg Lead - 671 mg/kg Mercury - 1.9 mg/kg Silver - 47.5 mg/kg Vanadium - 156 mg/kg	SVOC contamination above PCLs was found in soils, sludge and/or sediment beneath the East Drainage Lagoon. The soil less than 5 feet bgs was remediated by the Navy in 2008. The soil removal and backfill activities are reported in the RACR (CH2M HILL, 2009). TCEQ letter of February 3, 2011, approved closure to TRRP Remedy Standard A - Commercial/Industrial land use.  This area is not believed to be a source of groundwater contamination.	<ul style="list-style-type: none"> <li>Restrict land use to commercial and/or industrial use only.</li> <li><b>Soil (<sup>aw</sup>Soil<sub>10g</sub>):</b> Benz-a-anthracene - 17.7 mg/kg Benzo-a-pyrene - 7.64 mg/kg Benzo-b-fluoranthene - 134 mg/kg Carbazole - 10.2 mg/kg Dibenz-a,h-anthracene - 21.3 mg/kg Arsenic - 12.1 mg/kg Barium - 443.8 mg/kg Beryllium - 1.8 mg/kg Cadmium - 5 mg/kg Chromium (total) - 2400 mg/kg Lead - 17.5 mg/kg Mercury - 0.008 mg/kg Silver - 0.48 mg/kg Vanadium - 125 mg/kg</li> </ul>	N/A	<ul style="list-style-type: none"> <li>RFI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>Soil RAP (EnSafe, 2004)</li> <li>RACR for Soil (CH2M HILL, 2009)</li> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>
SWMU 15	Former Acid Neutralization Pit	Soil exceeding PCLs excavated to a depth of 5 feet below ground surface and backfilled with clean soil in 2007-2008.	<b>Soil (greater than 5 ft. bgs):</b> Benzo-a-pyrene - 19 mg/kg Arsenic - 13 mg/kg Cadmium - 5.6 mg/kg Lead - 166 mg/kg Mercury - 0.03 mg/kg Silver - 2.5 mg/kg <b>Groundwater:</b> Addressed in AOC 18	SVOC contamination above PCLs was found in soil and sludge near the former acid neutralization pit. The soil less than 5 feet bgs was remediated by the Navy in 2008. The soil removal and backfill activities are reported in the RACR (CH2M HILL, 2009). TCEQ letter of February 11, 2011, approved closure to TRRP Remedy Standard B - Commercial/Industrial land use.  The pit is also suspected to be a source of chromium and hexavalent chromium in groundwater in this part of the site. Response actions and post-response action care for the chromium contamination in groundwater at the site will be addressed under AOC-18, Trichloroethene Area.	<ul style="list-style-type: none"> <li>Establishment of a PMZ that will prohibit shallow groundwater extraction and installation of wells for potable use or irrigation on the Subject Property (see AOC 18).</li> <li>Restrict land use to commercial and/or industrial use only.</li> <li><b>Soil (<sup>aw</sup>Soil<sub>10g</sub>):</b> Benzo-a-pyrene - 7.64 mg/kg Arsenic - 12.1 mg/kg Cadmium - 5 mg/kg Lead - 17.5 mg/kg Mercury - 0.008 mg/kg Silver - 0.48 mg/kg</li> </ul>	N/A	<ul style="list-style-type: none"> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>

TABLE 1A

SUMMARY OF SOLID WASTE MANAGEMENT UNITS (SWMUs) AND AREAS OF CONCERN (AOCs) WHERE RESPONSE ACTIONS ARE COMPLETE

SWMU or AOC	Site Name	Remedial Action Tasks	Residual Contaminants of Concern (COCs)	Response Action Status	Response Action Goals	Post-Response Action Care Goals	Reference
AOC 14	Manufacturing Building 1	No soils are present in the area exceeding <sup>10</sup> Soil <sub>Comb</sub> PCLs to a depth of 5 feet below ground surface. The <sup>ew</sup> Soil <sub>ing</sub> exceedances were addressed through institutional controls.	<b>Soil (greater than 5 ft. bgs):</b> 1,1-Dichloroethylene - 1.8 mg/kg 1,1,1-Trichloroethane - 46 mg/kg Trichloroethylene - 11 mg/kg Antimony - 14 mg/kg Arsenic - 41.6 mg/kg Lead - 29 mg/kg Mercury - 0.17 mg/kg <b>Groundwater:</b> Addressed in AOC 18	VOC contamination above PCLs was found in soil beneath Building 1. Degreasers formerly located in Building 1 are believed to be one of the primary sources of the groundwater VOC plume. TCEQ letter of February 11, 2011, approved closure to TRRP Remedy Standard B - Commercial/Industrial land use. Response actions and post-response action care for VOCs detected in groundwater at the site will be addressed under AOC-18, Trichloroethene Area.	<ul style="list-style-type: none"> <li>Establishment of a PMZ that will prohibit shallow groundwater extraction and installation of wells for potable use or irrigation on the Subject Property (see AOC 18).</li> <li>Restrict land use to commercial and/or industrial use only.</li> </ul> <b>Soil (<sup>ew</sup>Soil<sub>ing</sub>):</b> 1,1-Dichloroethylene - 0.050 mg/kg 1,1,1-Trichloroethane - 1.620 mg/kg Trichloroethylene - 0.034 mg/kg Antimony - 5.41 mg/kg Arsenic - 12.1 mg/kg Lead - 17.5 mg/kg Mercury - 0.008 mg/kg	N/A	<ul style="list-style-type: none"> <li>RFI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>
AOC 15	Manufacturing Building 6	No soils are present in the area exceeding <sup>10</sup> Soil <sub>Comb</sub> PCLs to a depth of 5 feet below ground surface. The <sup>ew</sup> Soil <sub>ing</sub> exceedances were addressed through institutional controls.	<b>Soil (greater than 5 ft. bgs):</b> 1,2-Dichloroethane - 0.056 mg/kg Trichloroethylene - 0.120 mg/kg Barium - 925 mg/kg Cobalt - 42.2 mg/kg Lead - 19.5 mg/kg <b>Groundwater:</b> Addressed in AOC 18	VOC contamination above PCLs was found in soil beneath Building 6. Degreasers formerly located in Building 6 are believed to be one of the primary sources of the groundwater VOC plume.	<ul style="list-style-type: none"> <li>Establishment of a PMZ that will prohibit shallow groundwater extraction and installation of wells for potable use or irrigation on the Subject Property (see AOC 18).</li> <li>Restrict land use to commercial and/or industrial use only.</li> </ul> <b>Soil (<sup>ew</sup>Soil<sub>ing</sub>):</b> 1,2-Dichloroethane - 0.014 mg/kg Trichloroethylene - 0.034 mg/kg Barium - 443.8 mg/kg Cobalt - 29.7 mg/kg Lead - 17.5 mg/kg	N/A	<ul style="list-style-type: none"> <li>RFI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>

NWIRP DALLAS CORRECTIVE ACTION ORDER NO. 31268

TABLE IA

SUMMARY OF SOLID WASTE MANAGEMENT UNITS (SWMUs) AND AREAS OF CONCERN (AOCs) WHERE RESPONSE ACTIONS ARE COMPLETE

SWMU or AOC	Site Name	Remedial Action Tasks	Residual Contaminants of Concern (COCs)	Response Action Status	Response Action Goals	Post-Response Action Care Goals	Reference
AOC 16	Waste Petroleum, Oil, and Lubricants (POL) Spill Site	<p>One of the three groundwater pump and treat systems was installed at AOC 16 in 1996 to stop offsite migration of contaminated groundwater. This system was turned off in 2007 and removed in 2008 after proving that pump and treat was not effective in controlling or remediating the groundwater in the area.</p> <p>No soils are present in the area exceeding <sup>soil</sup>Soil<sub>Comb</sub> PCLs to a depth of 5 feet below ground surface. The <sup>soil</sup>Soil<sub>ing</sub> exceedances were addressed through institutional controls.</p>	<p><b>Soil (greater than 5 ft. bgs):</b>                      Benzene - 0.074 mg/kg                      cis-1,2-Dichloroethylene - 0.430 mg/kg                      Trichloroethylene - 37 mg/kg                      Arsenic - 14.4 mg/kg                      Lead - 52 mg/kg  <b>Groundwater:</b> Addressed in AOC 18</p>	<p>Past waste releases in this area are suspected to be one of the sources for the groundwater VOC plume. TCEQ letter of February 11, 2011, approved closure to TRRP Remedy Standard B - Commercial/Industrial land use. Response actions and post-response action care for VOCs detected in groundwater at the site will be addressed under AOC-18, Trichloroethene Area.</p>	<ul style="list-style-type: none"> <li>Establishment of a PMZ that will prohibit shallow groundwater extraction and installation of wells for potable use or irrigation on the Subject Property (see AOC 18).</li> <li>Restrict land use to commercial and/or industrial use only.</li> </ul> <p><b>Soil (<sup>soil</sup>Soil<sub>ing</sub>):</b>                      Benzene - 0.026 mg/kg                      cis-1,2-Dichloroethylene - 0.248 mg/kg                      Trichloroethylene - 0.034 mg/kg                      Arsenic - 12.1 mg/kg                      Lead - 17.5 mg/kg                      Mercury - 0.008 mg/kg</p>	N/A	<ul style="list-style-type: none"> <li>RFI for NWIRP Dallas (EnSafe, 2001)</li> <li>APAR for NWIRP Dallas (EnSafe, 2001)</li> <li>Stabilization Performance Effectiveness Report No. 11 (TNUUS, 2009)</li> <li>Groundwater RAP (TNUUS, 2009)</li> <li>TCEQ approval of NFA (TCEQ, 2011)</li> </ul>

TCEQ DOCKET NO. 2010-0069-IHW

Application by	§	BEFORE THE
U.S. DEPARTMENT OF THE NAVY,	§	
NAVAL WEAPONS INDUSTRIAL	§	
RESERVE PLANT DALLAS	§	TEXAS COMMISSION ON
CORRECTIVE ACTION	§	
ORDER NO. 31268	§	
DOCKET NO. 2010-0069-IHW	§	ENVIRONMENTAL QUALITY
DALLAS COUNTY, TEXAS	§	

**EXECUTIVE DIRECTOR'S RESPONSE TO PUBLIC COMMENT**

The Executive Director of the Texas Commission on Environmental Quality (the Commission or TCEQ) files this Response to Public Comment (Response) on an application for a corrective action Order (ORDER or Order) filed by the U.S. Department of the Navy for the Naval Weapons Industrial Reserve Plant (NWIRP)(hereinafter NWIRP Dallas) in Dallas, Texas.

The Executive Director has prepared a response to all timely, relevant and material, or significant comments consistent with 30 Texas Administrative Code Section 55.156. The Office of Chief Clerk received one timely comment letter from the City of Dallas (the City) and is located in Exhibit 1. This Response addresses all public comments received. No comments have been withdrawn.

If individuals need more information about this proposed Order, they may call the TCEQ Public Education Program at 1-800-687-4040. General information about the TCEQ can be found at our website at [www.tceq.texas.gov](http://www.tceq.texas.gov).

**I. DESCRIPTION OF FACILITY**

NWIRP Dallas is located at 9314 West Jefferson Boulevard, Dallas, approximately 12 miles west of downtown Dallas. The facility is located adjacent to and west of the former Naval Air Station Dallas (NASD) and is due north of Mountain Creek Lake. The site is in the drainage area of Segment 0841A of the Trinity River Basin (North Latitude 32°44'28", West Longitude 96°58'48").

NWIRP Dallas comprises approximately 424 acres, consisting of both the Industrial Facility (314 acres) and Cottonwood Bay (110 acres) parcels. The entire

NWIRP Dallas property (424 acres) is owned by the U.S. Government. The 314-acre Industrial Facility is a Government Owned/Contractor Operated facility constructed in 1940 and currently is under lease to Vought Aircraft Industries Inc. (Vought) which produces military and commercial aircraft sub-assemblies. Vought is a large quantity generator of hazardous wastes. The adjacent NASD is currently owned by the City.

The Navy seeks to substitute an Order for the facility's current Resource Conservation and Recovery Act (RCRA) Hazardous Waste Permit No. 50279. The Order will authorize response actions and post-response action care for the remediation of contaminated groundwater and sediment for NWIRP Dallas. On the permit, which was renewed November 21, 2005, and modified on October 9, 2006, Naval Air Systems Command is listed as operator (permittee) and the U.S. Government (Navy) as site owner. The current permit does not include any RCRA permitted units since the permitted hazardous waste container storage area was closed prior to permit renewal. The permit does list RCRA solid waste management units (SWMUs) and areas of concern (AOCs) that are subject to corrective action.

## **II. PROCEDURAL BACKGROUND**

The proposed Order is based on information submitted in the Order application, dated June 9, 2009. The application was made pursuant to the statutory authorities of Texas Water Code §7.031 and Texas Health and Safety Code (THSC) §361.082(h). The application has been certified by the Navy (Applicant) to be accurate and complete. The Applicant published its notice of Application and Preliminary Decision for the draft Order on July 16, 2011. The comment period ended August 15, 2011.

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## **III. COMMENTS AND RESPONSES**

TCEQ received one comment letter during the comment period that was submitted by the City of Dallas (City). The City's letter dated August 15, 2011, identifies three main concerns with the proposed remedial actions required by the Order to

address contaminated shallow groundwater and sediments. Following each statement of concern by the City is the Executive Director's response to the concern.

Comment No. 1

*The City challenges the appropriateness of Navy's proposed remedy for shallow groundwater contamination known as the AOC-18 Trichloroethene (TCE) Area (303 acres). Specifically, the City opposes implementation of a cleanup remedy known as a plume management zone (PMZ) for the portion of the plume of contamination located on City property. Contamination from NWIRP Dallas migrated onto approximately 5 acres of City property (former NASD). The City claims it has the right to require the Navy to clean up to a standard which would allow the City unrestricted use of its property. This standard under TCEQ rules is known as the Texas Risk Reduction Program (TRRP), Remedy Standard A residential land use, Protective Concentration Levels (PCLs).*

*Additional reasons for the City not giving consent for a PMZ include:*

- a. The City has proposed a Conceptual Design for an alternative remedy to decontaminate the plume using zero valent iron permeable reactive barriers (barriers) designed to intercept and treat groundwater contaminants. The City anticipates this remedial alternative would require several decades to decontaminate the groundwater and achieve Remedy Standard A, unrestricted use. The City's design also includes a contingent remedy that involves in-situ injections of an electron donor (i.e., emulsified vegetable oil based product) into the plume. The City believes this contingent remedy can achieve an expedited cleanup of the contaminated groundwater, and meet the 2016 remediation goal specified in the 2002 Settlement Agreement;*
- b. The City disagrees that the Navy has conducted sufficient groundwater monitoring to show that the groundwater plume is stable and not expanding further onto City property. The City states the Executive Director has stated the*

*plume is stable and not increasing in size or concentration. The City is also concerned that the absence of engineering controls at the property boundary may result in additional plume migration onto City property;*

- c. The proposed remedy of a PMZ does not satisfy the terms of the 2002 Settlement Agreement, City of Dallas v. United States. The City claims that the Settlement Agreement applies to its portion of the AOC-18 TCE Area plume and requires the Navy to attain Remedy Standard A residential land use PCLs for Navy releases on City-owned property;*
- d. The proposed PMZ restricts future development over and through the area of contaminated groundwater and reduces the value of the property; and*
- e. The proposed PMZ would require the City to pay for additional measures to ensure protection of human health and the environment due to the contamination left in place.*

#### **Response to Comment No. 1**

**In response to any release of contamination into the environment, TCEQ's Corrective Action Program requires the responsible party to investigate the releases. Once the responsible party determines the scope and character of contamination for all media (soil, groundwater, and surface water), the responsible party submits, for Executive Director's approval, a plan to remedy the contamination. That plan is called a Response Action Plan (RAP). The RAP recommends the remedy that the responsible party believes is most appropriate to address the type of contamination. In this case, past Navy activities contaminated soil, groundwater, and sediments on property owned by the Navy and adjacent landowners including the City of Dallas. The Navy RAP proposed a groundwater remedy called a "plume management zone" or PMZ.**

Texas Risk Reduction Program at 30 TAC § 350.33(f)(4) governs the criteria for implementing a PMZ remedy. To establish a PMZ, a responsible party must demonstrate that the chemicals of concern (COCs) will not migrate beyond the downgradient boundary of the PMZ at concentrations above the critical groundwater protective concentration levels (PCLs). This remedy is considered passive action because it involves mainly monitoring of the contamination to ensure it remains stable or diminishes over time. However, if the contamination in the groundwater PMZ exceeds an action level found in TCEQ rules at a certain monitoring point or exceeds a critical groundwater PCL at the groundwater alternate point of exposure, then Agency rules at 30 TAC § 350.33(f)(4)(D)(iii) require the responsible party to take more aggressive response actions such as treatment of the contamination to meet the appropriate response objectives. One aspect of the PMZ remedy is the requirement to file deed notices and property use restrictions on affected property so that the public and any future property owner knows that the contamination will remain in place. TCEQ rules refer to such property use limitations as "institutional controls." TCEQ rules at 30 TAC § 350.111(c) require a responsible party, such as the Navy, to obtain written consent from an affected landowner for any institutional control. If the responsible party cannot obtain that consent, then the responsible party must submit an alternative remedy for approval by the Executive Director.

