SFR-056/06
July 2007

Joint Groundwater Monitoring and Contamination Report - 2006

Prepared by the
Texas Groundwater Protection Committee

Contributing State Agencies and Organizations

Texas Commission on Environmental Quality
Texas Water Development Board
Railroad Commission of Texas
Texas Department of State Health Services
Texas Department of Agriculture
Texas State Soil and Water Conservation Board
Texas Alliance of Groundwater Districts
Texas Agricultural Experiment Station
Bureau of Economic Geology
Texas Department of Licensing and Regulation

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TEXAS GROUNDWATER PROTECTION COMMITTEE

www.tgpc.state.tx.us

Committee Membership

Texas Commission on Environmental Quality

Texas Water Development Board

Railroad Commission of Texas

Department of State Health Services

Texas Department of Agriculture

Texas State Soil and Water Conservation Board

Texas Alliance of Groundwater Districts

Texas Agricultural Experiment Station

Bureau of Economic Geology

Texas Department of Licensing and Regulation

The Joint Groundwater Monitoring and Contamination Report was designed and produced by the Texas Groundwater Protection Committee in fulfillment of requirements given in Section 26.406 of the Texas Water Code. The effort was partially funded by the U.S. Environmental Protection Agency. While the information contained in the report represents the contribution of each individual participating agency and group, the report as a whole is the work of the committee and does not necessarily reflect all of the views and policies of each participating organization.

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ACRONYMS

Agencies, Divisions, and Programs

BEG	University of Texas at Austin Bureau of Economic Geology
BRC	Bureau of Radiation Control (DSHS)
BS/EACD	Barton Springs/Edwards Aquifer Conservation District
CSD	Compliance Support Division (TCEQ)
DOE	United States Department of Energy
DSHS	Department of State Health Services
ENF	Enforcement Division (TCEQ)
EPA	United States Environmental Protection Agency
EUWCD	Evergreen Underground Water Conservation District
FOD	Field Operations Division (TCEQ)
GCD	Groundwater Conservation District
O&G	Oil and Gas Division (RCT)
NRC	Nuclear Regulatory Commission
RCT	Railroad Commission of Texas
RMD/CA	Remediation Division/Corrective Action Program (TCEQ)
RMD/DCRP	Remediation Division/Dry Cleaners Remediation Program (TCEQ)
RMD/PST	Remediation Division/Petroleum Storage Tank Reimbursement Program (TCEQ)
RMD/SC	Remediation Division/Superfund Cleanup Program (TCEQ)
RMD/SSDAT	Remediation Division/Superfund Site Discovery and Assessment Team (TCEQ)
RMD/VC	Remediation Division/Voluntary Cleanup (TCEQ)
RMD/VCBSA	Remediation Division/Voluntary Cleanup, Brownfields Site Assessment (TCEQ)
RMD/VCIO	Remediation Division/Voluntary Cleanup/Innocent Owner (TCEQ)
RRC	See RCT
SM&R	Surface Mining and Reclamation Division (RCT)
TAES	Texas Agricultural Experiment Station
TAGD	Texas Alliance of Groundwater Districts
TCE	Texas Cooperative Extension
TDA	Texas Department of Agriculture
TGPC	Texas Groundwater Protection Committee
TNRIS	Texas Natural Resources Information System
TNRCC	Texas Natural Resource Conservation Commission (see TCEQ)
TPWD	Texas Parks and Wildlife Department
TCEQ	Texas Commission on Environmental Quality
TSSWCB	Texas State Soil and Water Conservation Board
TWDB	Texas Water Development Board
TWC	Texas Water Code
UIC	Underground Injection Control Program (TCEQ)
USGS	United States Geological Survey
UWCD	Underground Water Conservation District
WPD/IHW	Waste Permits Division/Industrial and Hazardous Waste (TCEQ)
WPD/MSW	Waste Permits Division/Municipal Solid Waste (TCEQ)
WPD/RML	Waste Permits Division/Radioactive Material Licensing (TCEQ)
WQD/WQAS	Water Quality Division/Water Quality Assessment Section (TCEQ)
WSD/PDW	Water Supply Division/Public Drinking Water (TCEQ)
WSD/WRPA	Water Supply Division/Water Rights, Permitting and Availability (TCEQ)

State Legislation

CMRA	Texas Coal Mining And Reclamation Act
SMRA	Texas Surface Mining and Reclamation Act
SWDA	Solid Waste Disposal Act
TAgC	Texas Agricultural Code
THSC	Texas Health and Safety Code
TNRC	Texas Natural Resources Code
TRCA	Texas Radiation Control Act
TWC	Texas Water Code
WWDA	Texas Water Well Drillers Act

Federal Legislation

AEA	Atomic Energy Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CWA	Clean Water Act (Amended as Water Quality Act 1988)
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
HSWA	Hazardous and Solid Waste Amendments to RCRA (1984)
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
SMCRA	Surface Mining Control and Reclamation Act
TSCA	Toxic Substances Control Act
UMTRCA	Uranium Mill Tailings Radiation Control Act

Abbreviations

BMP	best management practice
CAFO	concentrated animal feeding operation
CFR	Code of Federal Regulations
COC	chemicals of concern
CSGWPP	comprehensive state groundwater protection program
GIS	geographic information system
GPS	global positioning system
GWSAP	groundwater sampling and analysis plan
IPD	Interagency Pesticide Database
LDR	land disposal restriction
LOA	letter of authorization
LPST	leaking petroleum storage tanks
MCL	maximum contaminant level
MSWLF	municipal solid waste landfill facility
NPL	national priorities list
OSSF	on-site sewage facility
PCL	protective concentration level
PMP	pesticide management plan
PMZ	plume management zone
POE	point of entry
PRP	potentially responsible party

ACRONYMS (cont.)

RQ	reportable quantity
TAC	Texas Administrative Code
TRRP	Texas Risk Reduction Program
USDW	underground source of drinking water
WHP	wellhead protection

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SUMMARY

The Texas Groundwater Protection Committee (TGPC) was created by the 71st Texas Legislature in 1989 to bridge gaps between existing state groundwater programs and to optimize water-quality protection by improving coordination among agencies involved in groundwater activities. Sections 26.401 through 26.408 of the Texas Water Code (TWC), does the following:

- sets out the state's groundwater protection policy;
- provides legislative recognition for the TGPC;
- requires the TGPC to coordinate the groundwater protection activities of state agencies;
- requires the TGPC to develop and update a comprehensive groundwater protection strategy for the state; and
- requires the TGPC to develop the format for notices of groundwater contamination,

State law requires the TGPC to publish an annual report on groundwater monitoring activities and cases of documented groundwater contamination associated with activities regulated by state agencies. The TGPC is required to prepare this report based on the activities of the Texas Commission on Environmental Quality (TCEQ), the Texas Water Development Board (TWDB), the Railroad Commission of Texas (RCT), the Department of State Health Services (DSHS), the Texas Department of Agriculture (TDA), the Texas State Soil and Water Conservation Board (TSSWCB), the Texas Alliance of Groundwater Districts (TAGD), the Texas Agriculture Experiment Station (TAES), the Bureau of Economic Geology of the University of Texas at Austin (BEG), and the Texas Department of Licensing and Regulation (TDLR).

This is the TGPC's eighteenth edition of the Joint Groundwater Monitoring and Contamination Report, which was first issued in 1990 for calendar year 1989. Each report is based on data from the previous calendar year.

The report describes the current status of groundwater monitoring programs for each participating agency, and describes 5,576 groundwater contamination cases documented or under enforcement during the 2006 calendar year. The report further describes the enforcement status of each case of groundwater contamination in the accompanying tables.

Purpose and Scope

The annual report describes the current status of groundwater monitoring activities conducted or required by each agency at regulated facilities or associated with regulated activities. Groundwater monitoring is conducted by members of the TGPC to assure regulatory compliance for groundwater protection, and to assess ambient groundwater quality. The report provides a general overview of groundwater monitoring by participating members on a program by program basis.

Additionally, the report provides the status of documented groundwater contamination reasonably suspected of having been caused by activities regulated by state agencies. The report contains a description of each case of groundwater contamination newly documented during the previous calendar year, along with a description of each case of contamination documented during previous periods for which remedial or enforcement action was incomplete at the time the preceding report was issued. The report tables contain the status of enforcement action for each listed case.

Groundwater contamination is broadly defined in the report as any detrimental alteration of the naturally occurring quality of groundwater. The definition is limited, however, to contamination suspected of being associated with activities under the jurisdiction of the contributing agencies and affecting usable-quality groundwater.

Naturally occurring groundwater conditions, such as a high degree of mineralization that may exceed established standards for public supplies of drinking water, are not included within the definition. The scope of the report is further limited to groundwater contamination that has been documented and to cases that are currently under enforcement action of some kind.

Historical cases of documented contamination have not been included unless enforcement action is still active, open or ongoing. However, cases that have been included in the reports from 1994 through 2005 as "action completed," with a notation of "no further action needed," and those that use institutional or engineering controls where groundwater contamination is still present, are included separately in Appendix 10. For these cases, though no enforcement action is currently active, the appendix provides a record that the groundwater contamination is or may still be present.

The report provides technical and administrative agency file numbers and file locations for groundwater contamination cases, field office locations, and agency contacts to assist those who are interested in obtaining or reviewing case-specific data. In addition, the report provides background information on monitoring and regulatory rules and policies of groundwater-related programs for each agency. This information is compiled to assist the public and state policy makers in interpreting the current status of groundwater contamination in the state and the degree of state agency response directed toward the contamination.

The report satisfies the legislative requirement of TWC Section 26.406 to provide the enforcement status of each case. However, the report must be interpreted in light of the specific geographic constraints and the specific enforcement authorities and procedures of each contributing entity. The conclusions on groundwater contamination and the related specific enforcement actions taken by each individual agency are not subject to the review of the TGPC.

Notification to Local Officials and Public Information

This report is compiled and made available to the public to provide the annual status of groundwater monitoring associated with the regulatory, planning, and administrative programs of state agencies and local groundwater conservation districts. The report also gives the annual status of documented groundwater

contamination reasonably suspected of having been caused by activities under the jurisdiction of those programs. Monitoring is discussed in the individual program descriptions.

State law (Section 26.406 TWC) requires the agencies that have groundwater protection responsibilities to maintain a file of all documented cases of groundwater contamination. This information is a matter of public record and is available for public review by arrangement with the respective agency. All groundwater contamination cases documented or under enforcement during 2006 are listed in four tables.

While Section 26.406 TWC requires the report tabulate all cases of groundwater contamination documented or under enforcement for the preceding calendar year, Section 5.236 TWC also requires the TCEQ to provide notice to local officials about groundwater contamination that may affect drinking water supplies in their area. Table 1 identifies these cases with a mark in the column headed "SECTION 5.236"

A copy of this report is provided to county judges and local public health entities to supply information on potential groundwater impacts to drinking water supplies within the listed counties. The report serves as the TCEQ's secondary notice to local officials, who should have received letters advising them of new cases, as well as newly confirmed cases, meeting the criteria of potential impact to drinking water. The Section 5.236 cases are identified in the report only for the year the case is first determined to be affecting or having the potential to affect a public drinking water supply. There are 26 reported Section 5.236 cases identified in Table 1.

Section 26.408 TWC became effective on September 1, 2003, and requires TCEQ to provide notice of groundwater contamination to owners of private drinking water wells that could be affected by groundwater contamination, and also to affected groundwater conservation districts. This state law requires TCEQ to provide this notice within 30 days of the date the agency becomes aware of or documents the contamination, and requires the TGPC to adopt rules to prescribe the form and content of the required notice. TGPC rules in 31 TAC §601.10, effective on November 12, 2003, prescribe the required TCEQ groundwater contamination notice contents (Appendix 4).

Groundwater Protection

Chapter 26 TWC empowers the TCEQ to establish the level of water quality to be maintained, and control sources of pollutants that may affect the quality of water in the state, including groundwater. Certain activities requiring the regulatory protection of groundwater are under the jurisdiction of the RCT, the TDA, the TSSWCB, and the TDLR.

The TAGD, as an organization, has no regulatory or enforcement mandate, but some groundwater districts have limited authority for action on groundwater contamination. The TWDB has certain monitoring responsibilities regarding groundwater characterization and planning, but is not authorized to regulate activities that may contaminate groundwater. The TAES and the BEG conduct research activities related to groundwater.

The state's groundwater protection policy (Section 26.401 TWC, Appendix 2) sets out nondegradation of the state's groundwater resources as the goal for all state programs. The policy recognizes the following principles:

- the variability of the states aquifers;
- the importance of maintaining water quality for existing and potential uses;
- the protection of the environment, and public health and welfare; and
- the maintenance and enhancement of the long-term economic health of the state.

This goal of nondegradation does not mean zero-contaminant discharge. The use of best professional judgment by the responsible state agencies in attaining the goal and policy is also recognized.

The TGPC identified groundwater classification (Appendix 3) as an important tool to be used in the implementation of the state's groundwater protection policy and developed such a system for use by state agencies. Through classification, the groundwaters in the state can be categorized. Protection or restoration measures can then be specified by member agencies according to the quality and present or potential use of the groundwater. The classification developed by the TGPC is based on water quality criteria supporting present and potential uses.

The state's policy on groundwater contamination is that the quality should be restored if feasible. Recognizing that in some cases, it may not be technically possible or cost-effective to clean groundwater to its original quality, the TGPC recommends an approach that focuses on protection of groundwater for its highest quality use related to human health and the environment, while addressing the costs of available remediation technologies.

Groundwater Monitoring

The groundwater monitoring programs of the participating agencies generally fall within one of three categories:

- regulatory agencies requiring or conducting monitoring to assure compliance with guidelines and regulations for the protection of groundwater from discharges of contaminants;
- agencies or entities conducting monitoring to assess ambient or existing groundwater quality conditions and to track changes in water quality over time; and
- agencies or entities conducting research activities related to groundwater resources and groundwater conservation.

Detailed monitoring program descriptions are given in each agency's or entity's section in the chapter entitled Groundwater Protection Program Descriptions.

Each regulatory agency which requires or conducts groundwater monitoring to assure compliance with guidelines and regulations to protect groundwater from discharges of contaminants has its own monitoring program requirements and procedures. Criteria used to assess the need for groundwater monitoring vary among the regulatory entities.

Data indicate that an estimated 52,455 monitor and water wells are being used for groundwater monitoring purposes at these regulated facilities. The majority of the facilities being monitored (approximately 99 percent) are under the jurisdiction of the TCEQ, with the remainder under the jurisdiction of the RCT, TAGD and DSHS.

The TWDB and the member districts of the TAGD conduct groundwater monitoring to assess ambient groundwater quality conditions through the assessment of particular constituents to track changes in water quality over time. Monitoring program activities reported by the Texas Water Development Board and participating organizations involved over 569 water wells in 2006.

Additionally, some monitoring programs are developed for water-quality assessment studies that target specific geographic areas, specific contaminants or constituents, or specific activities. Contamination cases discovered by these agencies or entities through groundwater studies or groundwater sampling programs are referred to the regulatory agency with appropriate jurisdiction.

The ambient groundwater monitoring network has historic limitations for the parameters that have been analyzed. There are very few historical analyses available for constituents that can generally be attributed to anthropogenic (man-induced) sources.

For example, there are limited analyses available for constituents such as volatile and synthetic organic compounds and certain heavy metals. Ambient monitoring has not traditionally targeted pesticides. Drinking water analyses conducted under the Safe Drinking Water Act (SDWA) include some pesticides in their suite of chemicals, however, this program targets "finished" water, not groundwater specifically. Analyses conducted under the United States Geological Survey (USGS) National Water Quality Assessment (NWQA) program also include pesticides in a wide range of constituents. TCEQ, TWDB, and members of TAGD have implemented a cooperative program since the year 2000 where ambient groundwater samples collected by TWDB and Groundwater Conservation District staff are analyzed by TCEQ staff for Atrazine and Metolachlor.

In general, the waste disposal programs— primarily the TCEQ's Office of Permitting, Remediation and Registration and the RCT—are monitoring existing, permitted facilities. Groundwater monitoring requirements have been established for the petroleum storage tank, industrial and hazardous waste, municipal waste, underground injection control, pollution cleanup, and enforcement programs. Initiatives in the municipal and industrial wastewater permitting program have required groundwater monitoring at facilities where activities pose a higher risk to groundwater quality. Additionally, permits required for surface storage and disposal of oil and gas waste and brine retention ensure the protection of groundwater by requiring pond liners, leak detection systems, groundwater monitoring, or a combination of these methods.

In the drinking water program, public water supply wells are also regulated by the TCEQ's Office of Permitting, Remediation and Registration. Public water systems receive sufficient monitoring to ensure that violations of drinking water standards are detected and addressed before water is distributed to consumers.

Currently, there is no state program for monitoring domestic wells, though some groundwater conservation districts do have programs that routinely monitor private water wells for ambient conditions or suspected contamination. The TDLR is responsible for oversight of licensed water well drillers, responding to complaints and routinely checking compliance with TDLR rules. The Texas Cooperative Extension provides outreach, continuing education programs, and other educational services on water quality to the people of Texas.

Groundwater Contamination

The groundwater contamination cases listed in this report have been documented predominantly through regulatory requirements for compliance monitoring. The majority of the cases were identified by release-detection monitoring in the TCEQ's petroleum storage tank program. Other information in this report identifies groundwater contamination cases that have been documented through investigations in response to groundwater contamination complaints, permits or, self reporting. However, groundwater contamination is most commonly detected when site-specific groundwater monitoring is conducted at waste disposal or product storage sites.

Groundwater contamination, as defined by the TGPC for this report, is the detrimental alteration of the naturally occurring physical, thermal, chemical, or biological quality of groundwater reasonably suspected of having been caused by the activities of entities under the jurisdiction of the agencies discussed within this report. The TGPC recognizes that groundwater contamination may result from many sources, including current and past oil and gas production and related practices, agricultural activities, industrial and manufacturing processes, commercial and business endeavors, domestic activities, and natural sources that may be influenced by, or may result from human activities. The contamination cases identified in this report are primarily those where contaminants have been discharged to the surface, to the shallow subsurface, or directly to groundwater from activities such as the storage, processing, transport, or disposal of products or waste materials.

Documented in this report are 5,576 groundwater contamination cases. These cases are presented in a tabular format in the section entitled "Groundwater Contamination Case Descriptions." Approximately 93.7 percent of the documented cases fall under the jurisdiction of the TCEQ. The remainder of the cases fall under the jurisdiction of the RCT (351 cases, or 6.2 percent), the groundwater conservation districts which are members of TAGD (1 case, or less than 0.1 percent) and a case under the jurisdiction of DSHS (1 case, or less than 0.1 percent).

On occasion, a contamination site may be listed more than once for some TCEQ program areas. This occurs because there is more than one occurrence of contamination at the named facility, and each occurrence is being addressed as a separate case. In the case of the Voluntary Cleanup Program (VCP), several parties may be affected by a groundwater contamination plume, and each of these parties is listed as a separate "case" in the VCP program. Every effort has been made to distill cases down to a single, individual occurrence of groundwater contamination. For this report only one case appears under two program areas within the TCEQ, as the programs share the lead on the case.

The most common contaminants reported include gasoline, diesel, and other petroleum products. This reflects the large number of contamination sites (66 percent of the documented cases) reported by the TCEQ's petroleum storage tank program. Less common contaminants include the following: organic compounds, such as phenol, trichloroethylene, carbon tetrachloride, dichloroethylene, and naphthalene; and pesticides, including alachlor, atrazine, bromacil, dicamba, and prometon; creosote constituents; solvents; heavy metals; and sodium chloride.

The report indicates the status of enforcement action for each case of groundwater contamination. Codes describing the enforcement status and the activity status are given for each contamination case. In general, regulatory programs are structured to achieve the desired degree of environmental protection at the lowest possible level of agency oversight. The enforcement status code represents the level of agency procedural action in pursuing investigation and remediation.

Describing an agency's enforcement actions presents only half the regulatory picture. Enforcement is ineffective if the required corrective actions are not carried out. Therefore, agency activities dealing with contamination incidents are assigned an activity status code. This code represents the current action addressing the assessment and mitigation of the contamination case. These two indicators (the enforcement status and activity status codes) are plotted graphically as a matrix to illustrate their combined effect on the enforcement status of each contamination case. The cumulative number of cases that have been assigned each enforcement status code is found in the enforcement status summary matrix at the end of each agency's groundwater contamination case table. The enforcement status matrix, enforcement status codes, and activity status codes are discussed in detail in the section entitled "User's Guide" on pages 31 through 38. Specific enforcement actions are typically described in each agency's program description.