The Executive Director agrees that the City has the right to withhold its consent to the Navy's proposed PMZ and its institutional controls. In response to the City's statements that it will not approve the Navy's proposed remedy; the Executive Director has added two provisions to the proposed Order. These special provisions address the next step for the Navy if it fails to secure the City approval of the PMZ remedy for City-owned property. The first is Provision II.E. of the Order, which states:

In the event that the Navy does not secure consent for its proposed remedy from the affected landowner, then the Navy will be required under this Order to develop an alternative remedy for the contamination in the groundwater plume consistent with 30 TAC Section 350.32 related to Remedy Standard A or 350.33 related to Remedy Standard B...

The second is Section I.D. in Attachment A of the Order, which provides a deadline on when the Navy must comply with TCEQ rules related to providing an alternative remedy:

TCEQ has given preliminary approval of the Groundwater Response Action Plan (RAP). Final approval of the Groundwater RAP requires that the Navy provide proof of filing of deed notices and restrictive covenants (e.g., institutional controls) for the PMZ. If the Navy is unable to comply with the Institutional Controls requirements for off-site landowner concurrence within the required 120-day timeframe, then the Navy must submit a revised Groundwater RAP within the following 90-day period. The revised RAP must either propose use of a remedial technology that can successfully reduce the chemicals of concern (COCs) on such off-site property to meet critical PCLs in a reasonable timeframe, or provide the information required for establishing a PMZ under the provisions of 30 TAC §§ 350.33(f)(3) and 350.111(d).

These additional provisions are based on TCEQ rules and enforceable against the Navy.

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Response to Comment No. 1.a., related to the City's proposed Conceptual Design for an alternative remedy to decontaminate the plume to achieve TRRP Remedy Standard A, Residential PCLs.

The role of the Executive Director is to evaluate the responsible person's response action plan to determine whether the proposed remedy

complies with the Texas Risk Reduction Program (TRRP) rules. In this case, the Navy's Response Action Plan recommends a remedy (i.e., PMZ) to which each affected landowner must consent under TRRP rules. If an affected landowner like the City does not consent to institutional controls, then the rules require the Navy to proceed to selection of a remedy that complies with each provision of the rules.

The Executive Director has determined the Navy's proposed remedy of a plume management zone is consistent with the subsurface geology of the site and would comply with all applicable TRRP requirements except the requirement to get the affected landowner consent to deed restrictions.

Prior to submittal of the groundwater Remedial Action Plan (RAP) in 2009, the Navy conducted various studies to determine whether a treatment technology was capable of decontaminating the groundwater to unrestricted use. These studies included two enhanced bioremediation pilot studies. After evaluating the results of these studies, the Navy concluded that there was no technology capable of achieving the decontamination goal under Remedy Standard A. The reason for the Navy's conclusion is the unique subsurface geology associated with the contaminated City property. The Navy found that the high clay content of the shallow groundwater bearing zone restricted removal of the high concentration of volatile organic compounds (VOCs) present because the VOCs are chemically bound to the soils.

The Navy, therefore, submitted its current response action plan which calls for a PMZ for the entire AOC-18 TCE Area plume (which includes approximately 5 acres of property owned by the City). The Navy's plan also includes use of two permeable reactive barriers for the onsite portion of the plume. The proposed PMZ for the portion of the plume on City property includes institutional controls (e.g., deed notice or deed restrictions on

public use of the property) and post-response action care groundwater monitoring.

After the City sent its Comment Letter during the public comment period, the Executive Director completed a technical review of one of the two remedies proposed by the City as an alternative solution. These two alternative remedies are: permeable reactive barriers (barriers) on City property, and in-situ injection of chemicals into the plume on City property to treat the contaminated groundwater. To evaluate the City's proposals, the Remediation Division staff reviewed information provided by the City, as well as additional information requested from the Navy concerning site hydrogeology and groundwater plume dynamics for the proposed design.

The Executive Director concurred with the City's determination that barriers may require several decades of treatment to achieve the cleanup goal of Remedy Standard A, unrestricted use. In addition, the Executive Director identified a number of technical concerns regarding the City's barrier alternative. Specifically, certain design elements of the barriers do not conform to established criteria for this type of contamination control. Also, installing barriers may cause unintended adverse impacts to areas both inside and outside the plume by redirecting the contamination into a different direction. In addition, the use of barriers will not address contamination already existing on City property. Details related to the Executive Director's concerns about the City's barrier proposal can be found attached as Exhibit 2.

After the Executive Director completed his technical review of the City's barrier recommendation, the Corrective Action Section staff provided that evaluation to the City and to the Navy on October 3, 2011. The evaluation is provided as part of this RTC as Exhibit 2.

As of the date of filing of this RTC, the Executive Director continues evaluating the feasibility of the City's second alternative (in-situ injection of chemicals to treat the groundwater contamination) to determine whether this latter remedy would achieve the groundwater response action objective of Remedy Standard A, which the City prefers over the Navy's selected remedy.

Response to Comment No. 1.b., related to sufficiency of groundwater monitoring and stability of the groundwater plume.

The Executive Director wishes to clarify that his preliminary approval of the Navy's Response Action Plan (RAP) is not a final determination that the plume is stable. The RAP requires one year of monitoring by the Navy before the Executive Director makes any final determination regarding plume stability. To date, the Navy continues monitoring in an effort to demonstrate that the plume is stable and not expanding. If the Executive Director determines that the plume is not stable, the Navy will not have demonstrated that it meets the PMZ performance standard requirement of § 350.33(f)(4)(c)(ii). In that event, the Executive Director will deny the request for a PMZ.

If the Navy demonstrates that the plume is stable, then the Order requires that the Navy meet certain performance standards for a PMZ. The purpose of these standards is to ensure that the groundwater PCL exceedance zone does not expose human and ecological receptors to unacceptable concentrations of COCs. These groundwater standards are set out in TRRP Remedy Standard B at 30 TAC Section 350.33(f)(4)(C)(ii).

The performance standard for the proposed PMZ in the Order also requires confirmatory sampling for the next 30 years. Specifically, the Navy must conduct annual groundwater sampling during the 30 year post-response action care period to verify plume stability. If after establishment

of a PMZ, the Executive Director subsequently determines the plume is no longer stable, then §§ 350.33(f)(4)(D)(iii) and 350.33(f)(4)(F) would apply. These rules require the Navy to take additional response actions to ensure concentrations do not migrate beyond the PMZ.

Response to Comment No. 1.c., regarding the 2002 Settlement Agreement, City of Dallas vs. United States.

TCEQ does not have the statutory authority to implement the terms and conditions included in third-party agreements. The role of the Agency is to determine whether an applicant like the Navy complies with TCEQ rules governing its application. Alternatively, the Order does not alleviate any other applicable requirement to which the Navy is subject. The Executive Director is neutral on whether the Settlement Agreement applies to the City's property affected by the groundwater contaminated by the Navy.

Response to Comment Nos. 1.d. and 1.e., related to restrictions on future development over and through the area of contaminated groundwater and the need for additional measures to ensure protection of human health and the environment if the Navy is allowed to leave the contamination in place via a PMZ remedy.

TCEQ Chapter 350 TRRP rules allow an applicant such as the Navy to choose cleanup under Remedy Standard A or B. The Navy has chosen Remedy Standard B. The groundwater response objectives under Remedy Standard B do not include future development as a criterion to be evaluated for a response action or for post-response action care.

The Executive Director acknowledges the City's concern about restricted use of its property. However, the role of the Executive Director is to perform a technical review of the remedy selected by the responsible party and to determine whether the selected remedy meets TCEQ rules.

**However, the proposed Order requires appropriate changes to the Navy's Corrective Action Program in the event that the Navy or the Executive Director determines that the selected remedy is not meeting the groundwater response action objectives specified in the Navy's RAP. In addition, the institutional controls required for a PMZ (such as deed recordation or deed restrictions) are intended to inform future users of the existing land use limitations so that they can plan accordingly.**

Comment No. 2

*The City does not agree with the proposed sediment remedy and has 6 concerns about the Navy's plan to clean up contaminated sediment in nearby bodies of water. The City's issues are based on its review of the Navy Draft Final Mountain Creek Lake Sediment RAP, NWIRP Dallas, Texas, dated June 2009, and the Sampling and Analysis Plan (SAP), Remedy Design for Mountain Creek Lake Sediment, NWIRP Dallas, dated November 2010:*

- a. *The proposed dredging, consolidation, and capping of contaminated sediments within a portion of Cottonwood Bay would include contaminated sediments located on City-owned property within Cottonwood Bay and the Diversion Channel (i.e., approximately 4 acres within Cottonwood Bay and approximately 3 acres within the Diversion Channel). The City opposes removal of contaminated sediments from City-owned property and redeposition onto Navy property. The City requests that all sediment and associated material dredged, including sediment from City-owned property, be properly disposed of off-site at an authorized disposal facility;*
- b. *The planned confirmation sampling for the City-owned property appears to be extremely limited. The City recommends a minimum of four samples per one-half acre of City-owned property for proper confirmation sampling;*

- c. The City questions whether the design of the cap protects the contaminants from storm events and from increases in surface water discharges into Cottonwood Bay resulting from potential future development of surrounding properties;*
- d. The City requested additional information regarding the proposed analytical parameters that would be used to distinguish older/contaminated sediments from recent sediments during implementation of the SAP. The City is concerned that as contaminated sediments are covered by new sediments the contaminated sediments may be left in place (no-action alternative). The City points to benthic communities and potential scouring of contaminated sediments as reasons against the no-action alternative;*
- e. The City asks for the rationale for excluding "metals" analysis from the deeper sediment samples; and*
- f. With respect to implementation of the remedial action, the City indicates that access approval will need to be obtained from the City to allow proper removal of the affected sediments from Mountain Creek Lake.*

**Response to Comment No. 2.a., related to the City's desire for offsite disposal of sediments.**

Past Navy activities have contaminated sediments in parts of adjacent water bodies called Cottonwood Bay and Mountain Creek Lake. The Navy has submitted a Sediment RAP for Executive Director's approval.

The role of the Executive Director is to ensure that the Navy's response plan related to removal and disposal of contaminated sediments complies with TCEQ rules. Using its regulatory authority, the Executive Director conducts a technical review on the proposed response actions to determine whether actions are capable of achieving the response action objectives.

TCEQ rules that allow a responsible party, like the Navy, the option of disposing of contaminated soils or sediments into an onsite landfill or an

appropriate offsite facility. Texas Risk Reduction Program rules at 30 TAC § 350.33(e)(2)(A) and waste management rules at 30 TAC Chapter 335 both specify standards for creating an onsite waste control (i.e., landfill). In this case, the Navy must submit proposed design specifications to ensure the onsite landfill complies with TCEQ rules.

To address human health and ecological risks, TCEQ rules at 30 TAC § 350.33(e)(2)(A) also require a responsible party to demonstrate it will prevent migration of COCs out of the proposed landfill. In this case, the Navy's Sediment RAP must demonstrate that physical controls such as a cap will reliably contain COCs within the landfill.

After careful evaluation of the Navy's plan, the Executive Director has determined that the Navy's proposed remedy for contaminated sediments should achieve compliance with Agency response action objectives. The proposed Order requires the Navy perform the following actions:

- a. Consolidate contaminated sediments to one area within Cottonwood Bay and construct a cap over the sediments to prevent direct human or ecological exposure. The Navy must collect verification samples to confirm removal of COCs greater than the critical PCLs from the areas to be dredged;
- b. Maintain the cap at the specified thickness to prevent erosion (indicated by the geotextile layer or the underlying sediment becoming uncovered) and to eliminate the potential for any direct human or ecological receptor to contact affected underlying sediments;
- c. Conduct annual inspections and more comprehensive, 5-year review inspections of the cap. Annual inspections will include integrity inspection of the cover system consistent with the operation and maintenance activities indicated in the approved RAP. Five-year

- inspections will evaluate performance of the gravel cover using bathymetric, sub-bottom, and side scan sonar surveys; and
- d. Following cap construction, the Navy must collect and analyze fish tissue samples every three years until such time as the Texas Department of State Health Services lifts the Fish Consumption Advisory 44 for Mountain Creek Lake.

Response to Comment No. 2.b., related to additional confirmation sampling on City-owned property.

TCEQ rules governing confirmatory sampling, sampling density, and sampling regime requirements are found at 30 TAC § 350.33(g). The purpose of this rule is to set the type, method, and extent of post-response action care. The appropriate location and frequency of sampling is defined on a site-specific basis in the approved Response Action Plan for the Executive Director's consideration.

Under 30 TAC § 350.33(g), the Executive Director evaluates such factors as: long-term effectiveness of the response action, the nature and design of any physical controls, the physical and chemical characteristics of the COCs, the geology and hydrogeology of the affected property, and the adjacent land use.

In this case, the Executive Director rejected the sampling regime originally proposed by the Navy and is requiring greater sampling frequency. We also relied on experts to assist us in establishing a scientifically based methodology for the sediment sampling. The TCEQ Corrective Action Section consulted with staff from Environmental Protection Agency, Region 6, and with the Natural Resource Trustees for the State of Texas and the federal government (i.e., trustees from the General Land Office, the Texas Parks and Wildlife Department, and the U.S. Fish and Wildlife Agency). These Agencies helped establish the appropriate

spacing between sample points to ensure the samples are representative of the area in question.

Under the proposed Order, the Navy must conduct both pre-excavation sampling and post-excavation sampling to confirm that the contaminated sediments have been removed. The methodology of using pre-excavation samples is similar to that followed during the NWIRP Dallas soil response action. To remove contaminated soils, the Navy used pre-excavation samples to both define the vertical and horizontal extent of contaminated soils (0-5 feet below ground surface), as well as verify the vertical and lateral limits of the soil excavation. Because the methodology used by the Navy for its soil removal remedy was successful, the Executive Director anticipates that the same methodology, in conjunction with the post-dredging confirmation sampling, will be satisfactory for demonstrating that all contaminated sediments have been removed from the areas to be dredged so that no contamination above PCLs remains in those areas.

The proposed Order requires other safeguards in addition to the confirmation samples to be collected within the dredged areas. The Navy will sample and analyze sediments outside the dredged areas. These "outside" samples will be taken before and after dredging to confirm COC concentrations are below sediment critical PCLs.

At the direction of the Executive Director, the Navy is currently preparing final details concerning the sampling regime to be followed both within and outside of the dredged area. Those details will be submitted in the Navy's Detailed Design document on contaminated sediment removal. This document will also include a contingency plan if sediment PCLs are not met both within and outside of the dredged areas. Therefore, the Executive Director believes that the Navy's current sampling regime will be adequate

and appropriate to determine that all contaminated sediments above the critical PCLs have been removed from the areas designated for dredging. The Executive Director will ensure the City, as well as any interested party, has the opportunity to provide review and comment on the draft Detailed Design document to be submitted later in 2011 or early 2012.

Response to Comment No. 2.c., related to cap design.

In evaluating the Navy's proposed cap for the sediment landfill, the Corrective Action Program follows TCEQ's Solid Waste Technical Guidance No. 3 for specific criteria for landfill cap design. Regarding the City's concern about impacts on cap integrity resulting from 100-year storm events, the Executive Director has determined that the Navy's RAP adequately accounts for such higher energy hydraulic events and conforms to TCEQ guidance.

According to the Navy's RAP, the Navy will construct scour protection structures where hydraulic calculations identify locations of high flow velocities. In addition, the Navy will use regional watershed runoff flow velocities associated with 100-year storm events to size the gravel for the cover system and the riprap and riprap aprons needed for scour protection.

Where specific watershed information is not available for riprap design, the Navy will use full flow velocities within the culverts to establish the required riprap and riprap apron sizes. The Navy will provide additional details on the design of the cover system and scour protection (i.e., calculations on storm water flow velocities, apron dimensions, and size of gravel used for the cover system) in the Detailed Design document.

To ensure the cap is performing properly and successfully, the Navy will conduct inspections after 100-year storm events, in addition to conducting its required annual cap inspections and 5-year reviews. When

the Navy submits the Detailed Design, the Executive Director will review additional information expected to be in that document regarding routine monitoring and assessment, as well as long-term operations and maintenance of the cap. As indicated previously, the City and other interested parties will have the opportunity to review and comment on the Detailed Design document.

Response to Comment Nos. 2.d. and e., related to the potential for contamination to remain after dredging, distinguishing older from younger sediment, and the rationale for not including metals analysis in the deeper samples.

The Executive Director understands there has been no additional burial of sediments that would necessitate the need to distinguish "older" from "younger" sediments. Regarding the burial of contaminated sediments, the Executive Director has been informed by the Navy that only a minimal amount of additional sedimentation (new sediments) was observed during the 2011 sediment sampling, conducted as per the Navy SAP, dated November 2010.

Based on the results of the additional sediment sampling which indicates that there has not been any significant burial of sediments since the previous sediment sampling conducted nearly 10 years earlier, the Navy has informed the Executive Director that it will not propose a no-action alternative. The Navy will remove the contaminated sediment as well as any clean sediment onto and place it in the designated portion of Cottonwood Bay.

Furthermore, due to the minimal deposition of new sediments, the need to perform additional analysis to distinguish older (buried) sediments from new sediments is not necessary. With respect to exposure of ecological receptor (e.g., benthic communities), the Navy will remediate the

dredged areas to background concentration levels, which should prevent unacceptable exposure to ecological receptors. Consequently, the Executive Director did not require the Navy to develop site-specific ecological sediment PCLs under a Tier 2 or 3 ecological risk assessment.

Finally, the Executive Director has a clear rationale for allowing the Navy to omit metals analysis in deeper samples. Under TCEQ TRRP rules, the human health exposure pathway for sediments applies to the 0 to 1-foot interval. However, the ecological exposure pathway for sediments applies only to the 0 to 0.5-foot interval. In this case, previous analytical results indicate that metal concentrations only exceed the ecological PCLs and not the human health exposure levels. Consequently, TRRP only requires analysis of the shallow interval (0 to 6 inches) and not the deeper interval (i.e., the 0.5 to 1 foot) of sediments for metals.

Response to Comment No. 2.f., regarding access to City property.

The Executive Director agrees with the City comment that the Navy must obtain approval from the City where access to City property is required to conduct the response action. Generally, the parties are able to reach an access agreement independent of action by the Executive Director and we encourage the Navy and the City to do so in this case. The Executive Director is willing to assist the parties to reach such an agreement consistent with the Remediation Division's Off-site Access Policy.

Comment No. 3

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*The City believes the Cottonwood Bay engineered cap remedy has the potential to adversely affect residents of Dallas. Therefore, the City believes that all impacted sediments should be removed and disposed of off-site at an authorized disposal facility.*

### Response to Comment No. 3

The Executive Director has determined that the Navy's proposed removal-and-control response actions complies with the response action objectives of TRRP Remedy Standard B by preventing direct exposure to the contaminated sediments. Additionally, the cap is designed to keep the contaminants from migrating. Maintaining the cap at the specified thickness for a minimum post-closure period of 30 years should provide long-term human health and ecological protection.

The proposed Order requires the Navy to conduct post-closure care operation and maintenance on the cap. This includes conducting annual integrity inspections of the cover system, as well as more comprehensive 5-year review inspections of the sediment cover. In addition, following cap construction, the Navy is required to collect and analyze fish tissue samples every three years until such time as the Texas Department of State Health Services (TDSHS) lifts the Fish Consumption Advisory 44 for Mountain Creek Lake.

#### CHANGES MADE IN RESPONSE TO COMMENT

The Executive Director has made one change to the proposed Order in response to public comment from the City of Dallas. The Executive Director added a provision to the Order and one to the Technical Requirements section. Both provisions require that the Navy must obtain the City's consent to its proposed remedy of a plume management zone (PMZ) or provide an alternative remedy which complies with TCEQ's Chapter 350 TRRP requirements.

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### RECOMMENDATION

The Executive Director has reviewed the comments from the City of Dallas (the City) and determined it is in the best interests of all parties to proceed with issuance of the Order, because:

- 1) The City does not oppose issuance of the Order, notwithstanding their concerns with the Navy's proposed response actions;
- 2) The Order mandates strict schedules for implementation of the proposed remedial actions for addressing contaminated sediments and groundwater;
- 3) The U.S. General Services Administration (GSA) intends to sell the NWIRP Dallas facility via auction in 2011. Issuance of the Order in lieu of the RCRA permit would facilitate marketability of the property by eliminating the need for the new owners to become a co-permittee along with the Navy; and
- 4) Any change in ownership of the NWIRP Dallas property will not affect the applicability or enforceability of this Order. The Navy remains responsible and liable for completing all of its obligations under this Order regardless of whether the activities are performed by agents of the Navy, or by agents of any party to whom the property is transferred before or after execution of this Order.

Respectfully submitted,

Texas Commission on Environmental Quality

Mark R. Vickery P.G.  
Executive Director

Robert Martinez, Director  
Environmental Law Division



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REPRESENTING THE  
EXECUTIVE DIRECTOR OF THE  
TEXAS COMMISSION ON  
ENVIRONMENTAL QUALITY

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Exhibit 1: Letter from City of Dallas

Exhibit 2: Interoffice Memorandum from Charles Stone, Technical Specialist in the  
Corrective Action Section to Allan Posnick, Project Manager for the NWIRP Dallas  
federal facility site.

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**CERTIFICATE OF SERVICE**

I certify that on October 18, 2011, the "Executive Director's Response to Public Comment" for Correction Action Order No. 31268 was filed with the Texas Commission on Environmental Quality's Office of the Chief Clerk.

*Susan Jere White*

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Susan Jere White, Staff Attorney  
Environmental Law Division



## CITY OF DALLAS

August 15, 2011

Melissa Chow  
Chief Clerk  
Office of the Chief Clerk, MC 105  
Texas Commission on Environmental Quality  
P.O. Box 13087  
Austin, Texas 78711-3087

Re: Comments on Proposed Corrective Action Order No. 31268  
Docket No. 2010-0069-IHW  
Naval Weapons Industrial Reserve Plant  
TCEQ SWR No. 31268  
9314 West Jefferson Boulevard  
Dallas, TX 75211

Dear Ms. Chow:

The purpose of this letter is to provide comments from the City of Dallas ("City") on the above referenced Corrective Action Order (CAO) No. 31268 for the Naval Weapons Industrial Reserve Plant (NWIRP). The NWIRP property is located west and adjacent to the former Naval Air Station Dallas ("NASD")/Hensley Field property owned by the City and contaminated groundwater and sediment from NWIRP affect City property.

NWIRP operations have resulted in releases of chlorinated volatile organic compounds (VOCs) and hexavalent chromium to shallow groundwater NWIRP-wide (and off-site) known as the Trichloroethene (TCE) Area ("AOC-18" TCE) groundwater plume and releases of polychlorinated biphenyls (PCBs) and various heavy metals (antimony, cadmium, chromium, copper, lead, mercury, nickel, silver and zinc) affecting sediments present in Cottonwood Bay and two discrete areas of Mountain Creek Lake (approximately 7.4 acres) adjacent to NASD. The CAO requires the Navy to implement and complete response actions and, where applicable, post-response actions for soil, groundwater and sediment contamination associated with releases from the solid waste management units (SWMUs) and Areas of Concern (AOCs) associated with NWIRP. The CAO requires the Navy to implement the proposed plume management zone (PMZ) remedy, which includes groundwater monitoring and institutional controls for the AOC-18 TCE plume to verify compliance with TCEQ Texas Risk Reduction Program (TRRP) standards. Additionally, the CAO requires the Navy to dredge, consolidate, and cover contaminated sediments from Cottonwood Bay and from discrete areas of Mountain Creek Lake on a portion of Cottonwood Bay, resulting in a unit that will be capped with a liner and 12-inches of gravel that serves as a permanent remedy preventing future human or ecological exposures to contaminated sediment.

The AOC-18 TCE groundwater plume has migrated onto and impacts 5.2 acres of the western portion of NASD. Figure 4 and Figure 4B from the CAO exhibit the groundwater plume's location beneath the City's property. Additionally, a portion of Cottonwood Bay and the Diversion Channel that contain impacted sediments are also owned by the City and the two affected areas in Mountain Creek Lake are adjoining City property. The City has concerns about the proposed remedies that affect the City property: the PMZ remedy for the portion of the AOC-18 TCE groundwater plume that migrated onto and impacts NASD and the remedy for the sediment contamination in Cottonwood Bay. The City also believes the Cottonwood Bay engineered cap remedy has the potential to adversely affect residents of the City of Dallas.

**AOC-18 TCE Groundwater Plume**

The Navy submitted a Groundwater Response Action Plan (RAP) in June 2009 to address the AOC-18 TCE groundwater plume. The TCEQ stated that the Navy demonstrated that the AOC-18 TCE plume is stable and not increasing in concentration or expanding in size; therefore, the Navy proposed a final remedy that included a

plume management zone (PMZ) and on May 16, 2010, the Executive Director of the TCEQ gave preliminary approval of the Groundwater RAP. The PMZ included the area of NASD that was impacted by the AOC-18 plume. The problem with this approval is that to date, the City has not agreed to a PMZ on NASD and has expressed this position multiple times. In addition, the City does not agree sufficient monitoring has been conducted to determine that the groundwater plume is stable and will not migrate further onto the City of Dallas property. The City is concerned that a lack of controls by the Navy - pump and treat system has been shut down and no engineering controls at the property boundary with NASD - presents the possibility that contaminated groundwater can further migrate onto NASD.

The CAO included the following deed recordation requirements regarding the groundwater plume, "If the Executive Director approves waste and contaminated media to remain in place above health-based concentration levels after completion of the corrective action and/or groundwater monitoring programs, the Navy shall record an instrument in the county deed records for the facility to specifically identify the areas of contamination exceeding health-based values. The deed certification shall follow the requirements of 30 TAC §§335.560 and 335.569 or 30 TAC §350.11, where applicable. If the Navy is unable to comply with the IC requirements for off-site landowner concurrence within the required 120-day timeframe, then the Navy must submit a revised RAP within the following 90-day period. The revised RAP must propose a remedial technology for the off-site parcel that can successfully reduce the COCs to the critical PCLs in a reasonable timeframe."

The corrective action performance standard for groundwater in the CAO also states that corrective action must be performed "beyond the facility boundary where necessary to protect human health and the environment, unless the Navy demonstrates to the satisfaction of the Executive Director that, despite the Navy's best efforts, the necessary permission from the property owner(s) was not received to undertake such action. The Navy is not relieved of all responsibility to clean up a release that has migrated beyond the facility boundary where off-site access is denied."

As a property owner, the City has the right to require that the groundwater beneath NASD be cleaned up to unrestricted standards - Remedy Standard A Residential Protective Concentration Levels (PCLs). As stated in the CAO, "The Executive Director's approval for implementation of the proposed PMZ is contingent upon the Navy providing proof of filing of deed notices and restrictive covenants (e.g., institutional controls). In the event that the Navy does not secure consent for its proposed remedy from the affected landowner, then the Navy will be required under this Order to develop an alternative remedy for the contamination in the groundwater plume consistent with 30 TAC Section 350.32 related to Remedy Standard A or 350.33 related to Remedy Standard B." In an effort to assist the Navy and provide an estimate of cleanup costs, the City obtained a proposal prepared by Terracon for conceptual costs for an alternative remedy using zero valent iron (ZVI) permeable reactive barrier (PRB) walls at the property boundary and surrounding the plume on NASD and conducting in situ injection of an electron donor into the plume. This proposal was submitted to the TCEQ, by their request, in June 2011, and is included as an attachment to this letter.

Additional reasons for the City not giving consent to a PMZ are 1) the remedy does not satisfy the Navy's obligations to the City pursuant to an enforceable settlement agreement, and 2) the remedy restricts the future development over and through the contaminated groundwater area.

1) The City of Dallas v. United States Settlement Agreement

On or about August 20, 2002, the City and the Navy entered into a Settlement Agreement ("Agreement") (attached) to resolve a lawsuit styled *City of Dallas v. United States*, No. 01-284-C in the United States Court of Federal Claims ("CFC Lawsuit"). The City brought the lawsuit alleging certain contractual violations and an unconstitutional taking arising out of the Navy's operation of NASD. In addition, the City served upon Navy a notice of intent to sue for environmental claims arising under the Resource Conservation and Recovery Act ("RCRA Notice"). The Agreement resolves all of these claims.

Among other things, the Agreement requires Navy to remediate the contaminated "groundwater under and within the [NASD] property to demonstrate achievement with the Applicable Remedy Standard" (para. 13(d)). The Agreement provides that if Navy "defaults upon its obligation to complete the Agreed Remediation in accordance with the terms of this Agreement, Dallas shall be entitled to recover damages

for such default measured by an amount sufficient to fund completion of the Agreed Remediation by Dallas."

The scope of the Agreement includes the portion of the AOC-18 TCE plume that has migrated onto NASD property. Paragraph 10 of the Agreement explains that the Agreement is intended to resolve the "Environmental Claims." "Environmental Claims" is a defined term. Paragraph 8 of the Agreement states: "All claims or causes of action based upon state or federal environmental statutes, or equitable doctrines that protect health, safety or the environment arising out of conduct or conditions at NASD, whether or not such claims or causes of action are expressly identified in either the RCRA Notice or the CFC lawsuit, are hereinafter referred to as the "Environmental Claims" (emphasis added).

By migrating onto City property, the AOC-18 TCE plume creates a claim or cause of action "based upon" RCRA and equitable doctrines as set forth in the Agreement. In addition, the AOC-18 plume is a "condition" at NASD caused by Navy's conduct. Since the AOC-18 plume is covered by the scope of the Agreement to the extent it has migrated to NASD, the portion of that plume that has migrated to NASD must be remediated to demonstrate achievement with the Applicable Remedy Standard.