The total number of groundwater contamination cases documented and identified by the TGPC in this and previous reports are tabulated in Figure 1, along with the activity status for these cases. All of the 5,576 cases listed in the data tables of this report have documented groundwater contamination. The activity status for each case is identified in the tables, and is summarized as follows for calendar year 2006:

- No activity has occurred in 149 reported cases.
- Detection of contamination is confirmed (validated) in 1,149 cases.
- Investigations are ongoing for the largest number of cases (2,121).
- Corrective action planning is completed in 267 cases.
- Action has been implemented in 843 cases.
- Monitoring action is ongoing in 433 cases.
- No further action is necessary for 884 cases that are designated as "action completed."
- No activity status information was provided for one case.

Figure 2a is a graph showing the total number of documented contamination cases, the number of new cases of contamination, and the number of sites where ongoing investigation is occurring plotted against the calendar year of the report. Figure 2b is a graph showing the historical activity status of groundwater contamination cases, plotted against the calendar year of the report.

Several general observations can be drawn from the limited data represented in Figures 1, 2a, and 2b. The limitations of the data do not allow for forecasting of probable trends. In addition, the use of the term "trend" may be too definitive, and should only be considered as a general observation of the historic data compiled to date.

The number of new cases had annually decreased up to 1995, but increased in that year and continued to increase through 1998. These increases are chiefly attributed to increased release detection activity in the Texas Natural Resource Conservation Commission's (now TCEQ's) Petroleum Storage Tank program, as well as to the initiation of milestone deadlines related to detection monitoring and cleanup expense reimbursement. These milestone deadlines required some types of remediation activities to be in place before the end of 1998 to qualify for reimbursement. Consequently, a slight decline in the number of new cases is noted for 1999, but there were still more new cases than cases where action had been completed. Another part of the upward trend in the number of new cases can also be attributed to cases being reported under the Voluntary Cleanup Program of the TCEQ, which was established in 1995.

Historically, the number of new groundwater contamination cases documented each year has been greater than the number of cases in which action was completed during the same year. This was evident in the initial publication of the report in 1989, and continued through the 1999 calendar year. (The elevated number of cases where action had been completed in the initial report was cumulative up to the end of 1989, because this reporting period was open-ended, including historical cases before 1989). Starting 2000, there has been a steady decline in the number of new groundwater contamination cases. The number of new cases reported in 2006 decreased by 16 percent from 2005. The number of cases where action was completed fluctuated. The number of completed cases climbed in both 2004 and 2005, and decreased in 2006. The number of completed cases for 2006 has again surpassed the number of reported new groundwater contamination cases.

Cases shown as having "contamination confirmed" peaked in 1991 and have fluctuated since then. Cases listed as being under "ongoing investigation" and "corrective action planning" reached a relative plateau in the period from 1992 through 1996. Because groundwater contamination is generally slow moving and time consuming to clean up, the number of cases shown as being under "ongoing investigation" began to rise again in 1996, to peak in 2000 and started to decline since 2002. Cases listed as having "action implemented" reached a relative plateau with an approximate one-year lag behind "corrective action planning," indicating that the cases are moving through the sequence of actions that should ultimately lead to completion. The overall numbers also reflect the maturing of the TCEQ regulatory programs, after adjustment for case increases resulting from major regulatory initiatives.

For all of the agencies and entities over the eighteen-year period from 1989 through 2006 (Figure 1), action has been reported as complete on a total of 11,221 groundwater contamination cases, and the cases were dropped from each successive annual report. Action was completed on 884 cases in 2006. Action on these cases was considered complete when the desired remedy was achieved or when no further regulatory action was required.

Figure 1. Case History of Groundwater Contamination

ACTIVITY STATUS	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006
TOTAL CASES	2241	3191	4759	5597	5646	5675	5849	6427	7459	7627	8065	7567	7435	7069	6750	6746	6132	5576
NEW CASES	--	1303	1247	998	583	376	421	992	1356	1365	1314	623	585	582	464	645	654	548
NO ACTIVITY	--	12	8	2	9	12	21	28	34	47	67	63	90	103	91	96	158	149
CONTAMINATION CONFIRMED	1237	1349	1717	1284	1407	1598	1481	1163	1100	1509	1512	1035	1032	1091	821	1107	968	1149
ONGOING INVESTIGATION	401	1178	1657	2195	2138	2069	2153	3093	3911	4006	4241	4219	3387	3816	3810	2928	2456	2121
CORRECTIVE ACTION PLANNING	48	85	454	825	749	760	780	674	311	333	343	190	165	209	242	233	242	267
ACTION IMPLEMENTED	301	329	408	524	717	732	743	663	518	470	549	1050	974	955	925	873	912	843
MONITOR ACTION	--	193	324	466	264	255	278	296	348	330	368	210	179	283	373	393	427	433
ACTION COMPLETED	254	45	172	273	342	226	371	493	461	921	1064	833	970	739	725	1277	1171	884
NO STATUS GIVEN	--	--	19	28	20	23	22	17	9	11	7	64	51	15	8	25	9	1

Note: 426 cases have more than one activity status code

Figure 2a. Case History of Groundwater Contamination: Total, New, and Completed Cases

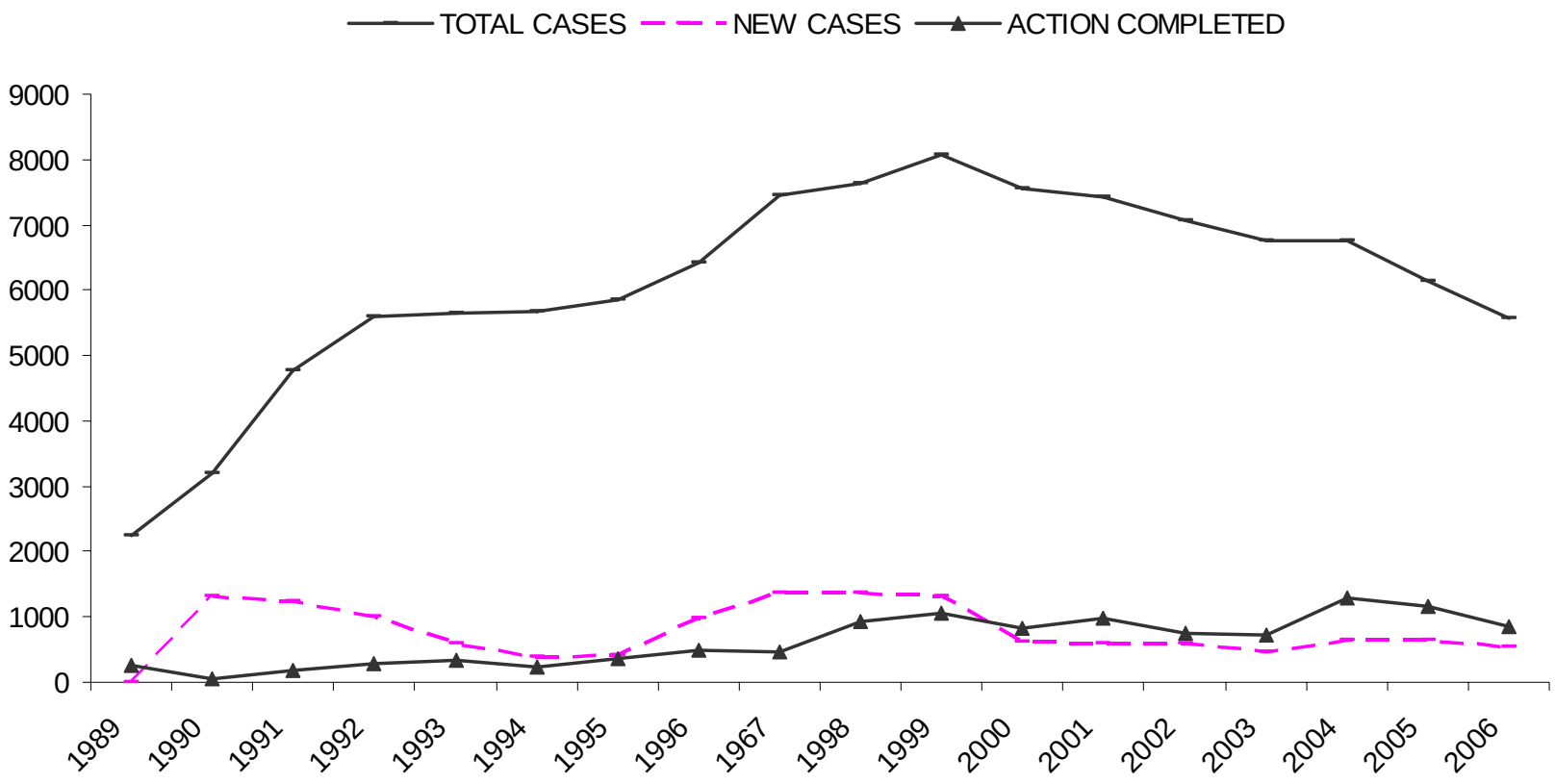
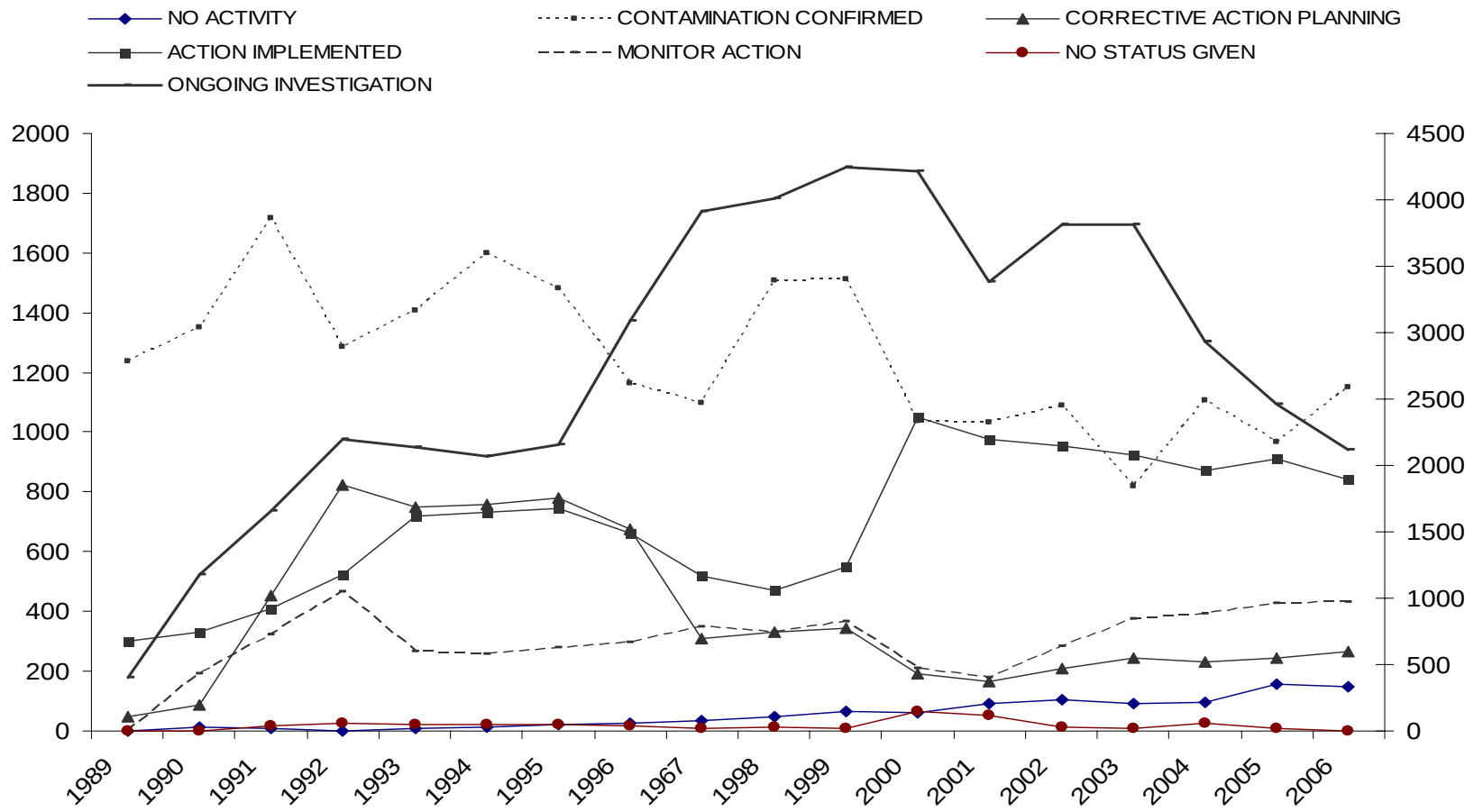


Figure 2b. Case History of Groundwater Contamination: Report Trends for Activity Status Codes



Note: Use the right-hand scale for the Ongoing Investigation

GROUNDWATER PROTECTION

The following section gives an overview of groundwater protection topics including: the Texas Groundwater Protection Committee (TGPC), the state's groundwater protection policy, the TGPC's recommended groundwater classification system, risk-based cleanup levels for groundwater, the definition of groundwater contamination as it applies to this report, and notification to and from regulatory agencies concerning groundwater contamination. Additional sources of public information are also discussed.

Texas Groundwater Protection Committee

The Texas Groundwater Protection Committee was created by the 71st Texas Legislature in 1989 as a means to bridge gaps between existing state groundwater programs and to optimize water-quality protection by improving coordination among agencies involved in groundwater activities. State law codified in §§26.401 through 26.408 TWC established the TGPC; outlined the TGPC's powers, duties, and responsibilities; and established the state's groundwater protection policy.

The TGPC actively identifies opportunities to improve existing groundwater quality programs and promotes coordination between agencies. The TGPC also strives to improve or identify areas where new or existing programs could be enhanced to provide added protection. Major responsibilities of the TGPC are:

- to improve interagency coordination in the area of groundwater protection;
- to develop and update a comprehensive groundwater protection strategy for the state;
- to study and recommend to the Legislature groundwater protection programs for areas in which groundwater is not protected by current regulation;
- to publish an interagency groundwater monitoring and contamination report;
- to file with the governor, lieutenant governor, and speaker of the House of Representatives a report of the TGPC's activities during the biennium preceding each regular legislative session, including any recommendations for legislation for groundwater protection;
- to advise the TCEQ on the development of agricultural chemical plans to prevent groundwater pollution; and
- develop the form and content of notices of groundwater contamination.

The TGPC's membership is composed of the following individuals or their designated representative:

- the executive director of the Texas Commission on Environmental Quality;
- the executive administrator of the Texas Water Development Board;
- the executive director of the Railroad Commission of Texas;
- the commissioner of Department of State Health Services;
- the deputy commissioner of the Department of Agriculture;
- the executive director of the Texas State Soil and Water Conservation Board;
- a representative selected by the Texas Alliance of Groundwater Districts;
- the director of the Texas Agriculture Experiment Station;

- the director of the Bureau of Economic Geology, University of Texas at Austin; and
- a representative of the Water Well Drillers and Water Well Pump Installers Program of the Texas Department of Licensing and Regulation selected by the executive director of the department.

The executive director of the Texas Commission on Environmental Quality serves as the TGPC's chairman. The TCEQ is designated as the lead agency for the TGPC and administers the activities of the TGPC. The executive administrator of the Texas Water Development Board serves as the TGPC's vice-chairman. TGPC members and their designated representatives are listed in Appendix 1.

Federal Involvement and Coordination

The TGPC actively coordinates with federal agencies on groundwater protection issues that affect the state. The TGPC has worked with federal agencies on issues related to a comprehensive state groundwater protection program and the development of pesticide management plans for the prevention of groundwater contamination. In addition, the TGPC has regularly provided national level input to federal agencies on groundwater protection and program issues through the Ground Water Protection Council (an association of state groundwater and underground injection control program directors) and the State FIFRA Issues Research Evaluation Group (a group formed by state agricultural regulatory officials and EPA to discuss and evaluate pesticide matters affecting states), and other state and federal stakeholder and regulatory guidance groups.

The TGPC also works closely with the U.S. Geological Survey (USGS), the federal agency with responsibilities that include national level geologic mapping and hydrologic studies. Staff of the USGS has participated in various TGPC-sponsored projects, providing groundwater expertise and opportunities for state input in federally-sponsored research.

In March 1985, the Texas Department of Water Resources, predecessor to the Texas Commission on Environmental Quality and the Texas Water Development Board, received a grant from the U.S. Environmental Protection Agency (EPA) to improve the coordination of groundwater protection activities undertaken by state agencies. In response to this federal initiative, the interagency Groundwater Protection Committee, predecessor to the Texas Groundwater Protection Committee, was formed. Since that time, the coordination of groundwater protection activities of the various state programs and agencies and the development of a groundwater protection strategy have been guided and funded through EPA grants administered under the Clean Water Act, Section 106.

State Groundwater Protection Strategy

In evaluating the states' activities under the groundwater protection strategy initiative begun in the early 1980s, the EPA concluded that additional efforts were needed to protect the nation's groundwater, and that groundwater protection programs were a patchwork of federal, state, and local efforts that focus on individual sources of contamination rather than protection of the resource as a whole. During fiscal years 1992 and 1993, the EPA published draft guidance for the development of comprehensive state groundwater protection programs (CSGWPP). The CSGWPP

guidance encourages the states to further their efforts in developing existing programs into a more comprehensive approach. The final guidance was published early in 1993.

The TGPC is charged with developing a comprehensive strategy that coordinates the activities of all the participating agencies and documents what needs to be done to protect groundwater in the State of Texas, The Committee addressed this duty directly in 1988 through the formal publication of the *Texas Ground Water Protection Strategy*. Since that time, there have been several efforts to describe changes to the groundwater protection programs and authorities of state agencies with respect to groundwater, in the *Texas Ground Water Protection Profiles*, 1991, and later in the various editions of the annual *Joint Groundwater Monitoring and Contamination Report*. There have been many changes in agencies and the programs that they administer since 1988. The more recent publications have focused on the water quality aspects of various programs rather than the state strategy for groundwater protection.

Recognizing the changes that have occurred since the state's first groundwater protection strategy was developed, the TGPC decided in January 2001 to begin the process to update it. That process resulted in the document, *Texas Groundwater Protection Strategy*, TCEQ Publication No. AS-188, February 2003. The new *Strategy* is providing a road map for the current activities of the TGPC. The *Strategy* is divided into thematic sections designed to highlight the state's current protection efforts, and importantly, identify any gaps that may need to be filled among those programs.

The *Strategy*:

- details the state's groundwater protection goal as established by the Legislature;
- explains the statewide groundwater classification system and how the state identifies contamination and quantity issues;
- describes the roles and responsibilities of the various state agencies involved in groundwater protection and discusses the TGPC as a coordinating mechanism;
- provides examples of how the various state agencies implement groundwater protection programs through regulatory and non-regulatory models;
- explains how the local, state, and federal agencies coordinate management of groundwater data for the enhancement of groundwater protection;
- discusses the role that research plays in understanding groundwater's importance and the importance of coordinating research efforts;
- provides an overview of the groundwater public education efforts in the state;
- discusses public participation in establishing and implementing groundwater policy;
- lays out a planning process for updating the groundwater strategy;
- proposes for inclusion in the next Strategy an identification and raking of significant threats to the state's groundwater resource, consideration of the vulnerability of groundwater resources, and a prioritization of actions to address those threats; and
- provides recommendations and possible actions to protect groundwater.

Meetings

The TGPC and most of its subcommittees meet quarterly; meeting times and agendas are published on the TGPC's website at www.tgpc.state.tx.us and in the Texas Register on their open meetings website at www.sos.state.tx.us/texreg/index.shtml. The public is invited to attend all meetings. The TCEQ maintains written records of all TGPC meetings. The TCEQ maintains a mailing list of TGPC members, designated and alternate members, agency staff, and interested parties for meeting notification.

Groundwater Protection Policy

Section 26.401 TWC establishes the state's groundwater protection policy. The policy (see Appendix 2) sets out nondegradation groundwater resources as the goal for all state programs. The policy recognizes the variability of the state's aquifers, the importance of maintaining water quality for existing and potential uses, the protection of the environment and the public health and welfare, and the maintenance and enhancement of the long-term economic health of the state. Further, the policy recognizes that groundwater contamination may result from many sources, including current and past oil and gas production and related practices, agricultural activities, industrial and manufacturing processes, commercial and business endeavors, domestic activities, and natural sources that may be influenced by, or may result from, human activities. The use of the best professional judgment by the responsible state agencies in attaining the goal and policy is also recognized.

The policy states that discharges of pollutants, disposal of wastes, and other regulated activities should be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard. The programs of the various state agencies are generally coordinated to attain this goal.

Groundwater Classification System

The TGPC and its member agencies recognize that groundwater classification is an important tool to be used in the implementation of the state's groundwater protection policy. Through classification, the groundwater in the state can be categorized and protection or restoration measures can then be specified by member agencies according to the quality and present or potential use of the groundwater.