The CAO Proposed Groundwater Remedy does not satisfy the Settlement Agreement. Paragraph 13 of the Agreement defines the Applicable Remedy Standard as: "[R]emediation... in accordance with the procedures and requirements of the Texas Risk Reduction Program, 30 Texas Admin. Code Ch. 350, as administered by [TCEQ], to attain Remedy Standard A and achieve contaminant of concern ("COC") concentration levels below the Residential critical primary contaminant levels ("PCLs), requiring no institutional or engineering controls and no other restrictions upon the use of soil or groundwater[.]" By leaving the plume in place, the PMZ will not bring contamination below the Residential PCLs.

2) The PMZ has the potential to restrict redevelopment of this area of NASD and would require additional measures to ensure protection of human health and the environment because contaminated groundwater is left in place. This would be at additional cost to the City. The AOC-18 TCE plume affects 5.2 acres of the northwestern area of the NASD property and the proposed PMZ affects 9.6 acres of the NASD property. Types of redevelopment that could be affected are construction of a building, utility lines, or gas wells. If the City constructs a building over or even near the AOC-18 TCE groundwater plume, there is the potential for vapor intrusion and therefore, will need mitigation of possible vapors. Installation of a water utility line over and possibly through the impacted groundwater is another construction activity that could be impacted. NASD property, including the impacted area, has been leased for gas well development and the presence of contaminated groundwater will restrict development in this area. The final concern is the loss of value of the property because it is contaminated. The City's ability to sell or lease NASD property would be negatively affected by contaminated groundwater left in place.

### Sediment Contamination

RCRA Permit No. 50279 requires the Navy to address off-site contamination, including contaminated sediments within Mountain Creek Lake and Cottonwood Bay. In June 2009, the Navy submitted a Sediment Response Action Plan (RAP) to address contaminated sediments in Mountain Creek Lake, the Diversion Channel, and Cottonwood Bay, which included the removal of contaminated sediments from areas not under Navy ownership, and consolidation of affected sediments in Cottonwood Bay. Subsequent to consolidation, the sediments will be covered with an artificial liner and 12 inches of gravel to prevent water infiltration and migration of the contaminants. The Executive Director of the TCEQ gave preliminary approval of the Sediment RAP on June 7, 2010.

The corrective action objective for contaminated sediments in Mountain Creek Lake includes the permanent removal of chemicals of concern greater than the applicable Critical Protective Concentration Levels from Mountain Creek Lake, the Diversion Channel and the eastern portion of Cottonwood Bay owned by the City of Dallas, and the southwestern portion of Cottonwood Bay to prevent direct human or ecological exposure. This objective is to be achieved through dredging, consolidation, and permanent capping of these sediments within a portion of Cottonwood Bay.

The City does not agree with the chosen remedy for the contaminated sediment in Cottonwood Bay. The City is very concerned about the Navy containing the sediments within Cottonwood Bay and the future risk of human and environmental exposure to contaminated sediments. The City believes that all impacted sediments should be dredged and transported and disposed of at an approved off-site facility.

Two reports from the Navy that address the contaminated sediments in Cottonwood Bay and Mountain Creek Lake are 1) The Navy's Draft Final Mountain Creek Lake Sediment RAP, Naval Weapons Industrial Reserve Plant, Dallas, Texas, dated June 2009 and 2) Sampling and Analysis Plan (SAP) (Field Sampling Plan and Quality Assurance Project Plan), Remedy Design for Mountain Creek Lake Sediment, Naval Weapons Industrial Reserve Plant Dallas, Dallas, Texas, dated November 2010. The City comments are separated to address the details in each of these reports.

1) The Sediment RAP identifies PCBs and several heavy metals as contaminants of concern (COCs) for Cottonwood Bay and Mountain Creek Lake, including chromium and lead. The Navy screened multiple potential technologies to prevent human and environmental exposure to contaminated sediments including treatment, containment, removal, and natural attenuation. Response action alternatives were developed considering various combinations of removal and containment, and natural attenuation. These alternatives were then evaluated based on implementability, reliability, acceptability, and cost. After evaluation, the Navy determined that the best alternative is a combination of removal by dredging and containment of all contaminated sediments in place by constructing a cover system.

The City is not comfortable with the removal of contaminated sediment from City-owned property and redeposition of the material onto Navy property. The City requests that all sediment and associated material dredged from City property be properly disposed of offsite at an approved facility in accordance with applicable regulations (state, local and federal). As supported by the RAP, this is a feasible alternative that was rated high for implementability, reliability and acceptability. This alternative has additional capital costs, but eliminates additional costs associated with future inspections and monitoring - which are required when the contaminated sediments are capped in place.

The RAP also includes the evaluation of water flow through Cottonwood Bay to evaluate the water energy within the bay to account for design to accommodate a 25 year storm event. NWIRP is currently being contemplated for early transfer to another owner and the City of Dallas Hensley Field is currently undergoing redevelopment into active land uses that are not currently present at the site. How will future land use of the NWIRP site, adjacent NASD, and other surrounding properties be evaluated with respect to the potential to generate higher energy environments in Cottonwood Bay in future storm events?

The planned confirmation sampling appears extremely limited. A minimum of four samples per one-half acre of City owned property should be planned for proper confirmation sampling subsequent to settling of disturbed sediments following the proposed dredging.

2) The SAP was developed to evaluate the magnitude and extent of sediments affected with COCs, since the original sediment sampling data is over 10 years old and unaffected sediments may have partially covered affected sediments or affected sediments may have migrated beyond the originally-defined boundaries of affected sediment.

The SAP indicates a potential no action decision if affected sediments have been buried. Has a study of the benthic communities present at the site been conducted that evaluates the benthic communities present and the typical depths that the communities burrow into sediments? In the event of no action, what actions will be taken to ensure that large-scale erosion during storm events or other high velocity flows will not erode affected sediments and distribute them over a larger area or onto other properties not owned by the Navy?

The SAP indicates that sediment samples will be collected at a depth of 0 to 6 inches and the second sample from 6 inches to 12 inches. The SAP indicates that the shallow sample will be analyzed for polychlorinated biphenyls (PCBs), polynuclear aromatic hydrocarbons (PAHs) and metals, and the deeper sample will be analyzed for PAHs and PCBs. What is the rationale for excluding metals analysis

from the deeper sediment sample? Please explain the rationale for how two relatively shallow sediment samples will be able to distinguish between the affected sediments originally detected on the site, burial of the affected sediments with a deep blanket of unaffected sediments and large-scale scour and redeposition of affected sediments in other areas.

### Conclusions

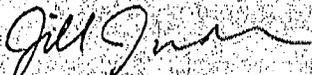
The CAO states that the AOC-18 TCE plume is being addressed through the use of a PMZ; however, the City has not agreed to a PMZ on NASD property. As a property owner, the City has the right to require that the groundwater beneath NASD be cleaned up to Remedy Standard A Residential Protective Concentration Levels (PCLs). Attached to this letter is a proposal for the conceptual costs of an alternative remedy that will clean up the contaminated groundwater on NASD. Based on review of the CAO, the Navy retains responsibility for response actions for the portion of AOC-18 that has migrated onto NASD regardless of whether the City agrees to a PMZ. The City does not agree to PMZ because 1) the remedy does not satisfy the Navy's obligations to the City pursuant to an enforceable settlement agreement, and 2) the remedy restricts the future development over and through the contaminated groundwater area.

The Sediment RAP includes the removal of affected sediments from the portion of Cottonwood Bay owned by the City, but contaminated sediment is proposed to be capped in place in Cottonwood Bay. The City is not comfortable with containing contaminated sediments in Cottonwood Bay and is concerned about the future risk of human and environmental exposure to the contaminated sediments. In addition, approval will need to be obtained from the City to allow proper removal of the affected sediments from Mountain Creek Lake.

The City feels it is important to point out that the CAO includes the following provisions regarding the Navy's responsibility, "Any change in ownership of the NWIRP Dallas property will not affect the applicability or enforceability of this CAO. The Navy remains responsible for completion of remediation and post-response action care no matter whether it conducts the remediation and post-response action care directly or through a third-party agent acting on behalf of the Navy." Additionally, "No change in ownership, corporate status, or partnership status relating to the facility will alter in any way the status or responsibility of the Navy under this CAO. The Navy shall be responsible for and liable for completing all of its obligations under this CAO, regardless of whether the activities specified herein are to be performed by employees, agents, contractors, or consultants of the Navy, or by employees, agents, contractors, or consultants of any party to whom the property is transferred before or after the execution of this CAO."

As an adjoining, impacted property owner, the City appreciates the opportunity to express our concerns and provide comments on the proposed remedy for the groundwater contamination identified as the AOC-18—TCE plume and the remedy for the sediment contamination in Cottonwood Bay and adjacent Mountain Creek Lake. If you require additional information, please contact Lori Fraull Trulson at (214) 671-8967.

Sincerely,



Jill A. Jordan, P.E.  
Assistant City Manager

c: Mary K. Suhm, City Manager  
A.C. Gonzalez, First Assistant City Manager  
Ryan S. Evans, Assistant City Manager  
Theresa O'Donnell, Director, Sustainable Development and Construction  
Kris Sweckard, Managing Director, Office of Environmental Quality  
Lemuél B. Thomas, Assistant City Attorney

March 24, 2011

Ms. Lori Trulson  
City of Dallas, Office of Environmental Quality  
1500 Marilla Street  
Dallas, Texas 75201

Phone: (214) 671-8967  
Fax: (214) 670-0134

RE: Estimated Conceptual Remedial Costs for the  
NWIRP AOC 2 Plume at  
Former Naval Air Station Dallas – Hensley Field  
8200 West Jefferson Boulevard  
Dallas, Dallas County, Texas  
Terracon Project No. 94067208

Dear Ms. Frauli:

As requested, Terracon Consultants, Inc. (Terracon) has prepared a summary of estimated conceptual remedial costs for cleanup of that portion of the Naval Weapons Industrial Reserve Plant (NWIRP) Dallas AOC-2 groundwater contamination plume on the former Naval Air Station (NAS) Dallas property. NWIRP Dallas is owned by the U.S. Navy and occupies a 314-acre facility which borders the former NAS Dallas property on the west. Area of Concern 16 (AOC-18), located on the eastern edge of the NWIRP property, was a waste petroleum, oil, and lubricant (POL) site that contains chlorinated volatile organic compounds in groundwater. The eastern extent of the groundwater plume currently extends approximately 300 feet onto the northwestern portion of the former NAS Dallas property, and is known as AOC-2 on the former NAS Dallas property. The impacted groundwater consists of up to three groundwater bearing intervals within the alluvial deposits and extends from a depth of approximately 15 feet to approximately 70 feet below ground surface.

In 1996, a groundwater recovery and treatment system consisting of up to seven groundwater recovery wells was installed. The groundwater recovery system was taken out of service in March 2008 and the Navy currently plans to address groundwater issues by the establishment of a plume management zone (PMZ) to limit possible future exposure to chemicals of concern (COCs) within the groundwater protective concentration level exceedances (PCLE) zones. However, as you are aware, such a PMZ approach requires the land owner to implement deed restrictions on their property to limit the use of groundwater. Furthermore, without an active groundwater cleanup effort, groundwater quality is not expected to improve significantly over the next several years (or decades) and long term groundwater monitoring would still be required.



Terracon Consultants, Inc. 8901 Carpenter Freeway, Suite 100 Dallas, Texas 75247 Registration No. F-3272  
P [214] 630 1010 F [214] 630 7070 terracon.com

The purpose of this letter is to present estimated conceptual costs for an alternative remedy to the PMZ remedial approach. Terracon's task has not included an in depth evaluation of the feasibility of multiple remedial alternatives. In particular, conceptual costs are presented for the installation of subsurface granular iron permeable reactive barriers (PRBs) that could be designed to intercept and treat groundwater contaminants in situ as the contaminated groundwater flows through the treatment barrier. Such treatment barriers have been effectively installed at other sites and in similar situations. Once installed, these barriers provide effective treatment for up to 20 or more years and do not typically interfere with future site development. Groundwater monitoring is typically required to ensure that the system is operating as designed.

### **Conceptual Design**

Granular iron PRBs utilize the highly reducing conditions brought about by the chemical interaction of the zero valent iron grains with groundwater as the groundwater passes through the treatment zone to reductively dechlorinate VOCs such as trichloroethene (TCE), cis-1,2-dichloroethene (cis 1,2 DCE), and vinyl chloride to innocuous end products. Over time, the surfaces of the granular iron grains within the barrier will tend to passivate and treatment efficiency will decline. However, based on previous performance of other PRB installations, treatment is expected to remain effective for up to 20 to 30 years.

The attached Figure 1 illustrates the location of two conceptual granular iron permeable reactive barriers for groundwater treatment. The most suitable method for installation of the barrier would be excavation using a biopolymer slurry for temporary trench support and installation of the granular iron/sand mixture via a tremie pipe into the appropriate desired depth intervals for treatment. Based on discussions with Envirometal Technologies, Inc., the license holder for the use of zero valent iron for groundwater remediation, it should be possible to incorporate layers of low permeability material between the treatment zones. As shown, the western barrier would be approximately 630 feet long and located along the property line between the NWIRP and NAS properties. It would be designed to intercept and treat groundwater COCs as they flowed eastward from the contaminant source area on the NWIRP site onto NAS property. The second conceptual barrier would be approximately 825 feet long and would be located to the east of the current groundwater PCLE zone on NAS property. This barrier would be designed to treat groundwater COCs as they flowed to the southeast and to prevent further spreading of the plume at NAS Dallas. It has been assumed that both barriers would be installed to a depth of approximately 70 feet. Following cessation of groundwater recovery efforts at the NWIRP property, it is expected that groundwater flow will resume in a southeasterly direction. For the purposes of this conceptual design it has been assumed that the mean groundwater flow velocity is on the order of 30 feet per year and that the influent COC concentrations would be similar to the maximum observed COC concentrations in the past three years.

The following table summarizes conceptual costs for the design, installation, and groundwater monitoring costs expected to be typical for implementing such a remedy. Since it is not clear at the present time, what if any reductions in groundwater concentrations may occur upgradient of the NAS property, it has been assumed that the upgradient PRB along the property line would be replaced once after 20 years. In addition, a contingency has been included to perform limited in situ injections of an

electron donor in the area between the two conceptual barriers to treat potential residual localized areas of groundwater impact at the NAS property.

**Estimated Conceptual Costs for Treatment of Groundwater at NAS Dallas  
 Downgradient of NWIRP Dallas AOC-2 Plume (See Attached Figure1)**

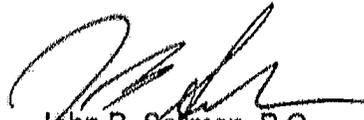
ITEM	ESTIMATED CONCEPTUAL COST
1) Additional Investigation to Support Detailed Design	\$20,000
2) Bench Scale Testing and Detailed Design	\$30,000
3) Property Boundary PRB (630'x70'x3')	
Granular Iron Supply and Delivery	\$480,000
Contractor Mob/Demob	\$25,000
Excavation and Placement	\$1,103,000
ETI Site License	\$193,000
Soil Transportation and Disposal	\$318,500
Construction Oversight	\$25,000
4) Toe of Plume PRB (825'x70'x3')	
Granular Iron Supply and Delivery	\$628,000
Contractor Mob/Demob	\$25,000
Excavation and Placement	\$1,444,000
ETI Site License	\$252,000
Soil Transportation and Disposal	\$417,300
Construction Oversight	\$25,000
5) Contingency for In Situ Injections of Electron Donor Between Barriers	\$300,000
6) Contingency for Replacement of Property Boundary PRB after 20 years	\$2,144,500
7) Annual Groundwater Monitoring and Reporting for 30 Years	\$750,000
<b>Subtotal Items 1 through 7 Above</b>	<b>\$8,180,300</b>
<b>Additional ~25% Contingency</b>	<b>\$2,050,000</b>
<b>Estimated Grand Total Including Contingency</b>	<b>\$10,230,300</b>

It should be noted that the conceptual design is considered to be conservative due to the complexity of the plume and the uncertainty of how the plume will behave now that groundwater recovery efforts associated with the NWIRP plume have terminated. Should you have any questions regarding this comment letter, please contact either of the undersigned.

Sincerely,  
 Terracon Consultants, Inc.



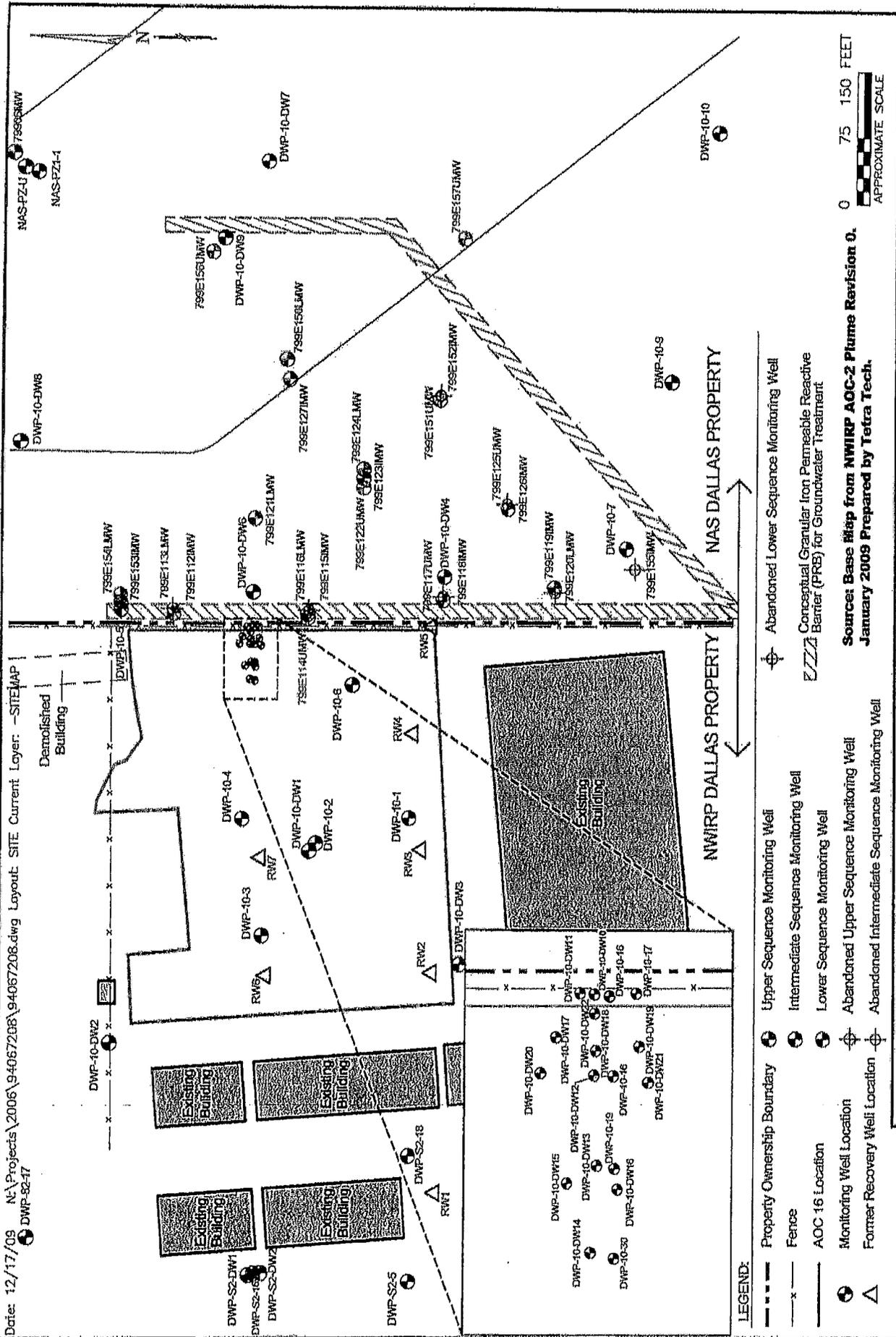
John L. Cuddihee, P.E.  
 Principal



John B. Saliman, P.G.  
 Principal

Attachment - Figure 1: Site Map NWIRP AOC-2

Date: 12/17/09 N:\Projects\2006\94067208\94067208.dwg Layout: SITE Current Layer: -SITE\MAP  
 DWP-82-47



- LEGEND:**
- Property Ownership Boundary
  - - - Fence
  - AOC 16 Location
  - Monitoring Well Location
  - △ Former Recovery Well Location
  - Upper Sequence Monitoring Well
  - Intermediate Sequence Monitoring Well
  - Lower Sequence Monitoring Well
  - ⊕ Abandoned Upper Sequence Monitoring Well
  - ⊕ Abandoned Intermediate Sequence Monitoring Well
  - ⊕ Abandoned Lower Sequence Monitoring Well
  - ▤ Concentrational Granular Iron Permeable Reactive Barrier (PRB) for Groundwater Treatment

Source: Base Map from NWIRP AOC-2 Plume Revision 0.  
 January 2009 Prepared by Tetra Tech.

**THIS DRAWING SHOULD NOT BE USED SEPARATELY FROM ORIGINAL REPORT.**  
 NOTE: ALL BORING LOCATIONS ARE APPROXIMATE.

Project Mgr:	JC
Drawn By:	JUD
Checked By:	JC
Approved By:	JC
Project No:	94067208
Scale:	AS SHOWN
Date:	12/15/09

**Tetracon**  
 Consulting Engineers and Scientists  
 Registration No. F-3072  
 8801 CARPENTER-HOESBERRY DALLAS, TEXAS 75247  
 PH: (214) 530-6000 FAX: (214) 530-7070

**SITE MAP**  
**NWIRP AOC-2**  
 FORMER NAS DALLAS  
 DALLAS, TEXAS

**FIGURE 1**

IN THE UNITED STATES COURT OF FEDERAL CLAIMS

CITY OF DALLAS, TEXAS,

Plaintiff,

v.

UNITED STATES,

Defendant.

No. 01-284 C  
(Chief Judge Baskir)

SETTLEMENT AGREEMENT

For the purpose of disposing of this action, without there being further judicial proceedings and without there being any trial or adjudication of any issue of fact or law, and for no other purpose, the United States and the City of Dallas, a Texas home rule municipality ("Dallas"), stipulate and agree as follows (an index of defined terms is attached as Addendum 1):

1. Beginning in 1929, the United States government occupied portions of Hensley Field, the site that came to be known as Naval Air Station Dallas ("NASD"), through agreements with Dallas, the owner of most of the property.
2. a. One portion of the site (approximately 30 acres) was purchased from Dallas by the United States in December 1940 pursuant to a Warranty Deed (the "Reverter Deed") providing that the property was conveyed "upon the express condition and limitation that it will be used by the United

States Government for the purpose of a United States Naval Training Base, and in the event the United States Government shall cease to use the property then this deed of conveyance shall become ipso facto null and void and of no further effect and the title shall revert back to the City of Dallas, free and clear of any encumbrance whatsoever . . . ." The property subject to this Reverter Deed is hereinafter referred to as the "Reverter Property."

b. A larger portion of the NASD site (approximately 722 acres) was leased by Dallas to the United States pursuant to a Lease (No. NOY(R)-44881) dated July 1, 1949, which was subsequently modified on ten separate occasions (the "NASD Lease"). The property subject to the Lease is hereinafter referred to as the "Leased Property."

c. In 1955, the United States extended the primary runway serving NASD approximately 500 feet into the adjacent Mountain Creek Lake, purchasing the newly-created land (approximately 14.1 acres) from the utility that used the lake as a cooling reservoir. This tract, which is contiguous to the Leased Property, is hereinafter referred to as the "Runway Extension." The United States conveyed ownership of the Runway Extension to Dallas pursuant to a Deed Without Warranty dated February 11, 2000, which limits future use of the Runway Extension to "nonresidential use . . . to include industrial use, and also to include any commercial use, office use, recreational use or use

Incidental to the aforementioned use if such incidental use is (1) permitted by applicable regulatory authorities; and (2) if such incidental use does not require further environmental remediation beyond that required for industrial use" of the Runway Extension.

3. The property that is the subject of this Agreement (which includes the Reverter Property, the Leased Property, and the Runway Extension) is more particularly described on Addendum 2 attached hereto and incorporated herein (the "Property").

4. In 1993, the Base Realignment and Closure Commission announced that NASD was one of the military bases slated for closure under the Defense Base Closure and Realignment Act of 1990, as amended, 10 U.S.C. § 2687 ("BRAC"). NASD officially closed as a Naval Air Station effective September 30, 1998.

5. On March 10, 1999, DON sent a letter notifying Dallas that it intended to terminate the NASD Lease in 60 days, i.e., effective May 10, 1999. On May 7, 1999, DON notified Dallas by letter that it was relinquishing the Reverter Property, intending it to revert to Dallas as of May 10, 1999.

6. On or about May 9, 2001, Dallas filed a complaint in the United States Court of Federal Claims ("CFC") styled City of Dallas, Texas v. United States of America, No. 01-284G (the "CFC Lawsuit"). In the CFC Lawsuit,

Dallas asserted that the United States, acting by and through the Department of Navy ("DON") and the Department of Defense ("DOD"), had breached certain contractual obligations arising under the NASD Lease and Reverter Deed, and that certain conduct by the United States constituted a permanent or temporary taking of private property without just compensation in violation of the United States Constitution.

7. The United States timely filed an answer to Dallas's complaint in the CFC Lawsuit, denying liability upon the claims asserted by Dallas, asserting Dallas's failure to state a claim as to some of the matters asserted, and challenging the Court's jurisdiction to grant some of the relief requested by Dallas.

8. On or about September 4, 2001, Dallas served upon DON and DOD a Notice of Intention to Sue for Violations of the Resource Conservation and Recovery Act, 42 U.S.C. §§ 6901 et seq. ("RCRA"), alleging certain violations of RCRA and the Texas Solid Waste Disposal Act, TEX. HEALTH & SAFETY CODE, Ch. 361 ("TSWDA"), arising out of DON's and DOD's conduct at NASD. All claims or causes of action based upon state or federal environmental statutes (including, but not necessarily limited to, RCRA, TSWDA, the Comprehensive Environmental Response, Compensation, Liability Act ("CERCLA"), and the Federal Water Pollution Control Act), or

equitable doctrines that protect health, safety or the environment arising out of conduct or conditions at NASD, whether or not such claims or causes of action are expressly identified in either the RCRA Notice or the CFC Lawsuit, are hereinafter referred to as the "Environmental Claims."

9. DON has not formally responded to the RCRA Notice, but denies liability for the claims asserted therein and any other Environmental Claims.

10. The parties engaged in negotiations to resolve their disputes and have now agreed to settle all claims, including the Environmental Claims, not expressly reserved in this agreement that each may have against the other based upon the United States' occupation of, and conduct at, NASD upon the basis of the terms and representations set forth in this Settlement Agreement. The terms of the settlement have been accepted upon behalf of the Attorney General.

11. By entering into this agreement, neither the United States nor Dallas is admitting any wrongdoing or conceding any legal or factual position advocated by either party. Each of the parties to this Agreement denies any liability to any other party herein, and it is fully understood that this Agreement is being made only to settle and compromise existing disputes, to avoid the uncertainties and expense of further litigation, and that this Agreement does

not in any way constitute or imply an admission of liability of any kind or character by any party to this Agreement.

12. Upon execution of this agreement by all parties, the United States shall promptly pay to Dallas \$18,550,000. Further, DON shall commit to the Agreed Remediation at least \$25,000,000 of funds previously appropriated in FY 2002.

13. The United States, through the DON, will discharge any obligation(s) imposed upon the United States by CERCLA 120 (42 U.S.C. § 9620, as delegated to DON by Executive Order 12580) and, within the time period provided in Paragraph 14 (except as otherwise expressly provided in Paragraph 13d), will perform the following remediation (the "Agreed Remediation") upon the Property in accordance with the procedures and requirements of the Texas Risk Reduction Program, 30 TEXAS ADMIN. CODE, Ch. 350, as administered by the Texas Natural Resource Conservation Commission, to be known as the Texas Commission on Environmental Quality ("TCEQ"), to attain Remedy Standard A and achieve contaminant of concern ("COC") concentration levels below the Residential critical primary contaminant levels ("PCLs"), requiring no institutional or engineering controls and no other restrictions upon the use of the soil or groundwater (the "Applicable Remedy Standard"), except as to the Runway Extension, remediation of which shall be

governed by the Deed Without Warranty dated February 11, 2000, and the industrial or other nonresidential uses referenced therein, to the extent such remediation standard is inconsistent with this Agreement. The United States will:

a. Remediate or remove contaminated surface and subsurface soils within the Property to demonstrate achievement of the Applicable Remedy Standard (except to the extent otherwise agreed to in writing by Dallas and approved by TCEQ, and except as specifically provided in Paragraph 13h with respect to Building 20 and Building 156).

b. Remediate the two "TANG Ponds" (identified on Addendum 2) to demonstrate achievement of the Applicable Remedy Standard (except to the extent otherwise agreed to in writing by Dallas and approved by TCEQ). Upon accomplishing this remediation and obtaining closure from TCEQ, the United States will not be responsible for any renewed contamination of the TANG ponds not caused by the United States.

c. Remediate or remove the contents of the construction "Rubble Landfill" (identified on Addendum 2) to demonstrate achievement of the Applicable Remedy Standard (except to the extent otherwise agreed to in writing by Dallas and approved by TCEQ).

d. Remediate the contaminants in groundwater under and within the Property to demonstrate achievement of the Applicable Remedy Standard (except to the extent otherwise agreed to in writing by Dallas and approved by TCEQ) no later than 15 years after commencement of the work, utilizing monitored natural attenuation as the primary remedial method, as approved by the TCEQ. In the event the TCEQ does not approve the proposed remediation method, or ongoing groundwater monitoring discloses the need for more active remedial measures to be undertaken in order to complete groundwater remediation to the Applicable Remedy Standard within 15 years following commencement of the work, the United States shall undertake such measures in a timely manner.

e. Remove or otherwise abate all damaged, friable, and accessible asbestos containing materials ("ACM") from the following buildings: 21, 23, 26, 33, 40, 43, 142, 155, 1239, 1307, and 1411. If, pursuant to Paragraph 13h, Dallas determines, and TCEQ approves, that Building 20 (north annex only) will not be demolished, then Building 20 (north annex only) will be added to the preceding list.

f. Remove all underground steam piping on or within the Property, including all friable asbestos lagging, leaving concrete utility corridors in place, free of ACM.

g. Abate lead-based paint in two residential buildings (202 and 203) in accordance with the Residential Lead-based Paint Hazard Reduction Act of 1992, 42 USC §4851 et seq., and all applicable regulations.

h. Demolish and remove from the Property the debris of the following buildings or structures: 20 (north annex only), 36, 37, 38, 39, 42, 62, 82, 100, 138, 139, 175, 180, 186, 190, 196, 198, 197, 198, 199, 211, 216, 230, and 235. Also, if soil contamination above the Applicable Remedy Standard is detected beneath the building, demolish and remove from the Property the debris of Building 178 and Building 156. With respect to Building 20 (north annex only) and Building 156, if Dallas shall determine to preserve either structure without demolition, despite the existence of soil contamination underneath the structure, the Applicable Remedy Standard shall not apply to the soil beneath such structures, and within a reasonable clearance radius around the exterior walls of such structures for the operation of equipment. The alternate remedy standard for such soils shall be the Texas Risk Reduction Program, 30 TEXAS ADMIN. CODE, Ch. 350, Remedy Standard B, to achieve COC concentration levels below the Industrial critical PCLs, and Dallas agrees to cooperate in any deed restriction of these areas consistent with detected soil contaminants in accordance with the procedures and requirements of TCEQ to attain such alternate remedy standard. Within 90

days after execution of this agreement by all parties, Dallas shall notify the United States of Dallas's determination whether Building 20 (north annex only) or Building 156, or both, shall be demolished.