The TGPC has developed a Groundwater Classification System for use by state agencies. Four groundwater classes are defined based on quality as determined by total dissolved solids (TDS) content. The names and concentration ranges are based on traditional nomenclature associated with each class. Fresh groundwater is classified as having a TDS concentration range from zero to 1,000 milligrams per liter (mg/L); slightly saline groundwater, a TDS concentration range from 1,000 to 3,000 mg/L; moderately saline groundwater, a TDS concentration range from 3,000 to 10,000 mg/L; and very saline groundwater to brine, a TDS concentration greater than 10,000 mg/L. Quality also determines usability; however, it is implicit in the classification that a water-bearing zone must be able to produce sufficient quantities of water to meet its intended use. Appendix 3 contains the Groundwater Classification System recommended by the TGPC.

The Groundwater Classification System is applicable to all groundwater in the state. In assigning a classification, the member agencies attempt to use the natural quality of the groundwater that is unaffected by discharges of pollutants from human activities. All usable and potentially usable groundwater is subject to the same protection provided by the state's groundwater protection policy. Starting with the nondegradation goal, protection or restoration measures can be varied according to the response level set by the classification so long as the following conditions are met:

- Current groundwater uses are not impaired;
- Potential groundwater uses are not impaired;
- A public health hazard is not created; and
- The quality of groundwater is restored if feasible.

In determining protection or restoration measures, an agency considers all present or potential beneficial uses of groundwater of a given quality. Generally, drinking water for human consumption would require the highest degree of groundwater protection or restoration. Protection for this use will also, arguably, be protective of all other current or potential uses. These considerations facilitated defining two response levels for purposes of assigning protection or restoration measures that are commensurate with the potential to impact human health and the environment.

- Level I response for the fresh, slightly saline and moderately saline classes should be based on the current or potential use as a human drinking water supply.

- Level II response for the very saline to brine class should be based on indirect exposure (i.e., by means other than drinking) or no human consumption.

In specifying a protection or restoration measure, member agencies should apply best professional judgment on a case-by-case basis. Evaluations to be made include, but are not limited to, such factors as productivity, the availability of alternate sources of water, background concentrations of naturally occurring constituents, the effects of constituents on usability, traditional and potential beneficial uses of the water, economic and technical feasibility of treatment, and projected needs for and types of impacts on these groundwaters.

The classification system is intended to be implemented by member agencies as an integral part of their groundwater protection programs. In addition to its response-setting function, the classification system fosters consistency among the various programs.

Risk-Based Remediation Programs

The state's policy on groundwater contamination provides that water quality be restored if feasible (Appendix 2), and consequently requires that groundwater be kept reasonably free of contaminants that would interfere with present uses or impair future uses of groundwater. In response, the TCEQ has developed an approach that focuses on protection of groundwater for high quality uses, including those affecting human health. The TCEQ, which has primary jurisdiction for the regulatory

protection of groundwater quality, has implemented a risk-based approach in setting cleanup levels that are based on sound science, flexibility, and common sense.

There are many ways that risk-based considerations could be incorporated into a groundwater remediation program. Generally, a risk-based approach takes into consideration the current and/or potential future exposure of populations to concentrations of contaminants that exceed established levels that are protective of human health. In addition to consideration of exposure pathways, risk-based determinations using dose-response data are used to calculate human health protective concentrations of chemicals in environmental media. The primary exposure pathway for humans to groundwater is through ingestion; however, humans can also be exposed via air inhalation to chemicals that have volatilized from groundwater. Also, humans may be exposed to contaminants by the ingestion of surface water that has been affected by the discharge of contaminated groundwater into the surface water body. Likewise, if fish from such a surface water body are consumed by humans, then the person conducting the assessment would also need to consider this as an additional human exposure pathway when determining cleanup levels for contaminants in groundwater. Since the mid 90's, some agency rules have required risk-based concentration levels to be protective not only of human health but also of ecological receptors. The process for determining ecologically-protective concentration levels has been substantially improved in the last decade.

Depending on the level of the risk and the current regulatory policies, risk management may involve no-action, engineering solutions such as soil and groundwater remediation or physical controls, or institutional controls such as deed restrictions or limiting access to the site. Thus, risk-based decision-making can be protective of human health and the environment, and offer a scientifically sound, administratively effective way to respond to the pressures for timely action at large numbers of sites, while making efficient use of both public and private resources. The TCEQ has incorporated risk-based corrective action into its rules and policies, and has made many of the risk management policy decisions up front to streamline and add consistency to the remediation process.

The Texas Risk Reduction Program

The Texas Risk Reduction Program (TRRP) (TCEQ rules 30 TAC Chapter 350) is the current remediation rule with an effective date of September 23, 1999. TRRP applies, in various manners, to the State Superfund; Industrial and Hazardous Waste; Voluntary Cleanup; Underground Injection Control; Municipal Solid Waste; Spill Prevention and Control; Composting; Radioactive Substance; and Wastewater Treatment programs. Releases reported to the TCEQ in response to the Petroleum Storage Tank Program, on or after September 1, 2003, are subject to TRRP. Section 350.2 (Applicability) describes the manner in which the TRRP rule is applicable to these various program areas of the TCEQ's Office of Permitting, Remediation and Registration. Figure 3 summarizes the numerous guidance documents that the TCEQ has prepared to implement the TRRP rules.

Figure 3. Guidance Documents for Texas Risk Reduction Rules

Series	Topic
RG-263	Guidance for Conducting Ecological Risk Assessments at Remediation Sites in Texas
RG-366 Sub-Series	
TRRP-1	Introduction to the Texas Risk Reduction Program
TRRP-2	TRRP Applicability and Grandfathering
TRRP-3	TRRP Compatibility with RCRA
TRRP-4	Comparison of 30 TAC 335 and 30 TAC 350: Points to Consider in Making the Shift
TRRP-4A	Comparison of 30 TAC 334 and 30 TAC 350: Regulation of LPST Sites Under TRRP
TRRP-7	Land Use Classification
TRRP-8	Groundwater Classification
TRRP-13	Review and Reporting of COC Concentration Data
TRRP-16	Institutional Controls
TRRP-17	Notification Requirements
TRRP-18	Risk Levels, Hazard Indices, and Cumulative Adjustments
TRRP-19	Toxicity Factors and Chemical/Physical Parameters
TRRP-21	Human Health Points of Exposure
TRRP-23	Tier 1 PCL Tables
TRRP-24	Determining PCLs for Surface Water and Sediment Companion documents: Sediment PCL table Surface Water RBELs table
TRRP-25	Critical PCLs
TRRP-27	Development of Human Health PCLs for Total Petroleum Hydrocarbon Mixtures
TRRP-28	Application of Remedy Standards A and B
TRRP-29	Soil and Groundwater Response Objectives
TRRP-33	Monitored Natural Attenuation Demonstrations

These TRRP guidance documents are completed and are available. Other guidance documents are in various stages of completion.

TRRP is a risk-based rule in the sense that many of the cleanup levels for the various environmental media are determined through use of risk-based calculations. Other risk-related factors, such as the location of human points of exposure (POEs) to environmental media and the response objectives for soil and groundwater, are prescribed in the rule for application to all sites rather than being determined on a site-specific basis.

Cleanup levels for chemicals of concern (COCs) under TRRP are referred to as protective concentration levels (PCLs). Whenever a maximum contaminant level

(MCL) is available for a COC, it is used as a groundwater PCL. If a federally-promulgated MCL is not available for a COC, then a risk-based calculation is used to define the PCL. The PCL for a carcinogenic COC is set such that the risk level from exposure to that COC in groundwater would not exceed 1×10^{-5} (1 in 100,000) and such that the cumulative risk level from exposure to multiple carcinogenic COCs does not exceed 1×10^{-4} (1 in 10,000). The PCL for a noncarcinogenic COC in groundwater is set such that its hazard quotient does not exceed 1 and such that the hazard index from exposure to multiple noncarcinogens does not exceed 10.

TRRP also establishes a groundwater resource classification process that provides criteria to define whether a groundwater-bearing unit containing potentially usable groundwater is a Class 1, 2, or 3 groundwater resource. A groundwater-bearing unit is described as a saturated geologic formation, group of formations, or part of a formation which has a hydraulic conductivity equal to or greater than 1×10^{-5} centimeters/second. Class 1, 2, and 3 resources are defined as follows:

- A Class 1 groundwater resource must meet at least one of the following conditions:

(a) any groundwater-bearing unit within 1/2 mile of an existing well used to supply drinking water to a public water system and that groundwater-bearing unit can contribute COCs to the groundwater production zone of the well;

(b) a groundwater-bearing unit which is the only reliable source of water not more than 800 feet below the land surface that is capable of producing groundwater with a naturally occurring total dissolved solids content of less than 1,000 milligrams per liter (mg/l) and at a sustainable rate greater than 5,000 gallons per day to a well with a four inch diameter casing; or

(c) a groundwater-bearing unit capable of yielding groundwater with less than or equal to a naturally occurring total dissolved solids content of 3,000 mg/l and at a sustainable rate greater than or equal to 144,000 gallons per day to a well with a 12 inch diameter casing.

- A Class 2 groundwater resource includes:

(a) any groundwater-bearing unit which is a groundwater production zone for an existing well located within 1/2 mile of the affected property and which is used to supply groundwater for human consumption, agricultural purposes, or any purpose which could result in exposure to human or ecological receptors; or

(b) any groundwater-bearing unit which is capable of producing waters with a naturally occurring total dissolved solids content of less than 10,000 mg/l and at a sustainable rate greater than 150 gallons per day to a well with a four inch diameter casing.

- A Class 3 groundwater resource includes any groundwater-bearing unit which produces water with a naturally occurring total dissolved solids content of greater than 10,000 mg/l or at a sustainable rate less than 150 gallons per day to a well with a four inch diameter casing.

The standard groundwater response objectives do not apply typically to those stratigraphic units that do not contain enough groundwater to be considered a groundwater-bearing unit (that is, a non-groundwater bearing unit). The PCLs for COCs in Class 1 and 2 groundwater are determined as described above. The PCL for a COC in Class 3 groundwater is 100 times greater than the PCL for that COC in

Class 1 or 2 groundwater. All of the groundwater with COC concentrations that exceed the applicable PCL are described as the protective concentration level exceedence (PCLE) zone. Lower cleanup levels than those based upon groundwater ingestion may be necessary to also be protective for cross-media exposure pathways such as groundwater-to-air and groundwater-to-surface water.

The point of entry (POE) under TRRP is the location within an environmental medium where a receptor (human or ecological) will be assumed to have a reasonable potential to come into contact with COCs. For Class 1 and 2 groundwater resources, the prescribed POE to groundwater is a well which may be completed at all locations throughout the groundwater PCLE zone. For Class 3 groundwater, the prescribed POE to groundwater is set at all locations throughout the groundwater PCLE zone. Provided the person is authorized by the TCEQ to establish a plume management zone (PMZ) in Class 2 or 3 groundwater, the person may establish an alternate human health POE to groundwater. A PMZ is an exposure prevention approach. In other words, the person is not required to "cleanup" the groundwater, but is required to manage and to prevent use of the contaminated groundwater indefinitely. If a PMZ is approved, the person may move the POE from throughout the groundwater PCLE zone to the hydraulically downgradient limit of the PMZ. Alternate POEs and PMZs are discussed thoroughly in the TCEQ guidance document entitled Soil and Groundwater Response Objectives (RG-366/TRRP-29).

If PCLs are exceeded in the groundwater, a person may choose to conduct a response action to achieve the objectives of either Remedy Standard A or Remedy Standard B. Remedy Standard A is a pollution cleanup remedy in that all PCLE zones in surface and subsurface soils, groundwater, and other environmental media must be removed and/or decontaminated to the extent that COC concentrations are less than the applicable PCLs. Physical controls are not allowed as a response action under Remedy Standard A. In contrast, Remedy Standard B, when appropriate, allows exposure prevention response actions (that is, use of physical controls). A response action under either of these remedy standards must be completed within a reasonable time frame.

Under Remedy Standard B, unless a person demonstrates that an affected property meets the qualifying criteria for a modified groundwater response approach, he must use either an active restoration approach or monitored natural attenuation to reduce the concentration of the COCs to the applicable PCLs throughout the groundwater PCLE zone within a reasonable time frame.

Modified groundwater response approaches that may be approved for use under Remedy Standard B include: waste control unit (WCU); technical impracticability; and PMZ. A WCU is a landfill with a liner system and an engineered cap. In the circumstance where an existing or planned WCU overlies an existing groundwater PCLE zone, the TCEQ may approve the exclusion of that portion of the groundwater PCLE zone which directly underlies the WCU from the previously described groundwater response objectives. To use a technical impracticability approach, a person must demonstrate that it is not feasible from a physical perspective using currently available remediation technologies due either to hydrogeologic or chemical-specific factors to reduce the concentration of COCs throughout all or a portion of the groundwater PCLE zone to the applicable groundwater PCLs within a reasonable

time frame. The use of PMZs as a potential alternative approach to the general groundwater response objectives has been discussed previously.

For any releases reported prior to September 1, 2003, the Petroleum Storage Tank Program also uses a risk-based approach to corrective action, combining an exposure potential evaluation with risk-based cleanup levels to determine appropriate actions at Leaking Petroleum Storage Tank sites. The risk-based rules, effective as of November 8, 1995 are found in Title 30 TAC Chapter 334, Subchapter G (Target Concentration Criteria). Numerous guidance documents and memos provide supporting information.

The adoption of the original Texas Risk Reduction Rules in 1993, the PST risk-based rules in 1995 and the revised rules for the Texas Risk Reduction Program in 1999 substantiate the TCEQ's philosophy that risk-based cleanups are an acceptable remedial response to affected environmental media. Risk-based corrective action ensures protection of human health and the environment while making response actions more economically feasible than complete, or background cleanups.

Municipal Setting Designations

In May 2003, the Texas Legislature passed H.B. 3152, providing the TCEQ with the authority to establish Municipal Setting Designations (MSDs), i.e., properties within which the production of groundwater for potable use (e.g., drinking, showering, bathing, cooking, or food crop irrigation) will be restricted and environmental response actions for protection of potable water use will no longer be required. The goal of this law is to reduce corrective action requirements and associated costs for groundwater-bearing units that are not presently used as a potable supply and are not likely to be used as a potable supply in the future. This law took effect on September 1, 2003, and is codified in the Texas Health and Safety Code, Chapter 361, Subchapter W. Additional information regarding the program is available on the TCEQ's web page at http://www.tceq.state.tx.us/remediation/msd.html.

Corrective action sites subject to TCEQ jurisdiction can apply for an MSD subject to the following requirements:

- Municipal Area Location. The corrective action site must be located within the corporate limits or extra-territorial jurisdiction of a municipality with a population of 20,000 or more.

- Public Water Supply Available. A public drinking water supply must be presently provided or could be provided to the proposed MSD property and to properties within 0.5 miles of the MSD property.

- Groundwater Use Restriction. Potable use of groundwater within the proposed MSD must be restricted subject to an ordinance issued by the local municipality or subject to a restrictive covenant that is supported by a resolution passed by the local city council.

As of the end of calendar year 2006, twenty one MSD applications had been certified. The status of individual MSD applications can be monitored on the MSD

web page. Specific information on individual MSD applications can also be obtained from the status information.

Railroad Commission of Texas Cleanup Fund Program

The Site Remediation Section of the Railroad Commission of Texas (RCT) is responsible for the state-funded cleanup of abandoned oil field pollution sites through the Oil-field Cleanup Program, which is described elsewhere in this report. With a combination of these programs, the remediation of groundwater contamination as a result of oil and gas exploration and production activities has become proactive to the point that historic pollution is diminishing and response to new releases is quicker and more effective.

Cleanup options available for these sites include:

- cleanup to background constituent levels;
- cleanup to conservative risk-based levels (for example, TRRP Tier 1, Texas Surface Water Quality Standards, Federal Drinking Water Standards, and EPA Soil Screening Criteria); and
- risk-assessment-driven cleanup using site-specific consideration and data.

Regardless of ultimate closure options, when groundwater is contaminated, free-phase hydrocarbons are expected to be removed, and full delineation of contamination in all directions is to be performed. For the purpose of establishing consistency, the RCT staff may use as guidance the TRRP groundwater resource classification system. This system is based on the Texas Groundwater Protection Committee's classification (Appendix 3), with an additional consideration of low-yielding formations from which windmill pumps are able to provide water for stock.

Groundwater Contamination

The definition of groundwater contamination adopted by the TGPC (Title 31, Texas Administrative Code, §601.3) for use in this report is given in Appendix 4, Texas Groundwater Protection Committee Rules, and is paraphrased as follows:

> Groundwater Contamination - The detrimental alteration of the naturally occurring physical, thermal, chemical, or biological quality of groundwater. Further, groundwater contamination, for purposes of inclusion of cases in the public files and the joint groundwater monitoring and contamination report, shall be limited to contamination reasonably suspected of having been caused by activities of entities under the jurisdiction of the agencies identified in the Texas Water Code §26.406, TGPC rules, and subsequent legislative amendments. Reported contamination cases are generally limited to those affecting usable quality groundwater (less than 10,000 milligrams per liter of dissolved solids).

The first sentence of the definition is based upon the definition of pollution given in §26.001 TWC, and suggests that in identifying contamination, the quality of groundwater must be altered detrimentally. The definition implies that a comparison can be made between known background or natural water-quality conditions and a sampling event that indicates the presence of a contaminant not occurring naturally, or a naturally occurring constituent in amounts or a concentration greater than its

naturally occurring concentration. The definition then limits the scope of contamination to activities of entities under the jurisdiction of the agencies participating in the preparation of this report. This limitation excludes naturally occurring saline or highly mineralized water and the intrusion of these waters into usable quality groundwater resources. The contamination cases identified in this report are primarily those where contaminants have been discharged to the surface, to the shallow subsurface, or directly to groundwater from activities such as the storage, processing, transport, or disposal of products or waste materials.

Texas Water Code, §26.406, requires the listing and description of documented cases of groundwater contamination reasonably suspected of having been caused by activities under the jurisdiction of state agencies with groundwater protection programs. While the definition of groundwater contamination is broadly interpreted to encompass a large universe of identified cases, the documentation of groundwater contamination should be considered more carefully in order to assure accuracy and fairness in reporting impacts to groundwater resources. Documentation of contamination requires an evaluation of the significance of the data, the reliability of the data, and proper interpretation of the data.

Information and analyses of groundwater conditions should be representative of the actual conditions at the site. The data must be adequate to justify conclusions or further actions with regard to documenting contamination. Conditions that should be considered include whether a well is completed in more than one aquifer, whether a contaminant is present in the aquifer, or whether a contaminant has been introduced into the well from the surface. These factors are regarded as necessary and are incorporated into the design of monitoring programs and sampling procedures for each regulatory program. These factors are also important for ambient groundwater monitoring program design.

Groundwater information, especially analytical data, must be of reliable quality. A groundwater sample is subject to inadvertent alteration at many points from its removal at the well to its final laboratory analysis. It is important that reliable, verifiable procedures be used for sampling, handling, and laboratory analysis. Verification of analytical results is often desirable before concluding that contamination has occurred. Verification procedures include resampling and splitting samples with other entities for comparison of analytical results.

Proper interpretation of information and analytical data is essential to the goal of documenting groundwater contamination. Comparing sample results to known background water quality is often necessary to determine if contamination has occurred. Some compounds, such as refined gasoline or synthetic organic compounds are not naturally occurring and their presence in detrimental amounts constitutes contamination. Other constituents such as sodium, chloride, and nitrate are naturally occurring and a comparison to known background water quality is necessary to determine whether contamination has occurred.

As noted earlier, the occurrence of highly mineralized groundwater or the reporting of significant concentrations of dissolved solids and certain other naturally occurring constituents from groundwater monitoring programs does not, of itself, constitute groundwater contamination. Many aquifers contain water categorized as slightly saline to very saline, ranging from 1,000 milligrams per liter (mg/L) of dissolved

solids to 10,000 mg/L and greater. Mineralized waters are the result of natural hydrogeologic processes involving restricted circulation, chemical reactivity, and residence time. These conditions exist in many areas of the state and wells producing poor quality water are common.

Reporting of Groundwater Contamination

Water-quality monitoring and reporting requirements addressing unauthorized discharges are generally described in rules specific to the activity being regulated. Program-specific groundwater monitoring requirements are discussed further under each of the agency or program headings in the section entitled Groundwater Protection Program Descriptions.

Unauthorized discharges to water in the state, including groundwater, from regulated activities under the TCEQ's jurisdiction are prohibited (Texas Water Code, §26.121). Numerous state and federal laws either, 1) require monitoring of groundwater quality and notification to regulatory entities when such monitoring indicates an unauthorized discharge has impacted groundwater or, 2) direct the TCEQ to adopt requirements for monitoring and notification.