14. Dallas shall provide the United States (including its contractors, agents, and assigns) reasonable access to the Property at a level and duration necessary to perform the Agreed Remediation and associated tasks listed above, subject to the following terms, ensuring no unreasonable impediment or delay of Property redevelopment and reuse, and consistent with access to and use of the Property by Dallas and any tenants of the Property. Dallas shall impose restrictions upon the use of the Property to the extent and for the time period required to perform the Agreed Remediation under the terms of this Agreement. Accordingly, Dallas shall grant access to the Property for the purposes of performing the Agreed Remediation, subject to the following terms and conditions:

a. The United States shall commence on-site field work in connection with Agreed Remediation on or before 90 days following execution of this agreement by all parties, subject to Unavoidable Delay, and shall provide reasonable advance notice to Dallas of the planned start date. For purposes of this Agreement, "Unavoidable Delay" shall mean a delay resulting from inclement weather preventing onsite activity; TCEQ, EPA, or other agency

review of DON submissions or requests for concurrence; or building or development permit processing. The United States shall furnish periodic reports of Unavoidable Delays to Dallas, in order to facilitate Dallas's planning with respect to future reuse and redevelopment of the Property. Unavoidable Delays shall extend upon a day-for-day basis the period within which the United States agrees to complete the Agreed Remediation. In the event that further investigation, TCEQ review of reports, or subsequent events reveal the necessity for "New Work", the United States will, as quickly as reasonably feasible under the circumstances, remediate that contamination so that the condition of the Property conforms with the Applicable Remedy Standard (except to the extent otherwise agreed to in writing by Dallas and approved by TCEQ) as approved by the TCEQ. "New Work" shall mean any activity that is not described in DON's Work Plan (Addendum 3) and that the United States elects (or is required by the terms of this Agreement) to pursue in connection with the Agreed Remediation. Discovery of the necessity for New Work shall extend upon a day-for-day basis, based upon reasonable DON estimates of work periods, the period within which the United States agrees to complete the Agreed Remediation.

b. The United States shall pursue the Agreed Remediation field work with reasonable commercial diligence and shall complete the Agreed

Remediation field work within 36 months of commencement, subject to either Unavoidable Delay or the need for New Work. The parties acknowledge that either New Work or Unavoidable Delay may extend the work schedule.

c. DON has prepared and Dallas has reviewed DON's Work Plan (Addendum 3), describing generally the activities the United States plans to undertake upon the Property in connection with the Agreed Remediation. With respect to New Work, the United States shall provide a minimum of 30 days' advance notice to Dallas, describing in reasonable detail the planned activity, approximate work and clearance areas, schedule for onsite work, and other details available to the United States pertaining to such activities, in order to allow Dallas to notify tenants and contractors potentially affected by the New Work and minimize disruption of tenant and contractor activities.

d. Dallas shall take all actions reasonably necessary to provide the United States with access to all areas of the Property, including any areas occupied pursuant to a lease or other agreement with Dallas, as necessary to accomplish the Agreed Remediation. For those portions of the Property subject to the lease agreements identified in Addendum 4 hereto, the parties agree to be bound to the terms of Modifications No. 9 and No. 10 to the NASD Lease or to certain Adjustments thereto, as described and included in Addendum 4.

e. The United States confirms that all reasonable measures will be taken so that the Agreed Remediation will not interfere with the installation of water and sewer pipelines currently ongoing at the Property. Dallas estimates that the pipelines will be installed and work completed on or before August 31, 2002. No later than 45 days after completion of this work, Dallas shall provide the United States with copies of as-built drawings locating precisely the water and sewer lines as actually installed.

f. The United States shall cause its contractors, subcontractors, and consultants ("Contractors") performing work upon the Property to maintain the minimum insurance coverage described in Addendum 5, and shall cause its Contractors to name Dallas as an additional insured under such policy or policies. The United States shall provide copies of the certificates of insurance acceptable to Dallas, documenting the Contractors' insurance coverage, upon written request by Dallas.

g. In the event of damage to the Property arising from performance of work upon the Property by the United States or its Contractors, the United States shall restore the damaged property to the same or better condition and, if applicable, same grade level, existing before the commencement of the work that caused the damage, including without limitation any necessary repairs to paving and landscaping. With respect to

damage or destruction occurring during the performance of the Agreed Remediation, including any New Work, repair work may be deferred until completion of the work upon the portion of the Property to be repaired, but in any event shall be completed on or before 45 days following the date agreed for completion of the Agreed Remediation or New Work, in case the damage in question occurred in the course of New Work.

h. The United States shall pay all costs for all materials and labor in connection with the Agreed Remediation work for which it is responsible upon the Property. The United States and its Contractors shall maintain the Property free of any liens or claims of liens arising from any work or other activities the United States or its Contractors may perform upon the Property.

i. Dallas and the United States shall cooperate in good faith over the course of the Agreed Remediation and New Work in order to minimize disruption of Contractors, Property tenants, and future reuse and redevelopment activities of Dallas and tenants or prospective tenants of the Property.

j. If the United States is ever required to return to the Property in order to perform New Work, Dallas shall provide reasonable access to the Property, and impose restrictions upon the use of the Property as necessary

to support performance of those cleanup actions consistent with the terms of this Agreement.

15. a. In order to enhance mutual cooperation, efficient performance of the Agreed Remediation and any New Work, and reuse and redevelopment of the Property in accordance with BRAC policies, the United States and Dallas have agreed that the Agreed Remediation will be carried out under "open book" policies. Each party shall make available to the other upon a timely basis copies of monitoring or sample data, reports, scope of work, work specifications, similar contractor documentation describing any portion of the work to be performed, submissions to regulatory authorities, and written communications from regulatory authorities in connection with the Agreed Remediation or relating to environmental conditions of the Property pertaining to the Agreed Remediation. With respect to regulatory submissions by either party and material technical reports concerning the scope and progress of the Agreed Remediation, the party producing those submissions or reports shall furnish the other party a copy contemporaneously with receipt or submission to the regulatory authorities, but, when reasonably possible, in no event later than five business days prior to any meeting with regulatory authorities concerning those submissions or reports. Each party agrees to regularly apprise the other of the status of any material developments concerning the

Agreed Remediation or information about the potential for New Work to be performed.

b. All public meetings, meetings with representatives of oversight agencies, public planning sessions, and committee gatherings in connection with base closure under BRAC, closure of portions of the Property in accordance with the Applicable Remedy Standard, or reuse and redevelopment of the Property in accordance with adopted reuse and/or redevelopment plans shall be open to participation by the United States and Dallas representatives, and both parties shall cooperate in causing reasonable advance notices of such meetings, planning sessions, and committee gatherings to be provided to representatives of the United States and Dallas.

16. a. The parties shall file a joint stipulation to dismiss the CFC Lawsuit with prejudice not later than 10 days after execution of this Agreement and Dallas's receipt of the cash consideration described in Paragraph 12 above. The dismissal with prejudice shall constitute a complete release of the United States (including DON, DOD, and affiliated departments and agencies, together with their contractors, agents, employees, officers, attorneys, and other representatives) from all claims, counterclaims, and causes of action Dallas might have against the United States arising out of conduct or events

relating to the former NASD or the Property, including, without implied limitation, the Environmental Claims.

b. The United States, and its agents, representatives, Contractors, and assigns, hereby releases Dallas from all claims, counterclaims, and causes of action the United States might have against Dallas arising out of conduct or events relating to the former NASD or the Property, including but not limited to all claims, counterclaims, and causes of action that the United States might have been able to assert in the CFC Lawsuit in response to the claims and causes of action asserted therein by Dallas, the release to be effective upon dismissal of the CFC Lawsuit pursuant to the preceding Paragraph 16a.

c. The releases described in Paragraphs 16a and b, however, do not apply to the following matters, which are expressly reserved:

- i. all obligations of the parties referred to in this Agreement, until such time as they are fully performed; and
- ii. any claims, liabilities, or obligations attributable to environmental contamination of Mountain Creek Lake by any source.

17. In the event that either party shall default in performance of its obligations under this Agreement, the nondefaulting party may pursue any remedy provided under applicable law on account of such default. In the event

the United States defaults upon its obligation to complete the Agreed Remediation in accordance with the terms of this Agreement, Dallas shall be entitled to recover damages for such default measured by an amount sufficient to fund completion of the Agreed Remediation by Dallas.

18. The United States hereby confirms that Section 330 of Public Law 102-484, providing indemnity under certain circumstances for personal injury and property damage, applies to potential third-party claims arising out of the United States' operation of NASD.

19. Each party to this Agreement acknowledges that this Agreement is being made by free choice without inducement in any way by any statement, promise, or representation not contained in this Agreement. The parties understand and agree that this Agreement contains the entire agreement between the parties and is a final, complete, and exclusive statement of the Agreement and of all of the terms thereof; that this Agreement may not be varied, contradicted, or supplemented by evidence of any prior or contemporaneous oral or written agreement; and that this Agreement cannot be modified in any way except by written modification signed by all parties hereto.

20. This Agreement shall be interpreted, construed, and enforced according to the laws of the United States of America and federal common law

of contracts, and, where applicable and not preempted by federal law, the laws of the State of Texas and the Dallas City Code.

21. The parties hereby represent, warrant, and affirm that they have not assigned, pledged, or otherwise in any way sold or transferred any right, title, interest, or claim that they have or may have by reason of the matters that are the subject of this Agreement, and that they are the sole owners and holders of any such right, title, interest, or claim. The parties further represent, warrant, and affirm that no other action or suit with respect to the matters that are the subject of this Agreement is pending or will be filed in or submitted to any court, administrative agency, or legislative body, except if necessary to enforce the terms of this Agreement. Should there be any violation of the warranties and representations contained in this paragraph, this Agreement shall be null and void.

22. The undersigned persons hereby represent, warrant, and affirm that they have actual authority to sign this Agreement upon behalf of the parties for which their signatures appear, and that in signing this Agreement they are authorized to enter into the covenants and agreements set forth herein upon behalf of such parties.

23. The undersigned persons hereby represent, warrant, and affirm that they have read this Agreement in its entirety and understand all of its terms

and consequences; that they have executed and delivered this Agreement voluntarily and after consulting with counsel of their choice; that they believe this Agreement is in the best interest of the parties upon behalf of which they execute this Agreement; and that no promises or representations have been made by any party hereto that are not expressly stated herein.

24. Notice pursuant to this Agreement shall be given to the parties by hand delivery or U.S. mail, as appropriate under specific circumstances, to the following persons:

**UNITED STATES:**

Ed Lehr  
Southern Division Naval Facilities  
Engineering Command  
P.O. Box 180010  
North Charleston,  
South Carolina 29419

**CITY OF DALLAS:**

Dave Howe  
Assistant City Attorney  
City of Dallas  
Office of the City Attorney  
7DN City Hall  
1500 Marilla Street  
Dallas, Texas 75201

with a copy to:

John D. Tew  
Senior Trial Attorney  
Department of the Navy  
Navy Litigation Office  
Office of the General Counsel  
720 Kennon Street SE, RM 233  
Washington Navy Yard, DC 20374

Either party may change the person(s) designated to receive notice on its behalf or the address(es) for such notice by notifying the other party in writing of any such change(s) pursuant to this paragraph.

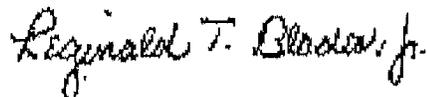
25. The parties agree that this Agreement is in no way related to or concerned with income or other taxes for which Dallas may be liable now or in the future as a result of this Agreement.

26. This Agreement is entered into solely for the purpose of settling this case, and for no other, and shall not bind the parties hereto, nor shall it be cited or otherwise referred to, in any other proceedings, whether judicial or administrative in nature, in which the parties or counsel for the parties have or may acquire an interest, except as necessary to effect the terms of this Agreement.

ROBERT D. McCALLUM, JR.  
Assistant Attorney General



DAVID M. COHEN  
Director



REGINALD T. BLADES, JR.  
Senior Trial Counsel  
Commercial Litigation Branch  
CIVIL Division  
Department of Justice  
Attn: Classification Unit  
8th Floor, 1100 L Street, N.W.  
Washington, D.C. 20530  
Telephone: (202) 514-7900  
Facsimile: (202) 307-0972

Attorneys for The United States

Date: August 21, 2007

*Madeleine B. Johnson*

MADELEINE B. JOHNSON  
City Attorney  
701 City Hall  
1500 Marilla  
Dallas, Texas 75201  
Telephone: (214) 670-3510  
Facsimile: (214) 670-3515

ATTEST:  
SHIRLEY A. ACY, City Secretary

by: *Shirley A. Acy*

*Lyndon F. Bittle*

LYNDON F. BITTLE  
CARRINGTON, COLEMAN,  
SLOMAN & BLUMENTHAL, L.L.P.  
200 Crescent Court, Suite 1500  
Dallas, Texas 75201  
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Facsimile: (214) 855-1333