Reporting Unauthorized Discharges and Spills

The TCEQ is the state's lead response agency for all hazardous substance discharges or spills, discharges or spills of other substances, and certain inland oil discharges or spills that may cause pollution. This authority is derived from §26.039 and §§26.261 through 26.268 TWC (Texas Hazardous Substances Spill Prevention and Control Act). Pursuant to §26.039 (b), whenever an accidental discharge or spill occurs at or from any activity or facility which causes or may cause pollution, the individual operating, in charge of, or responsible for the activity or facility shall notify the TCEQ as soon as possible and not later than 24 hours after the occurrence. Section 26.039 (a) defines an accidental discharge as an act or omission through which waste or other substances are inadvertently discharged into water in the state. The law further defines a spill as an act or omission in which waste or other substances are deposited where, unless controlled or removed, they will drain, seep, run, or otherwise enter water in the state, including groundwater. These provisions require that the TCEQ must be notified when contamination of soil or groundwater is discovered.

The TCEQ has adopted Spill Prevention and Control Rules (30 TAC Chapter 327). A reportable discharge or spill is an unauthorized or accidental discharge or spill of oil, petroleum product, used oil, hazardous waste, industrial solid waste, or other substances into the environment in a quantity equal to or greater than a reportable quantity as defined in the rules. Upon the determination that a reportable discharge or spill has occurred, the responsible person must notify the TCEQ as soon as possible but no later than 24 hours after its discovery. A summary of the TCEQ's Spill Prevention and Control Rules is given in Appendix 5.

The Railroad Commission of Texas (RCT) is generally the response agency for discharges or spills from activities associated with the exploration, development, or production, including storage or transportation, of oil, gas, and geothermal resources (Texas Natural Resources Code, §§85.042, 91.101, and 91.601). Discharges or spills from brine mining or surface mining are also under the jurisdiction of the RCT. The

official rules of the RCT are found in the Texas Administrative Code (TAC), Title 16, Part 1, Chapters 1 through 20 and are available online at http://www.rrc.state.tx.us/rules/index .

In general, the RCT has jurisdiction over discharges or spills associated with the transportation of crude oil prior to refining of the oil, and of natural gas prior to its use in a manufacturing process or as a residential or industrial fuel. As a result, discharges or spills from crude oil or natural gas pipelines are under the jurisdiction of the RCT. However, discharges or spills from pipelines transporting refined products such as gasoline, diesel, or other fuel oils fall under the regulatory jurisdiction of the TCEQ, and the Spill Prevention and Control Rules should be followed. As specified under the *State of Texas Oil and Hazardous Substances Spill Contingency Plan*, the TCEQ serves as the lead agency in directing and approving the response for the discharge or spill of a harmful quantity of crude oil (defined as five or more barrels discharged or spilled on the ground or any quantity discharged or spilled into water) during highway or rail transportation.

Notification to Local Officials

Section 5.236 TWC requires the TCEQ to provide notice to local officials regarding groundwater contamination which may affect drinking water supplies in their area. Notification is provided to county judges and public health officials to supply information on groundwater impacts to drinking water supplies within the county. These cases are identified in the report only during the year the case was reported as new.

The identified cases requiring notification under §5.236 are indicated in the field "SECTION 5.236" in the TCEQ's groundwater contamination case table (Table 1). There are 26 §5.236 cases listed in this report. In previous reports prepared by the TGPC, a total of 893 §5.236 cases have been identified (listed as HB 938 cases prior to 1994); 29 in 2005, 24 in 2004, 39 in 2003, 50 in 2002, 32 in 2001, 22 in 2000, 28 in 1999, 13 in 1998, 20 in 1997, 16 in 1996, 15 in 1995, 42 in 1994, 15 in 1993, 41 in 1992, and 507 in 1991. The large number of §5.236 cases listed in the 1991 report included all such cases identified up to March 31, 1992.

Notification to Private Water Well Owners

Passage of House Bill 3030, 78th Regular Legislative Session (2003), resulted in new Texas Water Code (TWC) §26.408. The statute requires that when the TCEQ receives notice from another agency or when TCEQ independently documents a case of groundwater contamination, the TCEQ must make every effort to provide notice, via first class mail, to each owner of a private drinking water well that may be affected by the contamination. The notice must be provided within 30 days of the determination (or receipt of information from another agency). Additionally, notice must also be provided to any applicable groundwater conservation district.

The TGPC adopted rules as required by the statute to “prescribe the form and content of notice” provided by the TCEQ. New 31 TAC §601.10 became effective on November 12, 2003 (Appendix 4). The TCEQ Executive Director sent letters to other members of the TGPC to alert them of the statute and their need to inform TCEQ of new cases of contamination. Since the statute became effective on September 1, 2003, TCEQ staff has implemented various activities resulting in mailed notice to

well owners within the mandated timeframe. 31 new cases of contamination during calendar year 2006 required notice to private drinking water well owners and are listed in the Figure 4.

Figure 4. Private Water Well Owner Notifications in Calendar Year 2006

Site	City	Contamination	30-day deadline	Notices Mailed	Number of notices
County Road 641	Groesbeck	Benzene, toluene, ethylbenzene, xylenes		1/6/2006	2
IH 10 West	Boerne	Benzene, toluene, ethylbenzene, xylenes		1/6/2006	9
North Ridge Street	Halletsville	Benzene		1/9/2006	4
1000 N. Dixie St	Odessa	Benzene, toluene, ethylbenzene, xylenes		1/13/2006	6
FM 2481	Bluff Dale	Acetaldehyde, acetone, benzene, chloroethane, chloromethane, cyclohexane, hexanes, methyl cyclohexane, pentanes, toluene		2/1/2006	8
Andrews Highway	Odessa	Hexavalent chromium		1/24/2006	75
City of Odessa	Odessa	VOCs, SVOCs, pesticidies, metals		1/26/06 & 1/29/06	52
Hornsby Bend	Austin	Nitrates		2/2/2006	7
Grant Road	Cypress	TCE, DCE		2/24/2006	12
Kelly Street	Center Point	methyl-tert-butyl-ether		2/27/2006	43
Crutchers Country Store	San Augustine	methyl-tert-butyl-ether		3/8/2006	12
Midessa Oilpatch RV Park	Midland/ Odessa	Trichlorethene, 1,1-Dichloroethane, tetrachloroethene, Cis-1,2-Dichloroethene		3/10/2006	44
Chemical Process Notice	Santa Fe, TX	Benzenes		3/14/2006	29
DelFasco Notice	Grand Prairie	Benzene, dichloroethene, tetrachloroethene, trichloroethane, vinyl chloride	3/24/2005	3/30/2006	9
LPST #116788	Livingston	Benzene	3/30/2006	3/30/2006	11
Midessa Oilpatch RV Park	Odessa	VOCs, SVOCs	Cont.	4/21/2006	17
Navarro County	Kerens	Coliform	4/27/2006	4/24/2006	11

Table (cont.)

Site	City	Contamination	30-day deadline	Notices Mailed	Number of notices
Pinemont Drive	Houston	Dichloroethene, Tetrachloethene, Trichloroethene, Vinyl Chloride	4/27/2006	4/26/2006	4
Fairbanks - N Houston Road	Houston	Benzene, Toluene, Xylenes	3/31/2006	4/29/2006	6
VCP # 1918	Southlake	Dichloroethene, Trichloroethene	5/12/2006	5/11/2006	2
RN#102029519	Plano	Benzene, eMethyltertbutylether	May-06	6/1/2006	1
RN# 103026639	Palmview	Benzene, toluene, Ethylbenzene, methyltertbutylether	May-06	6/1/2006	3
Vinton Hills	Vinton	1,2 dichloropropane	7/6/2006	6/30/2006	3
RN100678812 Notice	Live Oak	1,1 dichloroethene, trichloroethene, vinyl chloride	6/17/2006	July 6, 2006	2
Happy TX	Happy	VOCs	10/8/2006	10/4/2006	32
LPST # 116722 Notice	Abilene	Benzene	10/17/06	10/112006	1
Quail Valley Cleaners	Missouri City	Ethene, vinlyl chloride	10/14/06	10/11/2006	1
AB Cleaners	Sugar Land	Ethenes	10/20/06	10/202006	1
Catfish Cabin	Weatherford	MTBE	12/7/2006	12/7/2006	10
Red Creek	San Angelo	VOCs, SVOCs	12/7/2006	12/7/2006	5
LPST# 117035	Crockett	Benzene	12/20/06	12/19/2006	1

Public Information

The purpose of this document is to compile and make available to the public an annual report that provides the status of groundwater monitoring associated with the activities regulated by the contributing state agencies. The report further provides an annual status of documented groundwater contamination, including new cases and previous cases still undergoing enforcement actions, reasonably suspected of having been caused by activities regulated by the state agencies. Tables 1 through 4 provide a summarized tabulation of all groundwater contamination cases documented during 2006. Limited information pertaining to specific contamination cases listed in this report may be available by contacting appropriate agency personnel as listed in Appendix 7.

Each agency, or in some cases, individual programs within an agency, may be required by law, rule, or policy to provide notification of groundwater contamination once it has been confirmed through groundwater studies or validation of analyses. A program may require that a notice be provided to identified groups that may include local officials and health officers; public water suppliers; water well drillers; complainants; and/or affected or potentially affected parties. Such requirements are commonly based on the need to minimize potential adverse impacts to public health.

State Agencies' Files

Texas Water Code, §26.406 requires that the state agencies identified as having groundwater protection responsibilities maintain a public file of all documented cases of groundwater contamination. Each state agency has its own location and specific procedures for maintenance and accessibility of information related to groundwater contamination cases. Each regulatory program within an agency may have a unique system for maintenance and identification of information related to contamination cases. Information on agency files for each program with groundwater contamination cases tabulated within this report is provided in Appendix 8 (Central Records Locations of Agencies). Contamination case information is a matter of public record and is available for public review by arrangement with each agency. In some situations, the availability of information for certain enforcement actions may be limited or subject to specific access procedures. In addition, RCT district and TCEQ regional office locations are given in Appendix 6 and agency and groundwater conservation district contacts are listed in Appendix 7.

Other Reports and Publications

There are numerous water-agency publications that address groundwater contamination in the state. These publications provide a different focus or perspective on groundwater quality conditions and present information not contained within this report. Other publications provide information on statewide groundwater protection efforts and specific protection programs. Brief descriptions of several of these publications are provided in Appendix 9.

There are seventeen prior annual editions of this *Joint Groundwater Monitoring and Contamination Report*. These reports, which cover calendar years 1989 through 2005, were produced annually by the TGPC and published by the TCEQ (and its predecessor agencies, the Texas Natural Resources Conservation Commission and the Texas Water Commission). These reports provide a background on the evolution

of the state's groundwater protection programs. The reports may also provide insight to historical cases of contamination (cases that are no longer listed).

The *State of Texas Water Quality Inventory, 2004 - 17th Edition* (TCEQ, 2004) describes the conditions of the state's surface and groundwater quality. The state's groundwater protection program is described and the major documented and potential sources of groundwater contamination are identified. The report can be found at http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wqm/305_303.html#2004

Groundwater numbered reports, bulletins, publications, drought and water conditions, publication catalog are found at TWDB web site, http://www.twdb.state.tx.us/publications/reports/SGWReports.asp

Water for Texas - 2007 (TWDB, 2007) is the second state water plan to be adopted by the TWDB since the passage of Senate Bill 1 during the 1997 Texas Legislature. The publication incorporates the 16 approved regional water plans and describes how local government entities throughout the state will address their water supply needs for the next 50 years.

National Water Quality Monitoring Council (Council): The Council provides an opportunity for the monitoring community to develop consensus-based approaches and tools for monitoring and reporting on water quality. The Council promotes partnerships that foster collaboration, advance the science, and improve management of our water resources. For better information about the Council's latest conference proceedings, you can visit at http://acwi.gov/monitoring.

Texas Water Monitoring Council (TWMC). The TWMC serves as a broad-based collaborative body to help achieve effective and efficient collection, interpretation, and dissemination of basic data and processed information for use in addressing issues, policies, and management of Texas waters. TWMC operates through consensus building among its members. The Council addresses the full range of water resources including ground and surface water, freshwater, and estuarine environments. The TWMC convenes in a biennial water resources monitoring conference (or Congress) to address statewide water resource monitoring needs in the fall of even numbered years and prepare reports on the overall status of water resource monitoring in Texas with recommendations for improvements. http://www.txwmc.org/

USER'S GUIDE

The remaining portion of the report is divided into two sections. The first section, Groundwater Protection Program Descriptions, provides a narrative, program-specific overview for each contributing agency or organization. The second section, Groundwater Contamination Case Descriptions, contains a tabular listing of individual contamination cases which were documented for calendar year 2005. Appendices are included at the end of the report, providing more detailed information supporting or supplementing the body of the report.

Groundwater Protection Program Descriptions. In this section, the specific regulatory programs of each agency are described in terms of the activity or activities regulated, the standards and approvals required, monitoring of regulated entities' compliance with the conditions of approval, monitoring of groundwater to detect problems, and actions required if groundwater contamination is discovered at a site or facility.

The status of each program's required groundwater monitoring is described and includes comments on quality assurance policies and procedures and the number of facilities that are required to perform monitoring. The status of groundwater contamination is described, and the information contained in the case description table is summarized. Finally, special notes or comments specific to each program may be included for additional clarification.

Groundwater Contamination Case Descriptions. This section contains the individual groundwater contamination case descriptions for each contributing agency with regulatory groundwater protection authority. Each agency's table lists contamination cases by county and contains several fields (columns) of data specific to each case.

Rules and Definitions Related to Report Compilation

Texas Water Code, §26.406, authorized the TGPC to adopt rules defining the conditions that constitute groundwater contamination for the purpose of inclusion of cases in its annual monitoring and contamination report (Appendix 4). The TGPC adopted rules (Title 31, Texas Administrative Code, §§601.1 through 601.5) on March 5, 1991, defining certain terms and conditions that constitute groundwater contamination for the purpose of the report. The TGPC adopted revised rules with minor clarifying amendments on August 13, 1998, which became effective September 13, 1998. The rules were amended to add Subchapter B - Notice of Groundwater Contamination, 31 TAC §601.10, in response to passage of HB 3030 (78th Legislature, 2003), TWC 26.408, effective November 12, 2003.

In the rules groundwater, groundwater contamination and enforcement action are defined in broad terms so that the varying jurisdictional abilities and programs of the contributing agencies could be compiled in similar formats and compared. Broad definitions also enable the report to include the largest possible universe of documented contamination from man-induced activities.

- Groundwater is defined as water existing below the land surface in a zone of saturation, that is, the water which completely fills the interconnected pore spaces of the rock or sediment.

- Groundwater contamination is defined as any detrimental alteration of the naturally occurring quality of groundwater. It is limited, however, to contamination suspected of being associated with activities under the jurisdiction of the contributing agencies and affecting usable quality groundwater.

- Enforcement action is defined very broadly to include any action of an agency which accomplishes or requires the identification, documentation, monitoring, assessment, or remediation of groundwater contamination.

Using the Contamination Case Description Tables

Groundwater contamination case descriptions are presented in a tabular format for contributing agencies with enforcement authority over current groundwater contamination cases. The regulatory protection of groundwater is primarily the responsibility of the TCEQ. Certain activities requiring the regulatory protection of groundwater are under the jurisdiction of the RCT, the TDA, the TSSWCB, and the TDLR. The TAGD has no regulatory or enforcement authority as an organization, but individual groundwater conservation districts may have limited authority for action with regard to groundwater contamination.

Groundwater contamination case descriptions for the TCEQ, RCT, member districts of the TAGD and DSHS are listed in Table 1 through Table 4, respectively. No contamination cases were reported by the TSSWCB, TDLR, TDA, TWDB, TAES, or BEG for 2005.

Data Fields

The first page of each agency's table contains a legend of the column headings and a brief description of each heading. The legend describes attributes that may be unique to that particular table; however, some of the heading descriptions repeat the field definitions given in this section. There are eight fields (columns) of data (nine for TCEQ) in the tables used to describe the groundwater contamination cases. The contamination cases are grouped according to the county in which the contamination site is located, with a secondary grouping according to division or specific regulatory program within an agency. The data fields are described in Figure 5.

Figure 5. Contamination Case Descriptions—Data Fields

Data Field Name	Data Field Description
New Cases	An asterisk denotes each case that was not listed in the previous year's report.
File Name	Consists of: company names, cities, persons, or other entities considered potentially responsible parties or otherwise associated with the case. File names may also consist of geographic location names or well numbers.
File Number	Identification number assigned to the case by the numbering system used by the agency or program with jurisdiction for the case.[1]
Location	Location references. Most location descriptions refer to cities and addresses, others are geographic locations using distances from known points.
Contamination Description	Consists of a listing of contaminants or general group of contaminants (such as "gasoline" or "creosote constituents"). Abbreviations, explained at the beginning of each table, may also be used.
Date	The earliest date of contamination confirmation at the site by the jurisdictional agency or program. More detail on the significance of this field is given at the beginning of each table if the date represents something other than the above definition.
Enforcement Status	A two-to-four character code representing the status of the case with respect to agency enforcement action and contamination site activity.[2]
Data Quality	A code (up to 6 characters) describing the reliability of analytical data used by each regulatory agency to analyze the case. Addresses field and laboratory quality assurance procedures and data reliability and quality in determining conclusions for each case.
Section 5.236 (TCEQ Table Only)	Included in Table 1 only to distinguish cases subject to notification requirements under §5.236 TWC. A "Y" code identifies cases in which contamination has or may potentially affect a public drinking water supply.[3] The "Y" code appears only in the report for the year in which the case is listed as a new case (cases requiring such notification identified in previous reports are not duplicated in this report).

[1] File numbers can be used to access the files of the regulating agency to obtain data on each groundwater contamination case listed in Tables 1 through 4. Cases without file numbers may be accessed in the regulating agencies' files with the case file name.

[2] The regulatory agencies reporting the contamination cases have procedures and internal structures that differ from agency to agency. Definitions and descriptions for enforcement or activity status have been generalized to account for these differences. A more detailed explanation is given in the following section entitled Enforcement Status Matrix.

[3] An entry in this field constitutes secondary notification from the TCEQ to local officials for cases reported since the publication of the previous report.

Locating Specific Cases

To find a specific contamination case, locate the county of interest in the far left portion of the table. For that agency, all documented contamination cases for that county are listed under the respective division or regulatory program heading that has jurisdiction over that case. Under each program heading, contamination case descriptions are listed in alphabetical order according to file names. Check each division or regulatory program heading for the desired contamination case

description. Also, check the other agency tables for the desired contamination case descriptions for the county of interest. A location reference is provided in the tables under the field heading *LOCATION* and can be used to locate a specific case if the file name is unknown.

Enforcement Status Matrix

This report is required by §26.406 TWC to indicate the status of enforcement action for each case of groundwater contamination. For purposes of this report, enforcement action includes any agency action that accomplishes or requires the identification, documentation, monitoring, assessing, or remediation of groundwater contamination. However, the objectives of enforcement action and the means by which enforcement is conducted vary among the regulatory programs.

To describe only an agency's enforcement action presents a minimal observance of the regulatory undertaking. Enforcement is ineffective if required actions to address the assessment and mitigation of the contamination cases are not carried out. Therefore, agency actions dealing with contamination events are also placed in context of the activities necessary to address the events. This comparison of the level of agency action and the status or level of contamination assessment and mitigation is presented in the enforcement status matrix (Figure 6).

The enforcement status matrix allows a one-to-one correspondence between an agency's response and the completion of the discrete phases in the progression of contamination investigation and clean up. The vertical (Y) axis of the matrix gives the level of agency response (enforcement status), and corresponds to the first number given in the *ENFORCEMENT STATUS* field in the table. The horizontal (X) axis gives the level or status of contamination site activity (activity status), and corresponds to the second number in the *ENFORCEMENT STATUS* field in the table.

Different circumstances at the same level of agency response or the same level of contamination site activity can be indicated using an alphabetical code associated with each of the two numerical codes. These codes (YA,XA), presenting the enforcement status, followed by the activity status, are tabulated for each contamination case listed in this report.

Once familiar with the matrix, a reader should be able to quickly discern the status of a case and relate its progress in the respective regulatory program to all other cases. The matrix can also summarize the status of all cases by showing how many occur in each grid of the matrix. Each agency table is followed by an *Enforcement Status Summary*, which consists of an enforcement status matrix summarizing the number of cases in each gridspace. In addition, each table is accompanied by a statewide map showing the number of groundwater contamination cases, by county.