Attorneys for City of Dallas

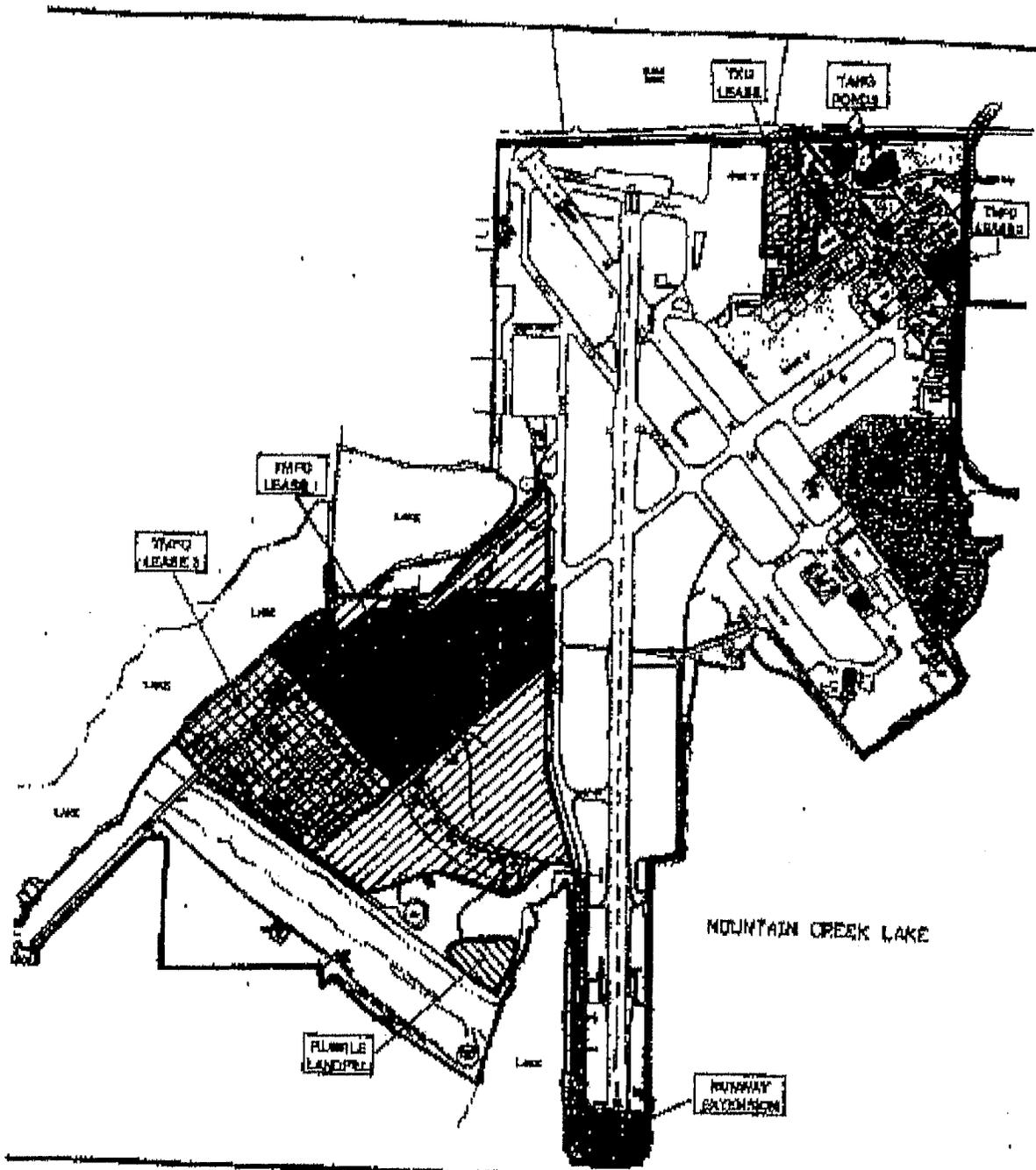
Date: *August 20, 2002*

## ADDENDUM 1

### DEFINITIONS AND ACRONYMS

Term	Paragraph Defined
ACM	
Agreed Remediation	13e
Applicable Remedy Standard	13
BRAC	13
CERCLA	4
CFC Lawsuit	8
CFC	6
COC	6
Contractors	13
DOD	14f
DON	6
Environmental Claims	6
Leased Property	8
NASD Lease	2b
NASD	2b
New Work	1
PCLs	14a
Property	13
RCRA	3
RCRA Notice	8
Reverter Property	8
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**ADDENDUM 2**  
**Property Description for Settlement Agreement**



Source: BRAC Cleanup Plan, March 1984, Figure 2-1

Bryan W. Shaw, Ph.D., *Chairman*  
Buddy Garcia, *Commissioner*  
Carlos Rubinstein, *Commissioner*  
Mark R. Vickery, P.G., *Executive Director*



## TEXAS COMMISSION ON ENVIRONMENTAL QUALITY

*Protecting Texas by Reducing and Preventing Pollution*

October 3, 2011

Ms. Lori Trulson  
City of Dallas, Office of Environmental Quality  
1500 Marilla Street  
Dallas, Texas 75201  
[Lori.trulson@dallascityhall.com](mailto:Lori.trulson@dallascityhall.com)

Re: Request for Additional Information - City of Dallas (City) August 12, 2011 Response Letter  
Naval Weapons Industrial Reserve Plant (NWIRP) Dallas  
TCEQ SWR No. 31268; TCEQ Hazardous Waste Permit No. HW-50279  
EPA ID No. TX6170022770  
CN No. 601543507/RN No. 101434587

Dear Ms. Trulson:

The Texas Commission on Environmental Quality (TCEQ) has reviewed your August 12, 2011 response to our July 1, 2011 letter concerning the conceptual design (CD) for the NWIRP AOC-2 plume which impacts the former Naval Air Station Dallas (NASD). The purpose of our review was to assess the proposed CD of a Permeable Reactive Barrier (PRB) regarding its potential as an effective treatment for decontaminating the groundwater and achieving TRRP Remedy Standard A, residential land use. This review involved use of the Navy information (requested by TCEQ) concerning hydrogeology, groundwater plume dynamics, and groundwater geochemistry of the AOC-2 plume.

Based on our review, we have identified a number of concerns regarding the PRB alternative, which are listed in Section F of the enclosed Interoffice Memorandum (IOM). Most significantly, we believe that elements of the CD do not conform to established criteria for PRBs. In addition, we have concluded (e.g., IOM Section F, No. 10) that there may be the possibility of significant unintended adverse impacts to areas both inside and outside the AOC-2 plume. Finally, we concur with the City that it may take several decades for this technology to decontaminate the plume and achieve the City's remediation goal of TRRP Remedy Standard A.

Considering our concerns, we believe it would be prudent to further evaluate the City's alternative (contingent) remedy of in-situ injections of an electron donor into the plume. According to the City, this (contingent) treatment technology should be capable of remediating the contaminated groundwater by 2016. Therefore, as with the PRB remedy, we request that the City provide a proposed conceptual design for the in-situ injection remedial alternative. We will then evaluate the CD for this technology in order to determine its potential for achieving the remediation goal of TRRP Remedy Standard A.

An original and one copy of your response must be submitted to the TCEQ at the letterhead address using mail code number MC-127. An additional copy should be submitted to the TCEQ

Ms, Lori Trulson  
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TCEQ SWR No. 31268

Region 4 Office, Dallas/Fort Worth. Your response must be received on or before November 29, 2011. The facility name, location and identification number(s) in the TCEQ reference line above should be included in your response. Please note that the Remediation Division has instituted a policy of sending letters via Portable Document Format (PDF) and email when appropriate. Therefore, current email addresses should be included in all future submittals.

Please call me at (512) 239- 2332 if you need additional information or wish to discuss these comments or the due date. Thank you for your cooperation in this matter.

Sincerely,



Allan Posnick, DSMOA Program Manager  
Corrective Action Team 2, VCP-CA Section  
Remediation Division  
Texas Commission on Environmental Quality

AP/jdm

Enclosure: TCEQ September 23, 2011 IOM

cc: Mr. Rich Mayer, EPA Region 6, Federal Facilities Section, [mayer.richard@epa.gov](mailto:mayer.richard@epa.gov)  
Ms. Sara Reed, NAVFAC Southeast, Naval Air Station Jacksonville, Box 30, Bldg 135,  
Jacksonville, FL 32212-0030, [sara.reed@navy.mil](mailto:sara.reed@navy.mil)  
Mr. Sam Barrett, Waste Program Manager, TCEQ Region 4 Office, Dallas/Fort Worth

# Texas Commission on Environmental Quality

## INTEROFFICE MEMORANDUM

**To:** Allan Postnick, P.G.  
Remediation Division

**Date:** September 23, 2011

**From:** Charles D. Stone, P.G., P.E.   
Remediation Division, Technical Support Section

**Subject:** Technical Comments: *Estimated Conceptual Remedial Costs for the NWIRP AOC 2 Plume at Former Naval Air Station Dallas - Hensley Field, 8200 West Jefferson Boulevard, Dallas, Dallas County, Texas; March 24, 2011.*

Per request, a technical evaluation was performed on a proposed conceptual design for a permeable reactive barrier (PRB) at the NWIRP/NAS Dallas AOC 2 area, based on the subject document. This IOM examines the proposed conceptual design and the setting for which it is intended for the purpose of assessing its potential efficacy and consequences. Technical comments follow.

### Sec A Background:

- A.1 The subject document was attached to a letter from the City of Dallas (2011) to the TCEQ. The subject document provides both a conceptual design and an estimated conceptual cost for a proposed response action for the AOC 2 groundwater plume.
- A.2 The proposed response action comprises a PRB comprised of two (2) legs. The western PRB is aligned along the NWIRP - NAS Dallas property line. The eastern PRB extends from the end of the western PRB diagonally into the NAS Dallas AOC 2 plume area. The last segment of the eastern PRB is oriented north-south (Figure 1, Subject Document). The reactive agent in the proposed PRB is zero-valent iron (ZVI) that comprises 10% of the PRB with 90% sand.
- A.3 The proposed PRB is intended to treat and to prevent further migration of the AOC 2 TCE plume in heterogeneous hydrostratigraphy.

### Sec B Site Geology:

- B.1 The area comprising the eastern portion of NWIRP and the western portion of NAS Dallas (AOC 2 plume) is situated on Quaternary Terrace deposits comprised of floodplain sediments. The floodplain sediments occupy the stream valley of a tributary of the (proto) Trinity River. The stream valley incised the paleo-surface of the Cretaceous Eagle Ford Formation (BIG, 1976; 1988). The stream valley forms a relatively narrow (~500 ft) topographic trough whose axis trends approximately east-west and base dips towards the east (Fig 2-25, NAVFAC, 2008; Fig 4-8, NAVFAC, 1999a).
- B.2 The terrace sediments deposited in the trough are fluvial, unconsolidated and comprise gravels, sands, silts and clays (e.g., Sec 4.2.2, NAVFAC, 1999a). The fluvial

deposits have been organized into a series of “fining-up” sequences (e.g., Sec 4.2.2, NAVFAC, 1999a) whose descriptions and distribution are consistent with typical meander-stream deposits. Such fluvial features consist of laterally migrating and stacked “fining-up” or point bar sequences, gravelly channel lag, fine-grained overbank deposits, and erosional remnants of reworked portions of sequences deposited earlier (e.g., Reading, 1996; Matthews, 1974, etc.).

- B.3 The terrace deposits which occupy the trough beneath the AOC-2 area at NWIRP (Item B.2) have been organized into three (3) separate “fining-up” sequences (FUS), the Upper (UFUS), Intermediate (IFUS) and Lower (LFUS) (e.g., NAVFAC, 2003; NAVFAC, 1999a). The FUS packages occur in complex interrelations, as is expected of sediments subjected to the processes of such a depositional facies (Item B.2).
- B.4 The complex interrelation of the FUS is compounded by the occasional absence of one or another of the sequences across the subject site. Figure 4-4 through Figure 4-7 (NAVFAC, 1999a) depicts the approximate areas of the subject site where the separate FUS are present and/or absent. In general, the IFUS is absent above the higher elevations on the flanks of the trough on the Eagle Ford Formation (Item B.1; Figure 4-8, NAVFAC, 1999a).
- B.5 The complex interrelations of the FUS results in a high degree of uncertainty regarding their exact stratigraphic juxtapositions in the area of AOC-2. For example, Cross-Section AA-AA’ (Fig 3-2, NAVFAC, 1996) and Cross-Section E-E’ (Fig 2-10, NAVFAC, 2003) are constructed from the same boring logs. However, the resulting stratigraphic reconstruction depicted in each cross-section is significantly different from one another. Therefore, the TCEQ recognizes that the significant disparity between two interpretations of the same set of boring logs at one location represents a high degree of uncertainty for critical stratigraphic interpretations at some other locations.
- B.6 The stratigraphy along the alignment of the proposed PRB in AOC 2 (Figure 1, Subject Document) reflects the same complexity as that described of the subject site (Item B.3, Item B.4, Item B.5). The western PRB is aligned on the NWIRP-NAS Dallas property line and is nearly perpendicular to the axial trend of the Eagle Ford trough (Item B.1). Hence, cross-section B-B’ on the same alignment is essentially a strike section across the trough (Figure A.1-3, NAVFAC, 2011).
- B.7 The IFUS is absent at the southern end of the proposed western PRB (Figure A.1-3, NAVFAC, 2011; Figure 4-7, NAVFAC, 1999a) and the southern portion of the eastern PRB inside NAS Dallas (Cross-section C-C’, Figure A.1-5, NAVFAC, 2011). Therefore, the IFUS is interpreted by the TCEQ to continue its east-west axial trend through the northern portion of AOC 2 (Item B.1, Item B.4). It is absent south of a line drawn approximately through the locations of monitoring well 799E119MW and monitoring well 799E159MW along which the IFUS pinches out (see also Figure 4-1, NAVFAC, 1996).

Sec C Site Hydrostratigraphy:

- C.1 The FUS (Item B.2, Item B.3) that occur throughout the NWIRP site comprise zones

of groundwater saturation. Since individual FUS are characterized by grain size distributions that grade vertically from coarse-grained basal layers to fine-grained at the top, porosity and permeability must also vary vertically with grain size gradations (e.g., Fetter, 1988).

- C.2 Since permeability varies with sediment grain size (Item C.1), each FUS was vertically subdivided into permeability zones on the basis of cone penetrometer test (CPT) measurements; they are: 1) "producing" zone, comprised primarily of sands and gravel; 2) "intermediate producing" zone, primarily sandy silt; and 3) "non-producing" zone, primarily silty clay (Sec 3.0, NAVFAC, 1996). "Clay" comprises the remaining lithology.
- C.3 The horizontal hydraulic conductivities of the permeability zones were determined for each FUS in the vicinity of the NWIRP-NAS Dallas property line at AOC 2 using various aquifer test methods (NAVFAC, 2003). The highest horizontal hydraulic conductivities were measured in the basal "producing" zones. The lowest horizontal hydraulic conductivities were measured in the "non-producing" zones. The range of FUS hydraulic conductivities used in groundwater modeling of the AOC 2 system are summarized in Table I.

**Table I: Hydraulic Conductivity of AOC 2 FUS**

FUS	Producing Zone	Non-Producing Zone
UFUS	$3.5 \times 10^{-4} - 1.8 \times 10^{-2}$	$8.6 \times 10^{-9} - 4.7 \times 10^{-8}$
IFUS	$3.5 \times 10^{-4} - 1.1 \times 10^{-2}$	$1.5 \times 10^{-7} - 4.2 \times 10^{-7}$
LFUS	$3.5 \times 10^{-4} - 7.1 \times 10^{-2}$	$1.5 \times 10^{-7} - 4.1 \times 10^{-7}$

\*\* Table 4-2, NAVFAC, 2003

- C.4 Hydraulic interconnectivity between all three (3) FUS has been observed in the AOC 2 area at NWIRP and NAS Dallas (e.g., Sec 4.1, NAVFAC, 1996; Sec 2.3, NAVFAC, 2003). The hydraulic interconnections bring "producing" and "intermediate producing" zones of different FUS into direct contact which result in complex hydrostratigraphy. The stratigraphic complexities are attributable to the typical fluvial processes associated with a meander-stream depositional system (Item B.6).
- C.5 Hydraulic gradients at and around AOC 2 are documented to have been relatively consistent throughout the period of study, not including the period during which the AOC 2 stabilization system was actively extracting groundwater there (e.g., Sec 2.2.2, NAVFAC, 2009), although significant change in groundwater gradients were affected by the extraction (Sec 3.2.1, NAVFAC, 2009).
- Additionally, the hydraulic gradients at and around the AOC 2 area have been generally the same in each separate FUS due to their hydraulic interconnectivity there (Item C.4; USGS, 2000).