Figure 6. Enforcement Status Matrix

		ENFORCEMENT STATUS	0	1	2	3	4	5	6
A Federal B State	STATE/FED FUNDS	5							
A AG Office B Federal	COURT/FED ACTION	4							
A Permit B Order C Exec Action D Fed Referral	EXECUTIVE ACTION	3							
A Info Request B Plan Approval C Notice of Contamination D Referred	STAFF ACTION	2							
CONFIRMED- A Inspection B Data Review C Complaint D Referral	STAFF DISCOVERY	1							
A Voluntary Compliance and Notification B Voluntary Entrance into Cleanup Program	VOLUNTARY ACTION	0							
			No Activity	Contamination Confirmed	Investigation	Corrective Action Planning	Implement Action	Monitor Action	Action Completed
				A Action B No Action	A Action B No Action			A Remediation B Source Removal C No Further Action Needed D Institutional Controls E Engineering Controls	

ACTIVITY STATUS

Enforcement Status Codes

In general, regulatory programs are structured to achieve the desired degree of environmental protection and mitigation with the lowest possible level of agency oversight. Routine monitoring is an example of this type of oversight activity. When monitoring or other activities indicate that greater agency involvement is necessary to address a contamination case, the agency may take enforcement action. Enforcement status codes are described in Figure 7. The enforcement status codes are ordered to reflect the progression of enforcement actions available to most of the agencies.

Figure 7. Enforcement Status Matrix—Enforcement Status Codes

Code	Enforcement	Description
0	Voluntary Action	An entity addresses the contamination incident, without being compelled to do so by enforcement action and either A) reports its actions to the agency, or B) enters into an agency's voluntary cleanup program.
1	Staff Discovery	The agency confirms identification of a contamination incident through its activities, such as: A) inspections, B) reviews of self-reported data, C) complaints received, or D) referrals received from other agencies.
2	Staff Action	The agency initiates an action to address a contamination incident, such as: A) an information request of the entity, B) approval of a work plan (e.g., assessment, corrective action, etc.), C) sending a notice of contamination to affected parties, or D) referring the incident to another agency with jurisdiction.
3	Executive Action	Action at the highest level of the agency, such as: A) issuing a permit with corrective action provisions; B) issuing an administrative order; C) other executive level action such as letter of approval or revocation, or conditional or final release of liability; or, D) referral to federal authorities such as U.S. EPA.
4	Court or Federal Agency Action	When other options fail or do not apply, an agency can: A) seek legal representation by the Texas Attorney General before the courts, or B) let federal agencies seek resolution according to federal laws or programs.
5	State or Federal Funds	The agency, by utilizing special federal (option A) or state (option B) funds, finances the cost of addressing contamination incidents. Examples are the federal and state "superfunds" for abandoned waste sites, and the state fund for plugging oil and gas wells.

Note:

Enforcement action includes any agency action which accomplishes or requires the identification, documentation, monitoring, assessing, or remediation of groundwater contamination. The achievements of these objectives vary among the regulatory programs. Not all agencies or programs within an agency will follow all of this sequence: for example, the Superfund program of the TCEQ starts at Status Code 5.

Activity Status Codes

Once groundwater contamination has been confirmed, either the regulated entity or an agency will address the groundwater contamination case. Confirmed cases of contamination are generally addressed by following a prescribed sequence of actions until it is concluded that no further actions are necessary or required. Once contamination has been detected or is suspected, initial actions consist of validation of sampling results or quality assurance controls to confirm contamination has occurred and is man-induced. An investigation to study the extent, composition, and circumstances of the contamination follows the confirmation of contamination.

Additional actions may or may not be required based on the investigation findings. If the investigation finds that further actions are required, the planning of corrective action measures to address the contamination and source are initiated. Following the development of the corrective action plan, actions are taken to implement the plan and physically address the removal, mitigation or treatment of contamination and source. The effectiveness of the corrective action measures is generally monitored during and after the implementation of the plan. Ultimately, the corrective action measures are considered completed when the site has been remediated, the source has been removed, or when no further actions are required. The activity status codes are further described in Figure 8.

Figure 8. Enforcement Status Matrix—Activity Status Codes

Code	Activity	Description
0	No Activity	No actions have been conducted at the incident site. The code is also given to cases that did not have any activity in the reported calendar year, mainly used by the Voluntary Cleanup Program of the TCEQ.
1	Contamination Confirmed	Contamination is being verified through resampling or data quality validation, etc. Options are to: A) take action and investigate further if validated or required, or B) not take action based on confirmation findings.
2	Investigation	The incident is being studied to determine the extent, composition, and/or other properties and circumstances of the contamination. Additional action A) may or B) may not be required based on investigation findings.
3	Corrective Action Planning	A remedy (corrective action plan) for the contamination is being developed (based on the investigation findings). General examples include plans to: remove the source of contamination, remediate impacted groundwater, disinfect or replace wells, etc.
4	Implement Action	The planned remedy (corrective action plan) is being carried out. Actions to address the contamination are being conducted.
5	Monitor Action	The effectiveness of the remedy is being monitored. This can be a long- or short-term action and can be performed during and after implementation.
6	Action Completed	The remedy is considered complete when the desired result has been achieved. Options include: A) remediation efforts were completed (contaminants reduced to health based levels); B) the contaminant source was removed and the impact addressed; C) no further regulatory action required; D) agency action final, however, contamination still exists under institutional controls (deed records noting contamination; use and exposure restrictions; required maintenance of engineering controls, etc.); or, E) agency action final, however, contamination still exists under required engineered controls.

DESCRIPTIONS OF GROUNDWATER PROTECTION PROGRAMS

Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality (TCEQ) conducts regulatory groundwater protection programs that focus on both the prevention of contamination and the identification, assessment, and remediation of existing problems. The TCEQ implements these programs through education, voluntary action assistance, permitting, and enforcement. As the state lead agency for water quality protection, the TCEQ administers both state and federally mandated programs. Federal programs administered by the TCEQ include the Resource Conservation and Recovery Act (RCRA); the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA); the Clean Water Act (CWA); the Safe Drinking Water Act (SDWA); and the development of state management plans for prevention of pesticide contamination of groundwater under the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA).

The Waste Permits Division, Office of Permitting, Remediation and Registration (OPRR), is responsible for permitting facilities that store, process, and/or dispose of hazardous and nonhazardous industrial waste and municipal solid waste, and dispose of radioactive materials. The Remediation Division, OPRR, is responsible for overseeing the investigation and cleanup of hazardous waste and pollutants released into the environment, including the regulatory programs governing petroleum storage tanks (PSTs), hazardous and nonhazardous industrial waste sites, voluntary cleanups, innocent owner/operator certification, state brownfields initiatives, and Superfund activities.

The Water Supply Division, OPRR, has responsibility for monitoring public water systems for compliance with state drinking water standards and conducting the Source Water Protection Program. The division is responsible for providing technical support to promote effective and coordinated management of water resources in the state. In addition, the Groundwater Planning and Assessment Team of the division is responsible for providing assistance to the state's Groundwater Protection Committee.

The Water Quality Division, OPRR, is responsible for the implementation of surface water quality management programs, the development and implementation of water quality standards, and permitting concentrated animal feeding operations, municipal and industrial wastewater treatment facilities, sludge disposal sites, and storm water run-off.

Within the Office of Compliance and Enforcement (OCE), the Field Operations Division is responsible for the field investigation of contamination complaints and the inspection of permitted and non-permitted facilities. In addition, primary responsibility for the Edwards Aquifer Protection program is in this division. The Compliance Support Division, OCE, is responsible for professional licensing and the on-site wastewater program. The Enforcement Division, OCE, is responsible for

ensuring that groundwater resources are protected during enforcement activities related to municipal solid waste, hazardous, and nonhazardous waste, petroleum storage tanks, agricultural and watershed management, water utilities, and public water supply programs.

Waste Permits Division

Currently, the Waste Permits Division consists of the Municipal Solid Waste Permits Section, Industrial and Hazardous Waste Permits Section, and Radioactive Material Licensing Team.

Radioactive Material Licensing Team.

Program Description. Disposal of radioactive substances, including low-level radioactive wastes or naturally occurring radioactive materials, is regulated by the radioactive material licensing program. The program is overseen by the U.S. Nuclear Regulatory Commission. Currently, no commercial low-level radioactive waste or naturally occurring radioactive material disposal sites are licensed in the state of Texas.

Status of the Groundwater Monitoring Program. One non-commercial licensed and one non-commercial unlicensed facilities are included in the radioactive materials licensing program of the TCEQ. Groundwater monitoring is currently being conducted by the licensee at one of the facilities, by the unlicensed facility and, at times during routine investigation, by the TCEQ at these facilities. The unlicensed facility is also a Municipal Solid Waste (MSW) facility.

Status of Groundwater Contamination. Both facilities have confirmed results of groundwater contamination. Out of 10 wells at one facility, approximately 2 have been impacted by radioactive material and 3 impacted by volatile organic compounds (reported under MSW). Out of 8 wells at the other facility, 3 have been impacted by radioactive materials.

Municipal Solid Waste Permits Section.

Program Description. The Municipal Solid Waste (MSW) Permits Section regulates the collection, handling, storage, processing, and disposal of municipal solid waste and the commercial disposal of non-hazardous industrial solid waste in Texas under the authority of the Texas Solid Waste Disposal Act, as amended (Chapter 361, Texas Health and Safety Code), and under federal authority of the Resource Conservation and Recovery Act (RCRA), Subtitle D, as amended. The MSW Permits Section audits groundwater monitoring results submitted by municipal solid waste landfill operators and by commercial industrial non-hazardous waste landfill operators. The MSW Permits Section also reviews corrective action plans and coordinates remedial activities to address groundwater contamination at municipal solid waste landfills.

Status of the Groundwater Monitoring Program. MSW Type I landfills (which may receive putrescible waste and household waste) are required to have groundwater monitoring systems, monitor groundwater quality, and evaluate the results statistically in accordance with 40 CFR §258.50(a) and 30 TAC §330.401,

unless they meet arid exemption requirements. Under state rules in 30 TAC §330.417, some MSW Type IV landfills (limited to brush, construction and demolition waste, and other rubbish free of putrescible waste and free of household waste) are also required to conduct groundwater monitoring (unless they meet arid exemption requirements), but are not required to statistically evaluate the data.

At the end of calendar year 2006, there were approximately 250 municipal solid waste landfills permitted to accept waste (approximately 185 Type I landfills for all types of municipal solid waste, and 65 Type IV landfills limited to brush, construction and demolition waste, and other rubbish free of putrescible waste and free of household waste). Of these 250, approximately 130 conducted groundwater monitoring during 2006. The remainder did not monitor because they: (a) were arid exempt or had a groundwater monitoring suspension, and were not required to monitor (80); or (b) were not yet constructed or not active (40). The MSW program also regulates 2 active industrial non-hazardous waste landfills that conducted groundwater monitoring, and approximately 22 closed landfills that conducted groundwater monitoring during 2006. In addition, the MSW program regulates approximately 185 active facilities other than landfills (including solid and liquid waste transfer stations, liquid waste processing facilities, recycling facilities, composting facilities, incinerators, energy recovery facilities, and others) which do not conduct groundwater monitoring.

The approximately 154 facilities (130 active and 22 closed municipal landfills, and 2 active industrial non-hazardous waste landfills) that conducted groundwater monitoring in 2006 account for a total of approximately 1,895 groundwater monitor wells. Approximately 1,707 (~90 percent) of the wells were sampled in 2006; the wells that were not sampled were dry during the monitoring period or did not yield enough water for sampling, or were inaccessible due to damage.

MSW rules that were in effect prior to the federal Subtitle D regulations required that four background groundwater samples be taken from each new monitor well during each calendar quarter within a two-year period, and that each sample be analyzed for 29 chemical parameters. Subsequent samples were taken quarterly, semiannually, or annually, as required in each facility's permit or by the MSW staff, and were analyzed for an abbreviated set of parameters. Sites that closed prior to the implementation of Subtitle D are following pre-Subtitle D requirements during their post-closure care maintenance periods.

In accordance with federal rules (40 CFR §258.50(c)) and state rules (30 TAC §330.401(e)), groundwater monitoring requirements for Subtitle D landfills include the submittal and approval of a Groundwater Sampling and Analysis Plan (GWSAP). All sampling and analysis procedures are included in this plan. These requirements also include: analysis for a modified and expanded list of analytical parameters including 15 heavy metals and 47 volatile organic compounds; at least four (typically eight) background sampling events (depending on the statistical method(s) used); a semiannual sampling schedule during detection monitoring; and statistical analysis of groundwater analytical data. An annual sampling schedule may be allowed if approved by the executive director.

Prior to the Subtitle D regulations, when groundwater analyses indicated a change from background or historical levels, or if there was any evidence of contamination

such as leachate seeps, increasing trends in inorganic constituents and/or total organic carbon, the MSW staff required resampling of existing monitor wells, often including analysis for additional constituents. If further sampling and investigation indicated probable contamination, the permittee was required to evaluate corrective measures and in some cases perform corrective action/remediation.

Under federal rules (40 CFR Part 258 Subpart E) and state rules (30 TAC Chapter 330, Subchapter J), MSW Type I landfills conduct background monitoring as prescribed in an approved GWSAP. Upon completion of background sampling, MSW Type I landfills are required to conduct detection monitoring sampling and statistical analysis of the groundwater analytical data at each detection monitoring event. Most active MSW Type IV landfills are required to conduct groundwater monitoring, but are not required to perform statistical evaluation of the monitoring results.

If statistical analysis indicates that a statistically significant change (SSC) in constituent concentrations from background concentrations has occurred at a facility, the owner/operator must notify the TCEQ of the SSC (30 TAC §330.407(b)). Beginning with calendar year 2004, MSW facilities are included in the Joint Groundwater Monitoring and Contamination report when an SSC from background is confirmed during detection monitoring, unless the SSC is demonstrated in accordance with 30 TAC §330.407(b)(3) to not be due to a release from the facility. In prior years, facilities were not included in the report until a later stage, during assessment monitoring, when contaminants were confirmed to be present above action levels. As a result the number of MSW cases in the 2004 report increased by about 75 percent from 2003. In 2006, 3 cases were added, and no cases removed, for a total of 47 MSW cases in 2006.

An owner/operator may demonstrate within 90 days of notification of an SSC that the exceedance is due to a source other than the landfill or to an error in sampling, analysis, statistical evaluation, or natural variation in groundwater quality (30 TAC §330.407(b)(3)). If the demonstration is not satisfactory, the facility becomes subject to the requirements of assessment monitoring, which includes analysis for an expanded list of constituents. During assessment monitoring, if one or more assessment constituents are detected at statistically significant levels above established groundwater protection standards (which may be maximum contaminant levels [MCLs], background concentrations, or health-based concentrations), the facility must initiate an assessment of corrective measures, characterize the nature and extent of the release, and notify local government officials (30 TAC §330.409(g)). After the assessment of corrective measures (30 TAC §330.411) and prior to the selection of the remedy, the permittee is required to conduct a public meeting to discuss the results of the assessment of corrective measures with affected and interested parties (30 TAC §330.411(d)). This in turn leads to the selection of the remedy (30 TAC §330.413) and the implementation of corrective/remedial action (30 TAC §330.415).

Status of Groundwater Contamination. Approximately 3,485 groundwater samples were collected from 1,707 MSW groundwater monitor wells sampled in 2006. Approximately 190 monitor wells in the regulatory program were not sampled in 2006 because they were dry or did not yield enough water for sampling, or were inaccessible due to damage. Groundwater contamination has been confirmed at 46

MSW landfills listed by county in Table 1 under the heading "MSW." Contamination was reported in approximately 285 samples from an estimated 150 monitor wells at those sites. Three of the 46 contamination cases are new. None of the new cases is known to have created a potential public health hazard or threatened a public or private drinking water supply, or resulted in point-of-use impacts. Therefore none of the new cases required notification to local officials under Texas Water Code (TWC), Chapter 5, Section 5.236, nor notification to private drinking water well owners under TWC §26.408.

At the end of 2006, confirmation of contamination or some form of investigation was under way at 22 sites (activity status codes 1 and 2). During 2006, corrective action and/or remediation (activity status codes 3, 4, and 5) took place at 22 sites. One site had no activity during 2006, and no further action was required for 2 sites (activity status code 6C).

Pursuant to federal (40 CFR §258.58) and state (30 TAC §330.415) rules, remedial actions for Subtitle D MSWLFs are completed when the owner or operator: (A) complies with prescribed groundwater protection standards established in the rules; (B) demonstrates that concentrations of assessment constituents have not exceeded the groundwater protection standards for a period of three consecutive years using the statistical procedures and performance standards in the rules; and (C) satisfies all actions required to complete selected remedies. Within 15 days of completion of the remedy, the owner or operator must submit to the TCEQ's executive director, and also place in the operating record, a certification by a qualified groundwater scientist that the remedy has been completed in compliance with the requirements of the rules.

Industrial and Hazardous Waste Permits Section.

Industrial and Hazardous Waste Program Description. The Industrial and Hazardous Waste (IHW) Program permits the treatment, storage and disposal of hazardous solid waste and the commercial treatment and storage of non-hazardous industrial solid waste under the authority of the Texas Solid Waste Disposal Act, as amended (Chapter 361, Texas Health and Safety Code), and under federal authorization to administer the federal Resource Conservation and Recovery Act (RCRA), as amended. In addition to operating federally-authorized programs, the IHW Permits Program also refers cases to the Office of Compliance and Enforcement when they involve violations of TWC §26.121, which prohibits unauthorized discharges into or adjacent to waters in the state, including groundwater.

Under RCRA authorization, the IHW Permits Program regulates approximately 179 industrial facilities, of which 83 industrial facilities have land disposal units. Of these, approximately 54 facilities conduct groundwater detection monitoring programs. Land disposal units subject to regulation include landfills, surface impoundments, land treatment units, and waste piles.

Once permitted, an operator continues to monitor the waste units according to provisions in the facility's permit. A permitted detection monitoring program is specified for units for which no release has been indicated. The sampling program is based on hazardous constituents specific to the waste being disposed. Should a release occur, the operator implements a compliance monitoring program wherein the monitor well system is sampled for all hazardous constituents, a concentration limit is

established for each detected constituent. Should this value be exceeded in subsequent sampling events, the operator must implement a corrective action program. Compliance monitoring and the corrective action program are administered by the Remediation Division.

Status of the Groundwater Monitoring Program. The IHW Permits Program monitoring program relies upon approximately 54 operators to correctly sample, analyze, interpret, and report the significance of groundwater quality at their facilities. The TCEQ inspectors and staff check the compliance status of operators annually and perform periodic in-depth reviews, including agency sampling of monitor wells for all RCRA regulated facilities. Similar actions are performed for non-RCRA sites as the situation dictates. The TCEQ analyses are compared to the facility's reported results, sampling procedure, data quality, and interpretations in order to determine the validity of the self-reported data.

Status of Groundwater Contamination. The Remediation Division is responsible for addressing groundwater monitoring and corrective action at industrial and hazardous waste facilities that have had a release to groundwater. Only detection monitoring is addressed by the IHW Permits Program. Four confirmed incidents of groundwater contamination in detection monitoring wells (affecting 13 wells) occurred in 2006; one additional facility has been carried over from 2005; pending approval, the facility will be placed into the corrective action program in 2007. Another (affecting 44 detection monitoring wells) was placed in a Compliance Plan during 2006.

Underground Injection Control Program Description. The Underground Injection Control (UIC) Program, administered under the authority of the federal Safe Drinking Water Act and the Texas Injection Well Act, regulates a wide range of activities using injection wells. The specific injection wells regulated by the commission include Class I industrial and municipal waste disposal injection wells, Class III injection wells for in situ mining of subsurface mineral deposits, and Class V (miscellaneous, mostly shallow) injection wells. There are 2,129 regulated injection well facilities, each with one or more injection wells, 49 Class I facilities, 6 Class III facilities, and 2,068 Class V facilities).

Class I injection wells are used to inject hazardous and non-hazardous liquid industrial waste below the lowermost underground source of drinking water (USDW). There are approximately 103 Class I injection wells permitted and operating in Texas. Approximately half of the wells are permitted to inject both hazardous and non-hazardous waste, with the other half being permitted to inject only non-hazardous waste. Nine Class I injection wells are authorized for commercial disposal of off-site generated waste; all other Class I wells in the state are limited to disposal of on-site generated waste.

The federal Land Disposal Restriction (LDR) regulations provide a general prohibition on injection of most hazardous wastes unless: (1) the waste is treated to meet or exceed LDR standards, or (2) exemption from the LDR is obtained from EPA based on demonstration that, to a reasonable degree of certainty, there will be no migration of hazardous constituents from the injection zone for as long as the waste remains hazardous. Most Class I injection wells for hazardous waste have

been exempted from LDR by EPA after successfully making the required demonstration.

The basic design objectives of Class I injection wells are to keep waste confined to injection zone and permanently isolated from drinking water. Class I injection well rules require multiple protective barriers of steel or fiberglass well casings, casing cements, continuous monitoring of the well for development of leaks, and annual monitoring of well mechanical integrity and injection zone pressure to assure separation of injected wastes from the lowermost underground source of drinking water (USDW). Class I injection wells in Texas average 5,000 feet deep, with average casing diameters of approximately 12 inches.