- C.6 The direction of natural hydraulic gradients (Item C.5) at and around AOC 2 has consistently been towards the south to south-by-southeast (NAVFAC, 1996; 1999a; 2003; 2007a; 2007b; 2011, USGS, 2000). Therefore, *groundwater flow direction generally is parallel to the axis of the proposed western PRB alignment along the north-south trending NWIRP-NAS Dallas property line.*

Sec D COC Distribution in Subsurface:

- D.1 Chloroethenes, primarily TCE, comprises the most significant risk concern in the AOC 2 area (NAVFAC, 1996; 1999b; 2009). Their dechlorination is a design criterion of the proposed PRB (Subject Document).
- D.2 Historically, the highest chloroethene groundwater concentrations associated with AOC 16/AOC 2 occur beneath the Waste POL Spill Site at NWIRP and is a likely source region for the AOC 2 plume at NAS Dallas. Past efforts to mitigate migration of the AOC 2 onto NAS Dallas included recovery of chloroethenes in groundwater beneath the Waste POL Spill Site at NWIRP (e.g., NAVFAC, 2009).
- D.3 The TCEQ performed a cursory evaluation of chloroethene groundwater concentrations in the vicinity of the Waste POL Spill Site over time. The TCEQ notes the occurrence of what appears to be spatial redistribution of chloroethenes as a result of the groundwater extraction operations (Item D.2) despite an absence of significant changes to the local groundwater gradients during the period of groundwater extraction (e.g., Sec 3.2.1, NAVFAC, 2009).
- A more complete analysis of chloroethene behavior during recovery efforts is outside the scope of this report and was not performed.
- D.4 Groundwater concentrations for dense non-aqueous phase liquid (DNAPL) compounds (e.g., chloroethenes) that exceed the respective compounds' 1% aqueous solubility limit signifies the presence of DNAPL in the proximal vicinity of that groundwater monitoring well (USEPA, 1992; 1994). Such concentrations can be useful for indicating the location of likely source regions from which dissolved groundwater plumes emanate.
- D.5 Based on the 1% aqueous solubility criterion (Item D.4), indications of TCE source region concentrations occurred exclusively in the area of Waste POL Spill Site at NWIRP in the UFUS (monitoring wells DWP-10-2 and DWP-10-3) and the IFUS (monitoring wells DWP-10-DW1, DWP-10-DW6 and 799E115IMW) (NAVFAC, 2009; 2010). Continued monitoring of these wells indicate significant decreases of TCE concentrations to below the 1% aqueous solubility criterion occurred in all monitoring wells, except DWP-10-DW1 (NAVFAC, 2009; 2010). Monitoring Well DWP-10-DW1 continues to exceed the 1% aqueous solubility criterion.
- D.6 Historical TCE groundwater concentration data at the Waste POL Spill Site (Item D.5) demonstrates that the footprint of the likely source region for the AOC 2 plume has diminished significantly in all directions towards the center of the array of recovery wells (Item D.3).
- D.7 Historical data from monitoring wells in the NAS Dallas AOC 2 plume indicate that

the highest TCE groundwater concentrations in the UFUS (monitoring wells 799E114UMW, 799E117UMW, 799E122UMW, 799E125UMW and 799E151UMW) are located closest to and south of the Waste POL Spill Site (Table 3-4, NAVFAC, 2009). Through time, TCE concentrations in these monitoring wells increase to the south, indicating groundwater transport of dissolved TCE is southerly through the stratigraphically continuous UFUS (e.g., NAVFAC, 2003). Depletions of TCE isoconcentration contours reflect this southerly transport (e.g., Figure 4-3, NAVFAC, 2007).

- D.8 Historical data from monitoring wells in the NAS Dallas AOC 2 plume indicate that the highest TCE groundwater concentrations in the IFUS (monitoring wells DWP-10-DW6, 799E123LMW, 799E127LMW and 799E153LMW) are located closest to and east of the Waste POL Spill Site (Table 3-4, NAVFAC, 2009). The migration direction of the IFUS TCE plume was easterly and lacked a southerly component. The lack of southerly transport of dissolved TCE is explained by noting that the distribution of dissolved TCE is confined to narrow east-west extent of the IFUS across the subject site (e.g., Figure 2-25, NAVFAC, 2003; Figure 4-5, NAVFAC, 1999).

Since IFUS pinches out to the south into non-transmissive clay (Item B.7), groundwater transport in that direction is not preferential. Rather, migration occurs along the channel axis to the east. However, in a southerly regional gradient field, easterly groundwater transport in the IFUS is not significant and explains the stable TCE plume with decreasing TCE concentrations.

- D.9 Historical data from monitoring wells in the NAS Dallas AOC 2 plume indicate that the highest TCE groundwater concentrations in the LFUS (monitoring well 799E121LMW) are located close to and east of the Waste POL Spill Site (Table 3-4, NAVFAC, 2009). Although the basal LFUS is generally hydraulically isolated from the IFUS throughout the subject site, the presence of dissolved TCE in the LFUS in the AOC 2 is likely attributable to the direct hydraulic interconnectivity between the producing zones of the IFUS and the LFUS in the vicinity of the Waste POL Spill Site (e.g., Figure 2-11, NAVFAC, 2003).

TCE concentrations in monitoring well 799E121LMW are decreasing (e.g., Table 3-4, NAVFAC, 2009). Transport of dissolved TCE east of monitoring well 799E121LMW has not occurred (monitoring well 799E150LMW) as other monitoring wells in LFUS at AOC 2 NAS Dallas exceed 0.005 mg/L (Table 3-4, NAVFAC, 2009).

#### Sec E: Proposed Conceptual Design of Permeable Reactive Barrier (PRB):

- E.1 The City of Dallas has proposed an alternative remedy for the AOC 2 at NAS Dallas (Sec A (above); Subject Document). Specifically, the proposal comprises a conceptual design and conceptual costs for a PRB consisting of ZVI to treat chloroethene-contaminated groundwater (Item D.1). The alignment of the proposed western PRB entails approximately 630 ft at the NWIRP-NAS Dallas property line at AOC 2 plus approximately 825 ft of the eastern PRB that extends into NAS Dallas from the property line (see Figure 1, Subject Document). The conceptual design of the proposed PRB specifies a width of three (3) ft and a depth of approximately 70 ft

(Subject Document).

- E.2 The conceptual cost of additional investigation and bench tests necessary for final design is estimated to be approximately \$50,000; construction costs for installation of the PRB is estimated to be approximately \$5,000,000; thirty (30) years of annual groundwater monitoring; approximately \$750,000; and PRB replacement cost after twenty (20) years; approximately \$2,150,000 (pg 3, Subject Document).
- E.3 The composition of the proposed PRB is 90% sand and 10% ZVI by volume (Terracon, 2011). The ZVI grain-size is (U.S. Standard Mesh) 8/50 and a sand source to match it (Terracon, 2011). The TCEQ evaluated an approximate grain-size distribution curve for an 8/50 source material and estimated the material's hydraulic conductivity to be approximately  $5 \times 10^{-2}$  cm/s using the Hazen equation (EQ 5.3, Kresic, 1997).
- The reported hydraulic conductivity of Connelly 8/50 ZVI ranges from  $5 \times 10^{-2}$  cm/s to  $2.7 \times 10^{-1}$  cm/s, and that reported for Peerless 8/50 ZVI is  $7 \times 10^{-2}$  cm/s (Table 5-1, SERDP, 2000).
- E.4 Based on the information in Item E.3, the TCEQ estimates the proposed PRB would have an initial hydraulic conductivity in the range of  $5 \times 10^{-2}$  cm/s to  $2.7 \times 10^{-1}$  cm/s. The lower value in the estimated range of initial PRB hydraulic conductivity is within the range of higher values for the "producing" zones (see Table I). Therefore, the proposed PRB is expected to have an initial hydraulic conductivity that is effectively higher than all other hydrostratigraphic units in the AOC.2 area.

Sec F Concerns Regarding Proposed Conceptual Design of Permeable Reactive Barrier:

- F.1 The conceptual design of the proposed PBR (Subject Document) is for a continuous-type PRB (e.g., USEPA, 1998; SERDP, 2000; etc.). Engineering design criteria for continuous PRBs require that they: 1) be oriented perpendicular to the direction of groundwater flow, 2) be more permeable than the contaminated groundwater unit, 3) allow flow-through of contaminated groundwater, and 4) not alter the groundwater flow system (e.g., ITRC 2004; SERDP, 2000; USEPA, 1999; USEPA, 1998, Suthersan, 1997, Nyer et al., 1996, etc.).
- F.2 Based on the proposed north-south alignment of the western barrier (Figure 1, Subject Document), its orientation is approximately *parallel* to groundwater flow direction (Item C.6). As such, the proposed western PRB does not conform to the fundamental orientation design criterion (Item F.1).
- F.3 The conceptual design of the proposed PRB includes the possibility of incorporating layers of low permeability layers to separate the three (3) FUS for the purpose of isolating the aquifers (Subject Document; Terracon, 2011). However, the complexity and uncertainty regarding hydrostratigraphic positions of units and the absence of "layercake" stratigraphy in the area (Item B.6) renders such a task difficult to execute. The TCEQ considers attempts to construct impermeable zones within the proposed PRB at the same locations as the occurrence of "non-producing" hydrostratigraphic zones to be impracticable and infeasible. Moreover, such an attempt could result in

misplacement of low-transmissive material that would adversely affecting PRB efficiency. For reasons provided, the TCEQ cannot recommend attempts to intersperse low-transmissive material in these PRBs.

- F.4 Without low permeability layers inside the proposed PRB (Item F.3) the proposed PRB will constitute one hydraulically *continuous* zone of comparatively high permeability (Item C.3, Item E.4) that intersects up to three (3) separate FUS (Item F.3) and whose longitudinal axis is approximately parallel to groundwater flow direction (Item F.2). Under equilibrium hydraulic conditions groundwater from the high transmissive "producing" zones intersected by the PRB can be expected to preferentially flow into the PRB and be rapidly transported therein to the south, along the site-wide gradient (Item C.6).
- F.5 Such a PRB (Item F.4) can effectively "short circuit" groundwater transport in its vicinity, thereby altering the groundwater flow system and violating a key PRB design criterion (Item F.1).
- F.6 As proposed, the western and the eastern PRBs intersect at their southern extent at the NWIRP-NAS Dallas property boundary (Figure 1, Subject Document). Since the proposed depth of the PRBs is approximately 70 ft (Subject Document), they are presumed to be keyed into the impermeable Eagle Ford Formation (Figure A.1-3, Figure A.1-5, NAVFAC, 2011). As such, the PRBs will introduce a continuous zone of high permeability (Item F.4) that brings into hydraulic contact all three (3) FUS (Figure A.1-3, Figure A.1-5, NAVFAC, 2011). Such hydraulic interconnectivity will provide communication between the southern portions of both the UFUS and the LFUS (see Figure 3-3, NAVFAC, 1996) and the IFUS, which is hydrostratigraphically absent and hydraulically isolated from the southern area of AOC 2 (Item B.7, Item D.8).
- F.7 The TCEQ acknowledges that the expected "short-circuiting" of the groundwater flow system created by construction of the proposed western PRB (Item F.5) would create significantly higher hydraulic gradients in the "producing" zones in contact with the PRB. At NWIRP, such increases of gradient would be expected to cause increased flow significant enough to affect mobility of the stable zone at the Waste POL Spill Site (Item D.6), the possible result of which could be to induce contaminant transport to the NAS Dallas property boundary.
- F.8 The proposed western and eastern PRB alignments enclose the AOC 2 IFUS dissolved TCE plume (Figure 1, Subject Document). The AOC 2 IFUS dissolved TCE plume is effectively hydraulically isolated because the IFUS pinches out to the south and an east-west component of hydraulic gradient appears to be locally absent (Item D.8). The IFUS dissolved TCE plume has reached the southern pinch-out and appears stable with decreasing concentrations (Item D.8). The proposed PRB would effectively circumvent the hydraulic isolation of the AOC 2 IFUS-TCE plume and bring it in hydraulic communication with the UFUS and the LFUS beyond the southern downgradient extent of the PRB and its ability to be treated (Figure 1, Subject Document).
- F.9 The TCEQ concerns discussed above in this section regarding the proposed PRB are primarily hydraulic in nature. The TCEQ also recognizes that during "short-circuited"

transport through the PRB TCE contaminated groundwater is subject to reaction with ZVI in the PRB. However, the effectiveness of ZVI is dependent upon the rate at which groundwater transports dissolved TCE to the ZVI and the groundwater residence time (e.g., Tang, 2004; USEPA, 1998; Roberts et al., 1996). Groundwater fate, rate and residence time determinations in a PRB that transects a complex hydrostratigraphic system are best understood using numerical modeling that simulates the system completely.

- F.10 The TCEQ believes that elements of the conceptual design of the proposed AOC 2 plume PRB (Subject Document) do not conform to established design criteria for PRBs (Item F.1). The TCEQ believes that the consequences of constructing the proposed PRB are presently not completely predictable, but includes the possibility of significant unintended adverse impacts to additional areas both inside (Item F.7) and outside the AOC 2 area (Item F.8). Finally, the TCEQ concurs with the conclusion that the conceptual design for the subject PRB is unlikely to meet the timeframe requirement for the AOC 2 cleanup goal by 2016 (Terracon, 2011).

Sec G References:

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- BEG 1988 *Geologic Atlas of Texas: Dallas Sheet*, Bureau of Economic Geology, The University of Texas at Austin, Austin, TX.
- City of Dallas 2011 *Comments on Proposed Corrective Action Order No. 31268, Docket No. 2010-0069-IHW, Naval Weapons Industrial Reserve Plant, TCEQ SWR No. 31268, 9314 West Jefferson Boulevard, Dallas, TX; August 15, 2011.*
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13	08/18/2004	(368218)
14	08/31/2004	(277738)
15	09/17/2004	(368219)
16	10/20/2004	(368220)
17	11/23/2004	(390781)
18	12/20/2004	(390782)
19	01/24/2005	(390783)
20	02/28/2005	(428192)
21	03/22/2005	(493748)
22	04/11/2005	(428193)
23	05/31/2005	(428194)
24	06/23/2005	(428195)
25	07/25/2005	(448159)
26	08/16/2005	(448160)
27	09/26/2005	(448161)
28	10/18/2005	(493750)
29	11/21/2005	(493751)
30	12/27/2005	(493752)
31	01/23/2006	(493753)
32	02/22/2006	(493747)
33	03/20/2006	(493749)
34	04/17/2006	(506949)
35	05/18/2006	(506950)
36	06/20/2006	(506951)
37	07/24/2006	(529088)
38	08/11/2006	(486157)
39	08/11/2006	(529089)
40	09/18/2006	(529090)
41	10/17/2006	(552157)
42	11/21/2006	(552158)
43	01/09/2007	(589684)
44	01/22/2007	(589685)
45	02/08/2007	(552156)
46	03/13/2007	(589678)
47	04/11/2007	(589679)
48	05/11/2007	(589680)
49	06/18/2007	(589681)
50	07/16/2007	(589682)
51	08/13/2007	(589683)
52	09/24/2007	(605974)
53	10/12/2007	(605975)
54	11/16/2007	(633400)
55	12/10/2007	(633401)
56	01/10/2008	(633402)
57	02/18/2008	(677786)
58	03/17/2008	(677787)
59	04/16/2008	(677788)
60	05/15/2008	(696589)
61	06/13/2008	(696590)
62	07/18/2008	(696591)
63	08/08/2008	(718293)
64	09/19/2008	(718294)
65	10/30/2008	(718295)
66	11/13/2008	(733530)
67	12/04/2008	(733531)
68	01/08/2009	(705179)
69	01/08/2009	(733532)
70	02/11/2009	(756705)
71	03/17/2009	(756706)

72 04/03/2009 (756707)  
73 05/06/2009 (773583)  
74 06/04/2009 (773584)  
75 07/22/2009 (821021)  
76 08/19/2009 (821022)

E. Written notices of violations (NOV). (CCEDS Inv. Track. No.)

Date: 02/29/2008 (677787)  
Self Report? YES Classification: Moderate

Citation: 2D TWC Chapter 26, SubChapter A 26.121(a)  
30 TAC Chapter 305, SubChapter F 305.125(1)

Description: Failure to meet the limit for one or more permit parameter  
Date: 05/31/2008 (696590)

Self Report? YES Classification: Moderate

Citation: 2D TWC Chapter 26, SubChapter A 26.121(a)  
30 TAC Chapter 305, SubChapter F 305.125(1)

Description: Failure to meet the limit for one or more permit parameter.

F. Environmental audits.

N/A

G. Type of environmental management systems (EMSs).

H. Voluntary on-site compliance assessment dates.

N/A

I. Participation in a voluntary pollution reduction program.

N/A

J. Early compliance.

N/A

Sites Outside of Texas

N/A