Applications for Class I injection wells must demonstrate that the location is geologically suitable and that the injection zone and confining zone are free of transmissive faults, fractures, and unplugged abandoned wells that could act as conduits for leakage of waste from the injection zone. Though UIC rules provide authority to require any ambient monitoring necessary to assure protection of drinking water, the most important and most common forms of monitoring required for Class I wells consist of (1) continuous monitoring of wells for leaks and annual mechanical integrity tests, (2) annual surveys of the area for newly constructed wells, and (3) annual measurement of injection zone pressure. Of particular note, continuous monitoring of wells for leaks coupled with annual mechanical integrity tests enables small leaks within a well to be quickly identified and repaired before any waste can escape from the injection zone and migrate into sources of drinking water. Also notable, in a few cases, the TCEQ has required pressure monitor wells completed in the injection zone at particular locations offset from the injection well.

As described above, Class III injection wells are used for in situ mining of minerals. In this process, water is injected underground into ore deposits to dissolve (or in the case of Frasch sulfur mining, to melt) the target mineral so it may be recovered in a dissolved (or molten) state in groundwater pumped to the land surface through a production well. The injected solution used for in situ mining by dissolution of minerals is typically water with the addition of sodium bicarbonate and oxygen; in Frasch sulfur mining, the injected fluid is super-heated water.

Producible minerals at a Class III injection site are generally found in or above an underground source of drinking water (USDW). Therefore, as an essential part of the UIC program, permits require monitoring of groundwater before, during, and after mining occurs at a Class III injection well project.

Since 1975, when the first Class III injection well permit was issued, 36 sites have been permitted for uranium mining, six for Frasch sulfur mining, and three for sodium sulfate mining. Groundwater monitoring varies for each of the three types of mining. The three sites which mined sodium sulfate and all six of the Frasch sulfur mining sites have plugged their wells in response to unfavorable economic conditions. In particular, off-site contamination from the sulfur mining sites is highly unlikely since sulfur must be super-heated to a liquid state in order for it to flow. Any movement away from the mine area would cause the sulfur to cool and harden.

The most extensive groundwater monitoring occurs at uranium mining sites. At the uranium Class III sites, groundwater samples must be analyzed prior to any injection

into a Class III well in order to determine background or pre-mining values. In many cases, the natural background values for radium and uranium may exceed EPA drinking water standards because of the existence of the ore body itself. During the mining phase of the project, the mining companies are required to submit quarterly monitoring reports for review and approval. The reports contain groundwater analyses from within the zone being mined as well as groundwater from aquifers overlying and underlying the mined zone. Analyses include conductivity, uranium, sulfate or chloride, and in some cases ammonia. These control parameters are used to detect movements of mining fluids, including excursions out of the mine area and into the monitor wells. If an excursion is detected, additional monitoring is required and steps must be taken by the company to control the location of the mining fluid. A company's failure to conduct such monitoring and control the movement of the mining fluid is a violation of the permit, which will result in appropriate enforcement action by the TCEQ.

When mining is completed, the affected groundwater must be restored to levels consistent with baseline values and with previous groundwater use. Groundwater quality must remain stable for a six-month period before the area can be declared restored and the monitor wells can be plugged. To ensure the aquifer is restored to levels approved by the TCEQ, groundwater samples are taken for verification every other month by the TCEQ and by the company and are analyzed by separate laboratories. At any time during the life of the project, water samples may be taken by the TCEQ, or by the company and split with field inspectors for verification of sampling procedures, analytical techniques, and results.

The UIC program also regulates Class V (miscellaneous) injection wells under the federal Safe Drinking Water Act and the Texas Injection Well Act. Class V injection wells include all injection wells not in the other four injection well classes. Class V wells are generally shallow, with injection into or above underground sources of drinking water (USDW). Examples of Class V wells include agricultural drainage wells, domestic wastewater disposal wells, aquifer storage and retrieval wells, aquifer remediation wells, and closed-loop wells for air conditioning and heating. Possible pollutants associated with Class V wells include pesticides, fertilizers, pathogens, metals, and salts.

Class V injection wells are generally authorized by rule. However, operators are required to submit well inventory information and obtain written approval before construction and operation of a Class V well. There were 27,782 Class V wells inventoried as of December 2006.

Status of the Groundwater Monitoring Program. The six in-situ uranium mining facilities are monitored for groundwater quality through the self-reporting process overseen by the TCEQ and through groundwater samples taken to verify compliance issues. Each uranium mining site has one or more production areas. All of these areas are required to have groundwater monitoring.

The Class III UIC program has no confirmed cases of groundwater contamination beyond the permit facility boundaries. Furthermore, there is no case of contamination of drinking water supplies from the Class I UIC program, nor from the Class V UIC program.

Water Quality Division

The Water Quality Division is responsible for the issuance of wastewater permits under the Texas Pollutant Discharge Elimination System; development of the Texas Surface Water Quality Standards; and updating the Water Quality Management Plan.

The division is subdivided into three sections, Wastewater Permitting, Customer Information & Application Processing, and Water Quality Assessment. The Water Quality Assessment Team of the Water Quality Assessment Section actively monitors and reports cases of groundwater contamination.

Water Quality Assessment Section.

Program Description. The Water Quality Assessment Team evaluates permit applications for municipal and industrial wastewater treatment facilities, concentrated animal feeding operations, sludge disposal, and wastewater land application sites for their potential to impact groundwater, and provides recommended permit provisions to the Wastewater Permitting Section that will aid in the protection of groundwater quality. Permit applications are reviewed for their compliance with applicable portions of Texas Administrative Code, Texas Water Code, and the Code of Federal Regulations.

Status of Groundwater Monitoring Programs. Groundwater monitoring is required by rule for certain wastewater facilities, and the Water Quality Assessment Team may recommend groundwater monitoring for additional facilities in order to be protective of groundwater quality. Information submitted in accordance with groundwater monitoring and other permit provisions, and TCEQ enforcement order requirements are routinely reviewed and evaluated. Any noncompliance may be referred to the Enforcement Division/Water Section for coordination of appropriate enforcement action.

There are approximately 3,443 municipal, industrial, CAFO, and sludge permits under programs of the Water Quality Division. Of those facilities, approximately 60 are currently required to conduct groundwater monitoring. Due to the nature of monitoring and reporting requirements, an exact number of monitor wells cannot be ascertained, however it is believed that 200-400 wells are monitored regularly by permit holders.

Status of Groundwater Contamination. The Water Quality Assessment Team has a total of 13 groundwater contamination cases listed in Table 1. The cases are listed by county under the division heading "WQD/WQAS." There were no new cases added. One case was removed from the Water Quality Division listings in Table 1 and was transferred over to the Remediation Division listings. This case is no longer permitted by the Water Quality Division and is being handled by the Remediation Division.

Water Supply Division

The Water Supply Division (WSD) is responsible for the quality, quantity, and availability of water in Texas. The division oversees public drinking water protection by implementation of the Safe Drinking Water Act; provides source water assessment and protection for drinking water; provides oversight of water utilities and water

districts; issues water rights permits; provides support to interstate water compacts; develops Water Availability Models for the river basins of Texas; evaluates water conservation plans and drought contingency plans; and issues permits and licenses for weather modification projects.

The division is subdivided into three sections, Public Drinking Water, Utilities and Districts, and Water Rights Permitting and Availability. Of these sections, Public Drinking Water and Groundwater Planning and Assessment Team of the Water Rights Permitting and Availability sections actively monitor and report cases of chemical groundwater contamination.

Technical Assistance. The WSD provides technical assistance related to groundwater quality issues to all divisions within the Office Permitting, Remediation and Registration and to other Offices and agencies as required. The WSD implements groundwater protection programs that emphasize prevention of contamination through the use of best management practices. The WSD also provides administrative support for the Texas Groundwater Protection Committee (TGPC). The TGPC has the responsibility of coordinating the state's groundwater quality protection activities under the authority of §26.403 TWC. Mandated responsibilities of the TGPC, as chaired by the Chief Engineer's Office and administered by the Water Supply Division, Water Rights Permitting and Availability Section, include the compilation of the groundwater portion of Texas' contribution to the biennial National Water Quality Inventory (305(b)) report to EPA, the development and implementation of the *Texas Groundwater Protection Strategy*, compilation and publication of the annual *Joint Groundwater Monitoring and Contamination Report*, the biennial report to the Legislature on the TGPC's activities, and the development of the *Texas State Management Plan for the Prevention of Pesticide Contamination of Groundwater*. The Water Rights Permitting and Availability Section is also the TCEQ program contact for the House Bill 3030 cases identified by other agencies.

The Division provides technical expertise in the evaluation and designation of groundwater management areas, priority groundwater management areas (PGMA) and the creation of groundwater districts in response to landowner petitions. As the point-of-contact for the TCEQ, the WSD reviews legislation that creates groundwater conservation districts or alters groundwater conservation district law. The WSD also provides technical support to groundwater districts and those interested in the creation of groundwater districts.

Under authority of Chapter 36 of the Water Code, the WSD tracks specific groundwater conservation district activities and initiates agency enforcement actions. These enforcement actions are initiated if a groundwater district fails to submit a management plan, fails to have their plan certified by the TWDB, or receives an unfavorable audit for management plan implementation from the State Auditor's Office.

Water Rights Permitting and Availability Section

Status of Groundwater Monitoring Programs. The Water Rights Permitting and Availability Section compiles and maintains the Interagency Pesticide Database (IPD). The database contains the results of groundwater monitoring for pesticides collected from various agencies and other entities that sample groundwater. The

database is part of an interagency effort of the TGPC to assess groundwater impacts from the label-specified use of agricultural chemicals. Analyses of approximately 4,508 samples from approximately 4,836 different wells are described in the database. There are a total of 209 confirmed pesticide detections in the database. These include 80 confirmed detections of atrazine, 38 of 2-chloro-4-isopropylamino-6-amino-s-triazine, 23 of simazine, 19 of prometon, eight of 2-chloro-6-ethylamino-4-amino-s-triazine, six of 2-hydroxy-4-isopropylamino-6-ethylamino-s-triazine, six of DEET, five of diazinon, four of metolachlor, three of 2,4-D, three of propazine, three of terbacil, two of carbaryl, two of imidacloprid, and one each of 2,4,5-T, chlorodiamino-s-triazine, heptachlor epoxide, hexazinone, imazaquin, p,p-DDE, and tebuthiaron.

The section conducts its agricultural chemical monitoring programs as outlined in the Texas State Management Plan for Prevention of Pesticide Contamination of Groundwater (PMP). The monitoring represents ambient screening for atrazine and metolachlor, and initial efforts at contamination response and enforcement for the PMP. In fiscal year 2006, monitoring consisted of 360 wells sampled and screened for atrazine and metolachlor. Fifty-four of these wells were also screened for alachlor. A subset of 22 wells was additionally sampled for analysis by a laboratory analytical method for metabolites of atrazine and metolachlor. Another subset of 13 wells was additionally sampled for analysis for the laboratory method 525.2 suite of pesticides.

Status of Groundwater Contamination. Cases of confirmed groundwater contamination that may not fall under the jurisdiction of an individual division or agency are tracked by the Water Supply Division. These cases include contamination that has not been directly linked to a single activity or source; historic enforcement cases where groundwater contamination is known to exist, but where no further regulatory action is required by law, rule, or order; existing cases that are outside the current regulatory scope; and cases that are confirmed in the Interagency Pesticide Database that do not require regulatory action. Out of the total 48 groundwater contamination cases listed in Table 1, 41 cases are pesticide related. The cases are listed by county under the division heading "WSD." None of the WSD cases required notification to local officials in 2006 under §5.236 TWC. This year a number of the pesticide cases were reclassified to the 6C classification under the horizontal enforcement status category. This was either because subsequent monitoring has confirmed that concentrations of the pesticide contaminants remain below or have diminished to below the MCL or HAL (Health Advisory Level) or, for the wells that have not been re-monitored, the original contaminant concentration was below the MCL or HAL. Three groundwater contamination cases are also closed in FY 06 that were related to the USGS Freon Plume Study. The contamination levels, although elevated in relation to those levels found from atmospheric origin, are well below the TRRP PCL and the HAL action levels.

Public Drinking Water Section.

Status of Groundwater Monitoring Programs. In 2006 the Public Drinking Water Section of the Water Supply Division monitored 6,687 public water supply systems in its regulatory program. Of these public water systems, 5,555 use groundwater as a primary or secondary source of drinking water. These systems have 7,719 entry points supplying groundwater from 12,031 public water supply wells whose usage is

classified as operational or demand. An additional 3,287 other wells are classified as emergency, proposed, plugged, abandoned or capped. Community and non-transient/non-community systems routinely monitor for regulated and unregulated inorganic and volatile organic chemicals at least once every three years, or every six years with reduced monitoring which is available for systems who meet waiver criteria. All transient/non-community systems monitor for most of the required inorganic chemicals once every three years. Only vulnerable groundwater systems monitor for required synthetic organic chemicals once every three years and annually for volatile organic chemicals. Technically defensible source water assessments determine well and geologic vulnerability. The monitoring for source water contaminants is expected to change as source water assessments are advanced and refined. In addition, regulations are changing to increase monitoring for disinfection by-products in distribution.

Most chemical monitoring for source water contaminants of public drinking water is performed at the entry point where the water enters into the distribution system *after* all treatment has been applied. Distribution sampling is not addressed here. For many entry point samples, the water analyzed is a blend of water from more than one water well, underground spring, and/or surface water intake. Monitoring of untreated groundwater is conducted when a new public water supply well is constructed, where groundwater is highly vulnerable to microbiological contamination, or when groundwater contamination is suspected. In 2006, 26,517 samples were collected from 11,337 groundwater sources represented by 7,202 entry points and 100 wells. The chemical groups included were minerals, metals, nitrates, radiochemicals, volatile organic chemicals, and synthetic organic chemicals. 67 samples showed contamination from wells or entry points served by wells that have confirmed contamination. In 2006, there were many samples with detections of volatile organic chemicals (attributed to tank coatings, artifacts, etc.), but only 11 wells showed new groundwater contaminations for volatile organic chemicals. Of these, three are natural gas or petroleum-related contaminations of unknown origin (natural or man-made); four were contaminations of MTBE, one was a contamination of benzene, one was a contamination of 1,2-dichloropropane, and two were contaminations of chlorinated solvents. Most inorganic and radiochemical contaminants are not assessed for man-made chemical contamination at this time. The potential natural occurrence or the long history of man-made chemical use of some contaminants such as nitrates and arsenic makes the assessment difficult.

Currently, all EPA certified drinking water chemical analyses under this program are performed by the Texas Department of State Health Services Bureau of Laboratories or the Lower Colorado River Authority Environmental Laboratory Services.

Microbial monitoring may also find contaminated wells. Water systems conduct monthly bacterial (coliform) testing in distribution. Though systems are required to maintain a disinfectant residual, sometimes contaminated wells (usually groundwater under the influence of surface water - GUI) are discovered. Additional well testing before treatment is conducted. Public drinking water maintains this database of GUIs. Microbiological analyses are conducted by laboratories that have been certified by the TCEQ.

Status of Groundwater Contamination. 12 groundwater contaminations cases are reported in the 2006 report, which includes 11 new groundwater contamination cases. All the 11 new groundwater contaminations required notification of local officials under TWC §5.236 (HB 938), and six of these new wells required notification of private well owners under §26.408 (HB 3030). A total of 150 current or former public water supply wells are still considered to be contaminated. This number includes only contaminations where actual well water was sampled and found to be contaminated. Groundwater contamination will no longer be inferred from entry point sampling alone. A detection of a contaminant in raw water collected directly from a well is now required to confirm contamination. The public drinking water program does not have authority over remediation of a groundwater contamination. Compliance with public drinking water rules and regulations is based on the ability to provide water that meets the standards, therefore, a water system can stop using a well, blend the water, treat the water, or use the water as long the drinking water produced meets the standards. In addition, at this time few of the contaminations initiate activities for remediation in other TCEQ programs. Currently, the Public Drinking Water Section will not remove contamination cases from the list unless the contamination is known to have undergone remediation.

Remediation Division

The Remediation Division is responsible for overseeing the investigation and cleanup of hazardous waste and pollutants released into the environment. The regulatory programs addressed by this division include petroleum storage tank sites, hazardous and nonhazardous industrial waste sites, voluntary cleanups, innocent owner/operator certification, state brownfields initiatives, dry cleaner remediation and Superfund activities. With the exception of the Innocent Owner/Operator Program (IOP), the goal of these programs is to remediate soil and groundwater contamination. The IOP does not require innocent owners or operators to investigate or remediate contamination. Ideally, soil and groundwater contamination reported at IOP sites is being or will be remediated under another program. The following Programs of the Remediation Division regulate sites with known groundwater contamination.

Voluntary Cleanup Program.

Program Description. The Voluntary Cleanup Program was created by amendment to the Texas Solid Waste Disposal Act and became effective on September 1, 1995. The purpose of the Texas Voluntary Cleanup Program is to provide a streamlined, incentive-based process for persons to pursue cleanup of contaminated properties. The Voluntary Cleanup Law provides the TCEQ's administrative and technical requirements and conditions necessary for persons to voluntarily clean up sites within this program. The following attributes of the Law encourage lenders, developers, and prospective purchasers to clean up abandoned or under-utilized properties: non-binding voluntary cleanup agreements with the TCEQ, agreement by the TCEQ not to pursue enforcement action on sites that are being voluntarily remediated, and a release to non-responsible parties from liability to the State of Texas for cleanup of existing contamination in areas covered by the Certificate of Completion.

Similar to the State Superfund Program, sites are investigated to determine if groundwater impacts have occurred. If groundwater contamination is verified, then the persons conducting the voluntary cleanup propose response actions to address the contamination. The TCEQ assesses their proposal to ensure that the proposed remedy is capable of achieving the goals of the groundwater cleanup. Due to the voluntary nature of the program, some sites may withdraw from the program prior to completing restoration of the groundwater. These sites are indicated with an activity status of "0." Only sites that pose an imminent threat to human health or the environment and withdraw prior to completion of the response action are referred for potential enforcement action to compel the completion of any necessary response actions.

Status of Groundwater Monitoring. There are an estimated 6,984 monitor wells in place under the Voluntary Cleanup Program regulatory program. During 2006, approximately 8,042 groundwater samples were collected from 722 sites. Approximately 1,464 of these samples showed groundwater contamination.

Status of Groundwater Contamination. For 2006, 708 cases are listed by county in Table 1 under the division heading "RMD/VC." Of these, only one case required notification to local officials under TWC §5.236. There were 82 new cases of groundwater contamination identified and added in 2006. A total of 63 cases were deleted from the 2005 report when action was completed (activity status 6). Eight cases transferred to the Dry Cleaners Remediation Program and none transferred to the Corrective Action Program in 2006.

Voluntary Cleanup/ Innocent Owner/Operator.

Program Description. The Innocent Owner/Operator Program was created by amendment to the Texas Solid Waste Disposal Act and became effective on September 1, 1997. The program is handled administratively through the Voluntary Cleanup Program. The purpose of the legislative amendment is to provide liability relief for owners or operators of property that has become contaminated as a result of a release or migration of contaminants from a source or sources not located on or at the owner's/operator's property. Also, a person, who, after appropriate inquiry consistent with good commercial or customary practice, did not know or have reason to know of contamination on their property at the time the person acquired the property is released from liability to the State. The program reviews the site investigation report to confirm, through the issuance of a certificate, that the person is an innocent owner or operator.

Due to the fact that sites reported under the Innocent Owner/Operator Program are not subject to remediation by the "innocent owners," most of these sites are not currently being remediated. These sites are indicated with an activity status of "0" and an enforcement status of " 0."

Status of Groundwater Monitoring. There are an estimated 581 monitor wells in place under the Voluntary Cleanup/Innocent Owner/Operator regulatory program. During 2006, approximately 282 groundwater samples were collected from 185 sites. Approximately 148 of these samples showed groundwater contamination.

Status of Groundwater Contamination. For 2006, 185 cases are listed by county in Table 1 under the division heading "RMD/VCIO..” Of these, none required notification to local officials under TWC §5.236. Of the 185 cases, 70 are new cases of groundwater contamination identified and added in 2006. 298 cases were deleted from the 2005 report due to action completed (activity status 6).

Brownfields Site Assessments.

Program Description. In Texas, many former industrial properties lie dormant or underutilized due to liability associated with real or perceived contamination. These properties are broadly referred to as brownfields. The TCEQ, in close partnership with the U.S. Environmental Protection Agency (EPA) and other federal, state, and local redevelopment agencies, and stakeholders, is facilitating cleanup, transferability, and revitalization of brownfields through the development of regulatory, tax, and technical assistance tools. In addition to the specific programs mentioned here, the TCEQ is available at no cost to local governments and will provide technical advice, education, and project partnering for brownfields redevelopment projects.

BSA applicants and co-applicants included seven municipalities, three non-profit organizations and federal government agencies (GSA and U.S. Army Corps of Engineers). Preliminary redevelopment plans included a civic center expansion, light industrial redevelopment, an eco-industrial park, upgrading and preserving a historical train display in a municipal park, home for a youth track club, a food bank warehouse, and a homeless shelter for women and children.

Although redevelopment has not yet been fully realized, the TCEQ has been very encouraged by the number of Brownfields stakeholders entering the BSA program.

Status of Groundwater Monitoring. There are an estimated 96 monitor wells in place under the Brownfields Site Assessment program. During 2006, approximately 72 groundwater samples were collected from the 8 sites, and approximately 24 of these samples showed groundwater contamination.

Corrective Action Program.

Program Description. The Corrective Action Program oversees remediation activities for many sites under the TCEQ’s jurisdiction. These sites include 1) Facilities with industrial and hazardous waste permits which have released hazardous contaminants to environmental media from RCRA-regulated units; 2) Facilities with contamination caused by releases from the Solid Waste Management Units (HSWA Corrective Action); 3) Facilities closing RCRA and non-RCRA Solid Waste Management Units; 4) RCRA and non-RCRA facilities which conduct corrective action through Enforcement Orders; 5) Facilities which self-implement the cleanup regulations of 30 TAC 335 and 350; and 6) Federal Facilities which may include all the five (5) items listed above.

Status of Groundwater Monitoring. There are more than 8000 monitor wells in place under the Corrective Action Program. During 2006, an estimated 16,000 groundwater samples were collected and approximately 6,000 of these samples showed groundwater contamination.

Status of Groundwater Contamination. For 2006, 569 cases are listed by county in Table 1 under the division heading "RMD/CA.". None of these cases required notification to local officials under TWC §5.23. None of these cases required notification to private well owners under TWC §26.408. The Corrective Action Section identified 53 new cases of groundwater contamination in the 2006 report. Remediation activities were completed for 29 cases of groundwater contamination in 2005 (action completed) and were dropped from the 2006 report.

Dry Cleaner Remediation Program

Program Description. The Dry Cleaner Remediation Program was created when House Bill (HB) 1366 amended Subtitle B, Title 5, Health and Safety Code by adding Chapter 374 Dry Cleaner Response. With its implementation, the Dry Cleaning Remediation Program was created when the law became effective on September 1, 2003. This law established new environmental standards for dry cleaners and a remediation fund to assist with remediation of contamination caused by dry cleaning solvents. The law also required the TCEQ to set up an Advisory Committee to assist in the development of rules to implement the new law.

HB 1366 requires all dry cleaning drop stations and facilities to register with the TCEQ. Many of these dry cleaners will be required to pay an annual registration fee, solvent fee and implement new performance standards at their facilities. Funds collected from the registration and solvent fees are used to perform corrective action at eligible contaminated dry cleaning facilities and/or drop stations.

Interested parties may submit an Application for Ranking to the DCRP. Complete applications are ranked and accepted to the program within 90 days of receipt. If the site is currently participating in the Voluntary Cleanup Program (VCP), then a signed Program Participation Election Form (PPEF) must be submitted, within 45 days, stating the applicant terminates their participation in the VCP before they are accepted into the DCRP.

Chapter 374 of the Health and Safety Code was amended when the 79th Texas Legislature passed and the Governor signed HB 2376 and SB 444. HB 2376, which became effective September 1, 2005, removed the 5-year ownership requirement for landowner eligibility, revised fee structures, extended the deadline for opting out of the DCRP fund, and limited the applicability of some performance standards. SB 444, which became effective on passage of legislation, extended the deadline for opting out of the fund to February 28, 2006, and allows some opt-out dry cleaners to receive credit for previously paid fees.

Status of Groundwater Monitoring. By the end of 2006 there were approximately 675 regulatory monitor wells located at 84 Dry Cleaner Remediation Program sites subject to groundwater monitoring. Approximately 335 of the monitor wells have been affected by contamination. During 2006, approximately 775 groundwater samples were collected from these DCRP sites. Approximately 375 of these samples have been affected by contamination.

Status of Groundwater Contamination. Groundwater contamination cases were first reported for the DCRP in the 2005 report. Forty-two DCRP sites were reported

as having groundwater contamination in 2005. Twenty-six additional sites are being reported for 2006. During 2006, there was one ground-water contamination case requiring notification to local officials under TWC § 5.236 (HB 938). Additionally, a county groundwater district was notified of two ground-water contamination cases. In these instances, there were no private water well owners to notify under §26.408 (HB 3030).

Superfund.

Overall Program Description. In 1980 the United States Congress passed the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), commonly known as the "Superfund" law. The purpose of the federal Superfund legislation was to protect public health and the environment from hazardous substances by authorizing federal action in response to releases into the environment from abandoned hazardous waste sites. Potentially contaminated sites that are referred to the Remediation Division (RMD) by the TCEQ's district offices, the EPA, local government entities, and individuals are evaluated and ranked according to the degree of hazard presented to the public health and the environment. High ranking sites are referred to the EPA for placement on the National Priorities List (NPL). When sites are listed on the NPL, the TCEQ staff petitions EPA for federal funds for planning, site investigation, feasibility studies, design work, remediation, and operation and maintenance of the site.

The Texas State Superfund Program was created in 1985 by amendment to the Texas Solid Waste Disposal Act to address those sites not eligible for funding under the Federal Superfund Program. The State Superfund Program follows the same step-by-step process, from corrective action planning to remediation, as described for the federal program. The Act requires that sites placed on the State Superfund Registry first seek funding for site cleanup from responsible parties, then federal resources, and lastly state resources.

Groundwater monitoring activities occur throughout the Superfund process, from planning through remediation and operation and maintenance phase. Residential, public and industrial wells near a potential site, in addition to existing or newly installed site monitoring wells, would typically be sampled to help determine whether a site warrants placement on the NPL. If not, the site would be evaluated for possible inclusion on the Texas Superfund State Registry of Hazardous Substances Sites for remediation under the State Superfund Program. Once placed on either the NPL or state registry, the potentially responsible parties (PRPs) are provided the opportunity to enter into an enforceable administrative order to conduct all aspects of site investigation and remediation. If the PRPs are unwilling to enter into an enforceable order, the state proceeds with this work.

A site investigation is conducted to characterize the type and volume of contaminants at a site, the media (such as soil or groundwater) contaminated, the lateral and vertical extent of contamination, the risk the site poses to human health and the environment, and to allow the selection of a remediation technology during the feasibility study or presumptive remedy study. Groundwater monitoring wells are installed during the site investigation to determine the effect, if any, a site has had or may have on local groundwater resources, and to select alternatives that could be used to solve the problems at the site. The remediation technology selected is highly

site-specific but may involve actions to control the source of the contamination and/or to remove contaminants from a groundwater bearing zone. If the remedy involves the pumping and treatment of contaminated groundwater, additional monitoring wells are generally installed and hydrogeologic data collected during the remediation. In addition, after the remediation is complete, groundwater monitoring may occur as a part of the operation and maintenance phase until the remediation goal is reached.

Superfund Cleanup Program.

Program Description. Superfund includes the Site Discovery and Assessment and Cleanup Programs. Site Discovery and Assessment is the first step in evaluating a site to determine if it is eligible for listing on either the state Superfund registry or the federal National Priorities List (NPL). In fulfillment of its role, the Superfund Cleanup Program ensures that all Superfund activities are completed in a timely and efficient manner, and in accordance with all applicable state and federal laws and rules. The Superfund process and the role of Superfund Cleanup Program vary between the state and federal Superfund Programs as illustrated below:

Potentially Responsible Party Lead Sites - Under Chapter 361, Texas Health and Safety Code, Solid Waste Disposal Act, §361.185, eligible state sites that do not qualify for the federal Superfund program must first be addressed by potentially responsible parties (PRP). Within the PRP lead remedial process, there are milestones that mark progress in relation to the various phases of the cleanup project as stated in an administrative order.

State Lead Sites - If PRPs are not available or forthcoming, the program may then utilize the Hazardous & Solid Waste Remediation Fee Account as a funding source for state-conducted remediation activities. Within the state lead remedial process, there are milestones that mark progress in relation to the various phases of the cleanup project.

Federal Sites - In general, after the state refers a site to the EPA, and it is accepted for the NPL, the state either takes the lead or provides management assistance to EPA's CERCLA program. The state assists EPA or takes the lead in the project management of the remedial investigation, feasibility study, remedial design, remedial action and operations and maintenance phases.

Status of Groundwater Monitoring. The Superfund Site Discovery and Assessment Program reported sampling occurred at approximately 140 wells in 2006, with 70 of those showing contamination. The Superfund Cleanup Program reported sampling occurred at more than 1900 wells from 101 sites in 2006.

Status of Groundwater Contamination. For 2006, 16 cases are listed for the Superfund Site Discovery and Assessment Program , and 69 cases are listed for the Superfund Cleanup Program. These are labeled in Table 1 under the Division heading “RMD/SSDA” and “RMD/SC”, respectively. Of these, 3 ground-water contamination cases required notification to local officials under TWC § 5.236 (HB 938) and 3 cases required notification to private water well owners under §26.408 (HB 3030).

Petroleum Storage Tank Program.

Program Description. The Petroleum Storage Tank (PST) program regulates underground and aboveground product storage tanks as authorized by the federal Solid Waste Disposal Act of 1970, as amended by the Resource Conservation and Recovery Act of 1976, and empowered by Subchapter I, Chapter 26 of the Texas Water Code. Approximately 95 percent of the regulated storage tanks contain petroleum products with the remainder containing regulated hazardous substances.

At regulated facilities where a product release has impacted groundwater, groundwater monitoring is required in conjunction with any necessary remedial activities. Groundwater monitoring is required until contaminant concentrations reach acceptable levels determined by the PST staff on a site-by-site basis.

Status of Groundwater Monitoring. There are an estimated 24,255 monitor wells in place under the PST program. In 2006 the PST program received monitoring reports from 1,160 leaking petroleum storage tank (LPST) sites which contain approximately 8,120 monitor wells. Of these, approximately 5,800 monitor wells have contamination to groundwater. During 2006, approximately 9,639 groundwater samples were collected from the 1,160 LPST sites. Approximately 6,885 of these samples showed groundwater contamination.

Status of Groundwater Contamination. To date, a total of approximately 13,267 groundwater contamination incidents have been documented by the PST Program. There have been 9,613 cases deleted due to completed action from this and previous reports. For 2006, 3,465 cases are listed by county in Table 1 under the division heading "RMD/PST." Of these, there are 7 cases that required notification to local officials under §5.236 of the Texas Water Code since the previous report's publication. There were 278 cases added in 2006 of which 255 were newly identified cases of groundwater contamination. A total of 680 cases were deleted from the 2005 report of which action was completed (activity status 6) on 668 cases. The great majority of the cases involve groundwater with documented contamination problems. A small percentage are cases where groundwater is imminently threatened.

Summary

The Remediation Division has a total of 4,886 groundwater contamination case descriptions listed by county in Table 1. Ten of the Division's cases required notification to local officials under TWC §5.236 in 2006. The TCEQ Remediation Division staff again worked throughout the reporting period to eliminate the "double counting" of cases, except in the Voluntary Cleanup Program, where multiple "cases" or reported groundwater contamination occurrences may be the result of a single contamination plume that affects many different individual land parcels. The Voluntary Cleanup Program recognizes these individual parcels as distinct participants in their program, hence there is inherently some duplication that will continue.

Chief Engineer's Office, Water Programs

Total Maximum Daily Loads (TMDLs). A TMDL, or Total Maximum Daily Load, is a tool for improving water quality. TMDLs are based on the relationship between pollution sources and in-stream water quality conditions. TMDLs are developed to provide a basis for planning and implementing pollution controls, land management practices, and restoration projects needed to protect and restore water quality. The TMDL establishes the allowable loadings for a water body and thereby provides the basis to establish water quality-based controls. These controls provide the pollution reduction necessary for a water body to meet water quality standards.

A surface water body is considered impaired if it does not meet the criteria for support of one or more of its beneficial uses, as defined in the Texas Surface Water Quality Standards. The federal Clean Water Act requires all states to identify the water bodies in their jurisdiction that do not meet water quality standards. This list of "impaired" water bodies, called the 303(d) list, is developed in Texas by the TCEQ using water quality data from various sources.

As part of the TMDL process, the TCEQ may conduct additional monitoring and data collection to better understand the water quality concerns. This information is used to further analyze the water bodies in question for point source and nonpoint source pollution. For the purpose of the Joint Groundwater Monitoring and Contamination Report, groundwater contamination cases are or may be contributing to some of the impaired stream segments in the 303(d) list. The discharge to some of the impaired streams include suspected groundwater sources from industrial and wastewater facility contaminated releases and dewatering from a mine site. Naturally occurring salt beds, especially in west Texas, can contribute to an elevated salinity when a river crosses these beds. Oil and gas exploration activities can also cause the discharge of naturally occurring mineralized groundwater to nearby surface water sources.

Whether the source of contamination is point source or nonpoint source in the TMDL process, the TCEQ develops an implementation plan with the participation of local stakeholders, describing the voluntary and regulatory measures needed to achieve the pollution reduction detailed in the TMDL. The Plan may address reduction in point source pollutants through adjustments to wastewater discharge permits. Pollution from nonpoint source pollution may be addressed through measures called "best management practices." The TMDL and implementation plan together constitute a watershed action plan.

Compliance Support Division

The Compliance Support Division (CSD) within the Office of Compliance and Enforcement (OCE) contributes to the protection of the state's groundwater resources by functioning as a licensing entity. The CSD licenses those environmental professionals who design, construct, install, remove, operate, and maintain environmentally sensitive equipment, facilities, and systems that provide commercial and residential irrigation, water and petroleum storage, drinking water protection and treatment, wastewater processing, on-site sewage facilities, and waste disposal services.

The Compliance Support Division issues 10 different types of licenses lending protection to the groundwater resources of Texas. During 2006, the CSD maintained

47,004 licensed environmental professionals, issued 18,899 new and renewal certifications, administered 10,937 examinations, and responded to 182 complaints.

The CSD also contributes to protection of groundwater by the timely processing and accurate review of licensing applications to include all education, training, experience and examination qualification requirements; the administration and validation of licensing examinations; the development and approval of training courses and instructors; the efficient issuance of new and renewal licenses; the investigation and resolution of competency reviews and enforcement cases; and the establishment and maintenance of licensing rules and standards.

On-Site Sewage Facilities Program.

Program Description. The Compliance Support Division administers the regulation of on-site sewage treatment facility (OSSF) construction as authorized in Chapter 366, Texas Health and Safety Code and guided by Chapter 285, Texas Administrative Code. The Texas Department of State Health Services (DSHS) began the permitting and regulation of OSSFs in counties without approved waste control orders on September 1, 1989. On March 1, 1990, installers and inspectors had to be trained and tested, and installers were required to be certified. On March 1, 1992, all duties and obligations of DSHS relating to OSSFs were transferred to the TCEQ. The On-Site Wastewater Installer Program was moved to the Field Operations Division on September 1, 1994. Subsequently, it was again moved to the Compliance Support Division on July 1, 1997, in an effort to consolidate professional certification programs within the TCEQ. This final move coincided with the publishing of revised rules on February 5, 1997, for OSSFs and the implementation of a certification program of On-Site Sewage Facilities Installers, Apprentices, Designated Representatives, and Site Evaluators, that had been approved on December 18, 1996. Final implementation of the OSSF training program was completed on October 1, 1998. All certifications required by the rule were in place effective August 1, 1998. The regulations require that new OSSFs be designed and constructed, using current technology, and that older failing systems be brought up to current standards. Additionally, continuing education training is a requirement for OSSF professionals to maintain their annual state certification. The program also performs compliance reviews of local regulating entities to evaluate their enforcement of the state's minimum requirements. The 1997 rules resulted in considerable improvement in installation of OSSFs statewide. The improvements are due to increased requirements for proper site evaluations and planning materials. Rule revisions that became effective June 13, 2001, provided the TCEQ and its local regulating entities more enforcement tools to ensure that the proper systems are being installed, inspected, operated, and maintained. Rule revisions that became effective August 29, 2002, provides the TCEQ with the authority to charge a fee up to $500 per permit if the local permitting entity gives back the program or the entity's program is revoked by the TCEQ. Rule revisions that became effective September 11, 2003, were administrative in nature in an effort to clarify requirements for issuing and renewing licenses and to achieve consistency with other legislation (Professional Geoscientists Practice Act). Rule revisions that became effective April 28, 2004, addressed the disposal of water softener discharge and rules that became effective January 6, 2005 addressed the disposal of graywater.

Status of Groundwater Monitoring Programs. The Compliance Support Division's contamination investigation program is generally a complaint response program. The programs in the division do not involve the monitoring of groundwater in association with a regulated activity in order to detect contamination. When appropriate during certain remediation or enforcement activities involving groundwater contamination, the TCEQ may perform or require groundwater monitoring to evaluate remediation progress or success.

Status of Groundwater Contamination. The Compliance Support Division provided technical assistance on more than 5,700 inquiries during 2006. No current case involves monitoring for groundwater contamination. Construction of an OSSF treatment and disposal system must be isolated from certain areas such as water wells, lakes, roads, and other objects subject to contamination from the OSSF or that may prevent the proper operation of the system. Additionally, no individual may install, construct, alter, extend, or repair an OSSF unless the individual holds a valid certification issued by the executive director of the TCEQ or has a valid exemption.

Monitoring Operations Division

Non-Point Source Pollution Management Program. The Texas Non-Point Source (NPS) Pollution Management program, authorized by Section 319 of the Clean Water Act, is implemented within the Monitoring Operations Division. The Division has responsibility for coordinating and updating the NPS assessment report and the NPS management plan, including the groundwater portions of the report. Priority activities involve oversight of grants and data collection, outreach activities, and development of watershed action plans. The NPS Program coordinates its activities with the basin management cycle through the Clean Rivers Program. While continuing its ongoing programs, the NPS program focuses new assessment and §319(h) funds in various watersheds in support of TMDL program activities addressing listed impaired water bodies.

The NPS Program produces the NPS Assessment Report and the NPS Management Program every five years, and provides annual assessment and management program updates as necessary. The program also administers §319(h) grants for the implementation and demonstration of best management practices for controlling nonpoint source pollution. Grant administration includes such activities as publication of requests for proposals, conducting workshops for grant applicants to explain the process and format for applications, reading and ranking project proposals, and making program recommendations to EPA. After award of a grant, intergovernmental/interlocal agreements must be executed, and contract administrative activities carried out, such as preparing progress reports, processing vouchers, and making site visits.

A statewide program to educate people in urban areas about nonpoint source pollution is a major commitment of the TCEQ NPS Program. Public awareness is necessary for developing the climate needed to address the water quality problems posed by nonpoint source pollution, The NPS Program works with the Small Business and Environment Assistance Division to implement outreach and education activities through brochures, pamphlets, mass mailings, and videos; newsprint, radio, and television media coverage; and state and regional workshops.

Enforcement Division

Program Description. The Enforcement Division drafts formal agreements to resolve compliance issues discovered at facilities regulated by the TCEQ. Enforcement actions that involve groundwater contamination are resolved primarily through administrative Agreed Orders that require investigation, monitoring, and remediation activities in accordance with state and federal rules and regulations.

Status of Groundwater Contamination. Four Enforcement cases are listed in this report under the division heading "ENF". Notification under §5.236 of the Texas Water Code was not required for any case during the current reporting period. No new sites were added during 2006.

Field Operations Division

Program Description. Field Operations Division personnel are generally the first responders to complaints, spills, or various other situations that may result in groundwater contamination. Reports of alleged groundwater contamination received from citizens or referred from other agencies or entities are assigned for investigation to Field Operations. Regulated activities may include industrial and municipal wastewater discharges, industrial hazardous and solid waste storage and disposal, municipal solid waste transfer and disposal, and petroleum storage tanks. After the investigation is completed and contamination is confirmed, field personnel will refer the case to the appropriate division for coordination.

Information is gathered about the contamination through site investigation, well inventories, and/or water quality sampling. The information is analyzed and efforts are made to effect remediation or initiate enforcement as necessary. Reports are maintained in investigation files for complaint sites or spill sites in the TCEQ's Central Records.

In addition, the Field Operations Division administers the Edwards Aquifer Protection Program rules consisting of review and approval of water pollution abatement plans, sewage collection system plans, and static hydrocarbon and hazardous substance storage facility plans. Rules for the protection of the Edwards Aquifer (Title 30, Texas Administrative Code, Chapter 213) were amended and expanded, becoming effective in September 2005.

Status of Groundwater Monitoring Programs. Investigation of groundwater contamination is essentially a response program. The program does not involve monitoring of groundwater in association with a regulated activity in order to detect contamination. However, during certain remediation activities of identified groundwater contamination, the TCEQ may perform or require groundwater monitoring to evaluate remediation progress or success.

Status of Groundwater Contamination. Four cases of groundwater contamination are listed, by county, in Table 1 under the division heading "FOD." The two cases in Dallas County (Jomar Property Corporation) and Nueces County (Encycle Seep) reported in FY 05 were referred to the Remediation Division in FY 06. Three new cases listed in FY 06 required notification to local officials under TWC §5.236.

Texas Water Development Board

Program Description. The Texas Water Development Board (TWDB) conducts an active groundwater resource assessment program. TWDB personnel have identified boundaries and various characteristics for all of the State's major and minor aquifers including water availability, recharge, and other geologic information. In addition, TWDB has identified the major entities using groundwater within each river basin, the aquifer(s) from which they pump, the quality of water being developed, and the quantity of water needed for a 50-year planning period. To accomplish this, TWDB collects data on the occurrence, availability, quality, and quantity of groundwater present and the current and projected demands on groundwater resources. The statewide groundwater level measurement program, groundwater quality sampling program, and groundwater studies are vital to the state's regional water planning efforts.

The purpose of the groundwater quality sampling program is to collect data to: 1) monitor changes, if any, in the quality of groundwater over time and 2) establish, as accurately as possible, the baseline quality of groundwater occurring naturally in the state's aquifers. TWDB conducts the groundwater quality monitoring program in accordance with procedures established in its *Field Manual for Ground Water Sampling* and by obtaining data collected by other entities also following these and similar procedures, such as groundwater conservation districts, the U.S. Geological Survey, and other state and federal agencies.

TWDB personnel process and store collected data by state well number in the TWDB groundwater database, including indicators of sample reliability, collecting entity, and analytical laboratory along with sample results. Because personnel identify wells with latitude and longitude, geographical information systems can spatially present water-quality data throughout the State. On occasion, the groundwater resource assessment program allows eligible entities to purchase water-quality lab equipment through agricultural conservation grants funded by the TWDB. Selected constituents reported by grant recipients are also included in the database.

Status of Groundwater Monitoring Programs. The TWDB sampled approximately 569 sites (wells and springs) in 2006. TWDB's collection of these samples and analysis of additional samples from cooperative entities comprise the ambient groundwater quality sampling program. As cooperators continue to send in data, the actual number of analytical results obtained from sites sampled in 2006 will be greater. TWDB enters water-quality data collected under this program in its groundwater database, scans accompanying images for an image-file database, available on the TWDB's Water, Information, Integration, and Dissemination internet-based mapping application (http://wiid.twdb.state.tx.us/ims/wwm_drl/viewer.htm), and files them in their Located Well Data file room. The sites have accurate latitude and longitude data for use with geographic information systems.

Figure 9 tabulates those sites of the 569 samples collected by the TWDB and analyzed by Energy Laboratories, Inc. that contained selected constituents in excess of their maximum contaminant levels. In addition to the constituents listed in Figure 8, TWDB's contracted lab analyzes the samples for major cations, alkalinity, silica,

strontium, and other additional trace elements. The TWDB concentrated its sampling in the Carrizo-Wilcox (275 wells), the Gulf Coast (94), and the Seymour (46) aquifers, in addition to several minor aquifers including the Woodbine, Queen City, Sparta, Blossom, Nacatoch, and Hickory. Sampling begun in 2006 in the Trinity aquifer should be completed in 2007. A small number of samples were collected in a few other aquifers for localized projects.

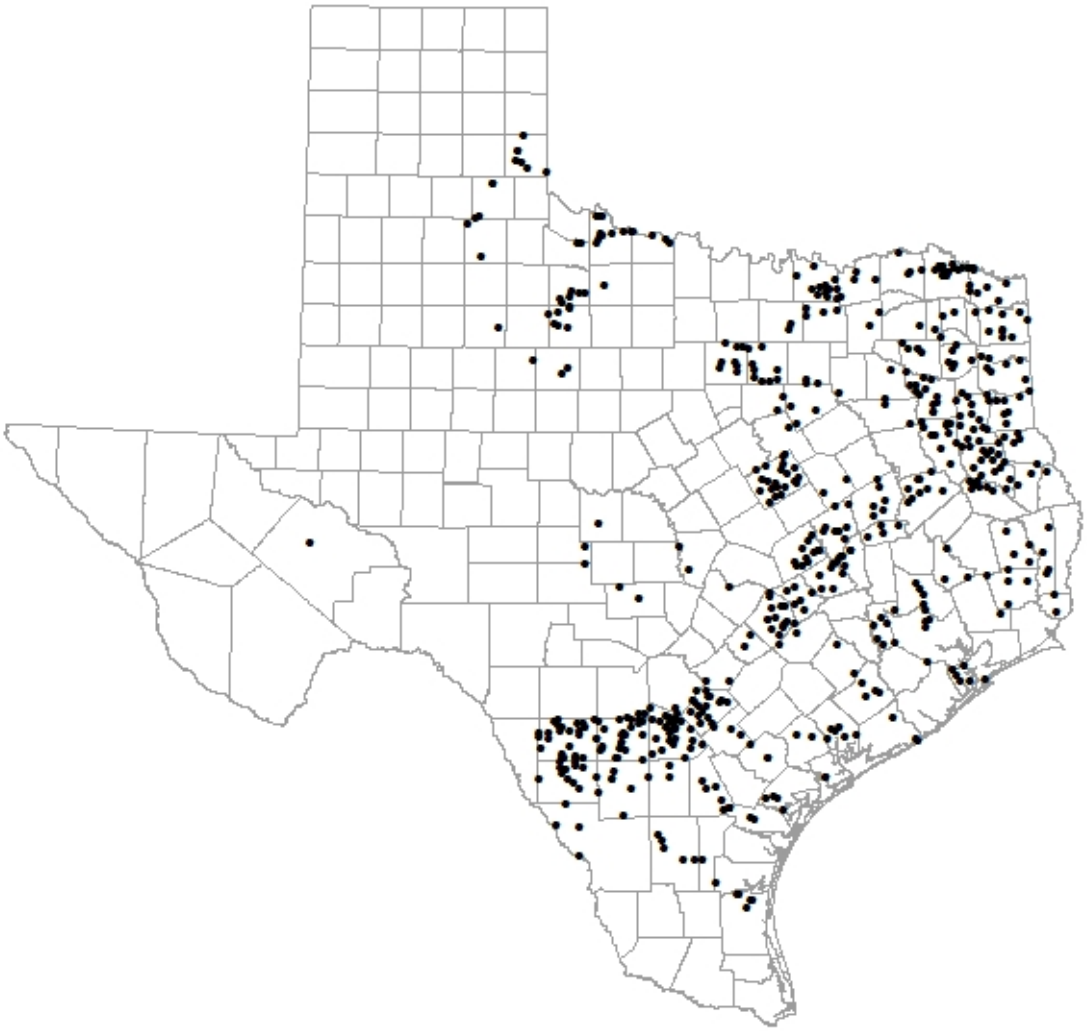
Figure 9. Texas Water Development Board Results of Analyses – 2006

Category	Constituent	MCL	Number greater than MCL
Primary	Antimony	6 μG/L	0
	Arsenic	50 μG/L	11
	Barium	2 MG/L	0
	Beryllium	4 μG/L	0
	Cadmium	5 μG/L	0
	Chromium	100 μG/L	0
	Fluoride	4 MG/L	4
	Gross Alpha	15 pCi/L	46
	Gross Beta	50 pCi/L	3
	Lead	Any detection	36
	Mercury	2 μG/L	N/A
	$NO_2 + NO_3$ (N)	10 MG/L	12
	Radium^{226} + ^{228}	5 pCi/L	N/A
	Selenium	50 μG/L	0
	Thallium	2 μG/L	2
Secondary	Chloride	300 MG/L	108
	Copper	1 MG/L	0
	Fluoride *	2 MG/L	29
	Iron	0.3 MG/L	78
	Manganese	50 μG/L	111
	pH	<7.0	106
	Sulfate	300 MG/L	31
	Dissolved Solids	1000 MG/L	101
	Zinc	5 MG/L	0

* Greater than 2.0 mg/L to 4.0 mg/L
MCL = maximum contaminant level
mg/L = milligrams per liter
μg/L = micrograms per liter
N/A = not applicable
pCi/L = picocuries per liter

Six cooperating groundwater conservation districts, following TWDB procedures, collected samples from the Edwards (Balcones Fault Zone), Trinity, and Ogallala aquifers for the TWDB ambient water-quality program in 2006. The TWDB is not a regulatory agency and has no groundwater protection regulatory programs. Consequently, the TWDB does not have regulatory jurisdiction over contamination cases detected by the agency. Any detection of contamination is referred to the proper regulatory agency. The accompanying map (Figure 10) shows the location of the 569 sites sampled by the TWDB in 2006.

Figure 10. Texas Water Development Board Sampling Locations – 2006



Railroad Commission of Texas

Oil and Gas Division

Class II Underground Injection Control Program Description. The Railroad Commission of Texas (RCT) regulates the disposal of oil and gas wastes by injection (Statewide Rule 9), the injection of fluid for enhanced oil recovery (Statewide Rule 46), and the underground storage of hydrocarbons (Statewide Rules 95, 96, and 97). As of December 31, 2006, the inventory of active wells in these categories was 31,721 out of 50,691 currently permitted wells. The RCT's Underground Injection Control Program for these categories of wells (Class II) is administered under authority issued by EPA under the Safe Drinking Water Act. The focus of the program is the protection of underground sources of drinking water. Class II wells must meet permitting standards and be tested and monitored to demonstrate mechanical integrity.

Class III Brine Mining Injection Well Program Description. Brine mining injection wells (Class III) are typical of solution mining wells. The RCT Class III Brine Mining Injection Well Program was approved on March 29, 2004. Since then, all active brine mining facilities were re-permitted per the provisions of Statewide Rule 81. Currently, 74 brine mining injection facilities with a total of 98 active brine mining injection wells are operating in Texas. A majority of brine mining facilities are required to monitor groundwater quality and submit groundwater-monitoring reports from 69 total monitoring wells for sampling. Groundwater monitoring is not conducted at facilities where usable quality groundwater is not present, typically located on salt domes along the Gulf Coast.

Statewide Rule 8 Water Protection Program Description. Through the Statewide Rule 8 Water Protection Program, the RCT regulates the surface storage and disposal of oil and gas wastes and brine retention facilities associated with brine mining and underground hydrocarbon storage. Rule 8 requires permits for pits and disposal methods that are not specifically authorized by the rule. There are currently 19 land farming facilities permitted for disposal of oil and gas waste and 4,100 pits permitted for storage or disposal of oil and gas wastes or retention of brine. Of the 4,100 permits, approximately 48 percent authorize pits to be used for short-term storage (48-72 hours) of produced water during emergency situations. The remaining permits are for various categories of pits, including saltwater disposal pits, collecting pits, skimming pits, brine pits, brine mining pits, and drilling fluid and gas plant evaporation/retention pits. Many of the pit permits require liners and leak detection systems. Rule 8 permits may also contain groundwater monitoring requirements in certain circumstances. The RCT monitors 165 wells associated with 35 disposal sites regulated under Rule 8. No monitoring wells were determined to be affected by contamination in 2006. The RCT also responds to citizen complaints regarding alleged groundwater contamination or alleged unauthorized activities that may endanger groundwater. RCT response may include investigation and sampling by the appropriate district office.

Oil-field Cleanup Program Description. Oil-field cleanup activities fall under the jurisdiction of the RCT and are subject to regulations under Statewide Rule 8, Statewide Rule 20, Statewide Rule 91, and RCT Special Orders. Other jurisdictional

rules that regulate oil-field protection and cleanup activities include: SWR 13 (well completion requirements), SWR 14 (plugging requirements), SWR 9 (injection [disposal] into a non-productive zone), SWR 46 (injection into a productive zone), SWR 57 (reclamation plants), SWR 93 (water quality certification), SWR 94 (disposal of oil and gas NORM waste), and SWR 98 (standards for management of hazardous oil and gas waste). Through SWR 30 (Memorandum of Understanding) the TRC maintains jurisdiction over natural gas plants and compressor stations.

If groundwater contamination occurs at a site, the responsible party is required to remediate to acceptable levels. Responsible parties may volunteer remedial action or cleanup may be required by legal action (Operator Cleanup Program). Operators, developers, or individuals who are not responsible for the contamination may participate in the Voluntary Cleanup Program. When investigation and research cannot locate a responsible party, the Site Remediation Section of the Oil and Gas Division will oversee the remediation of the groundwater contamination with state funds (State Funded Cleanup Program).

Monitoring wells are associated with all cases involving groundwater contamination. The number of monitoring wells at a site depends on the severity of the impact, the expanse of the plume, the toxicity of the contaminants of concern, and the sensitivity of the site. Most of the confirmed groundwater cases listed in this report under Railroad Commission Jurisdiction are under the purview of the Site Remediation Section of the Oil and Gas Division. There are 257 Operator Cleanup Program (OCP) sites, thirteen (13) Volunteer Cleanup Program (VCP) sites, and 20 State Funded Cleanup (CU) sites in the 2006 Annual Joint Groundwater Contamination Report. Complaints, nonpoint source grant investigations, District Office managed sites, and sites managed by other sections of the Oil and Gas Division of the TRC comprise the remaining listings on the TRC portion of the report.

Status of Groundwater Contamination. There are 351 groundwater contamination cases, listed by county, in table 2 under the heading RCT. The 351 cases are located in 110 counties. There are 25 new cases (7 of which are new Volunteer Cleanup Program projects) under RCT regulation that have been added to the report in 2006. Activities were completed on 29 cases that are listed on the 2006 report. A total of 11 cases were removed. No cases were referred to the RRC from other agencies; and two cases have been referred to other agencies. The 25 new cases were due to self-reporting, complaints, routine investigations, and participation in the Voluntary Cleanup Program. For the 2006 report, the enforcement and activity status have changed in 74 cases from the 2005 report.

Surface Mining and Reclamation Division

Program Description. The Surface Mining and Reclamation Division (SMRD) of the Railroad Commission of Texas (Commission) is authorized to enforce State laws and regulations consistent with the Texas Surface Coal Mining and Reclamation Act (Vernon's Texas Codes Annotated, Ch. 134, Texas Natural Resources Code) and the Texas Uranium Surface Mining and Reclamation Act (----, Ch. 131). As part of the groundwater information required in the Regulations, determination of the quality of subsurface water includes the analysis of common inorganic groundwater constituents plus certain trace metals. Monitoring plans for pre-mining, mining, and

post-mining conditions are required, normally on a three-month basis, in order to track variations in water-quality parameters.

Five (5) different companies at 9 permitted sites are presently mining coal, mostly lignite. Four (4) permittees have mines that are under reclamation operations and two (2) companies have permitted mines but have not commenced activities. Five (5) different companies are conducting uranium exploration activities at eight (8) permitted sites. Groundwater monitoring, both sampling for water-quality analysis and measurement of water level, is required for one year on a quarterly basis for the baseline information that is submitted with the initial permit application. In addition, the mining companies are required to submit plans for quarterly groundwater monitoring during mining and post-mining reclamation activities for Commission review and approval. Monitoring is done by or on behalf of the mining companies, which are required to submit the analytical results to the Commission on a quarterly basis, usually for the following parameters, in milligrams per liter (mg/L):

Calcium	Bicarbonate
Magnesium	Carbonate
Sodium	Sulfate
Potassium	Chloride
Iron (Total and Dissolved)	Fluoride
Manganese (Total and Dissolved)	Nitrate, as Nitrogen
Total Dissolved Solids	

Typically, an annual sample is also analyzed in a subset of these wells (spoils wells) for the following trace metals, in milligrams per liter:

Aluminum	Boron	Copper	Molybdenum
Arsenic	Cadmium	Lead	Selenium
Barium	Chromium	Mercury	Zinc

Continued quarterly samples during the entire permit period (mining and reclamation) include the chemical analysis of at least the following parameters:

Sulfate	Electrical Conductivity and Temperature
Chloride	Iron (Dissolved)
Total Dissolved Solids	Manganese (Dissolved)

Monitoring by the Commission is generally conducted only during investigations for some specific reason, such as water-quality complaints. The Commission no longer maintains a laboratory, and chemical and physical analysis of samples collected by enforcement personnel are sent to a commercial laboratory under contract with the Division. Typically between 5 and 15 water-quality and quantity complaints are investigated annually by Commission field personnel. To date, investigations have not borne out any confirmed contamination cases.

Status of Groundwater Monitoring Programs. All of the above-mentioned mining facilities, including those under reclamation operations, are subject to groundwater monitoring. Staff estimates that about 460 wells are being sampled four times per year (approximately 1,840 samples and >5,600 analyses). To date, results of the

sampling program do not indicate that any contamination attributable to mining and reclamation activities has occurred.

Various commercial laboratories perform chemical analyses for the mining companies and some have in-house laboratories. The Commission has no control over the actual sampling and sample preparation procedures, except to recommend generally accepted procedures (USEPA, USGS, etc.). Therefore, the Commission has no direct control over the quality of the chemical analyses reported by the companies. Methods for evaluating the results of chemical analyses (ionic balance) are being exercised by the mining companies and the Commission.

Status of Groundwater Contamination. There have been no confirmed contamination cases in the Surface Mining and Reclamation Program. Groundwater impacts related to the initial and current mining activities are almost totally associated with aquifer head draw-downs and declines. It may take years to decades for the spoils areas to become re-saturated and the groundwater contributions from the spoils areas to start affecting adjacent aquifers and stream base-flow. At that time, the preventive nature of the Commission permitting and enforcement activities should minimize the type of groundwater contamination expected from the spoils areas.

Department of State Health Services

Program Description. The Department of State Health Services (DSHS), formerly the Texas Department of Health, has limited involvement in groundwater protection, although it does provide services that are related to groundwater safety and public health concerns. With regard to groundwater issues, the Community Hygiene Group in the Division of Regulatory Services acts primarily in a non-regulatory manner and serves in an advisory or public service role. If and when public health is impacted by groundwater contamination, the agency's response would focus on providing advice and assistance to the population affected. Since DSHS involvement in groundwater issues is primarily advisory, the agency assists in determining the problem and providing help to the affected public. Regulatory aspects and remediation requirements would, however, be the responsibility of other state and federal agencies, as appropriate.

Although there are no direct programs that relate to groundwater protection, DSHS does have programs that indirectly provide protection to the state's water resources. Under the Regulatory Licensing Unit, the Chemical Reporting Group administers and enforces Tier II reporting of hazardous substances. The Policy Standards and Quality Assurance Unit oversees programs for youth camps, childcare centers and investigates public health nuisance complaints.

Status of Groundwater Monitoring Programs. The DSHS Division of Regulatory Services of the Radiation Branch does not regulate radioactive waste disposal, but does regulate radioactive waste processing. A total of 2,779 facilities require or may require groundwater monitoring in 2006, including RGR Panna Maria, Conoco Conquista, and WCS. Exxon Mobil is not included since it does not monitor groundwater but it is regulated by DSHS. As needed, the Radiation Branch will sample groundwater as a result of an incident, complaint, or situation that leads the Radiation Branch to believe there may be groundwater contamination.

The DSHS Laboratory Services Section performs chemical and microbiological analyses for any program at DSHS that needs water quality testing for its samples. For example, the laboratory routinely performs PCB analyses of surface and groundwater samples for the federal PCB program. The Laboratory Services Section also accepts water samples for routine microbiological analysis from the public for a fee

Licensees of the DSHS currently monitor groundwater for general water-quality, radionuclides, and other specified hazardous and potentially-hazardous constituents, as defined, on a routine basis. Monitoring locations include wells associated with or in the vicinity of various inactive in-situ uranium mine sites, inactive uranium millsites, and a low-level radioactive-waste processing and storage site. Annually, the DSHS collects split samples from selected monitoring wells at the inactive uranium millsites. Occasionally, the DSHS may sample groundwater monitoring wells as a result of a, complaint, or situation which leads the BRC to believe that a release to groundwater may have occurred.

Status of Groundwater Contamination. A total of 144 groundwater samples collected in 2006. Out these, 28 wells show groundwater contamination at the

Conoco site. The 28 wells have concentrations of one or more of the following constituents in excess of regulatory limits: Cadmium, Lead, Radium 226-228, Gross Alpha. One case is documented in table DSHS-1 in FY 06.

Other DSHS Programs. DSHS offers support on an as-needed basis when issues arise regarding the potential contamination of drinking water, including drinking water that is produced from a groundwater source. In such cases, DSHS may provide analytical, toxicological and epidemiological support for the purpose of protecting the public health.

Texas Department of Agriculture

Program Description. The Texas Department of Agriculture (TDA) has lead authority for pesticide regulation in Texas. The TDA recognizes certain pesticides as potential groundwater contaminants and has a primary responsibility in preventing unreasonable risk to human health and the environment from the use of pesticides. The agency conducts a variety of activities designed in part or entirely to reduce the potential of groundwater contamination by pesticides:

Product Registration: All pesticide products sold and used in Texas must be registered with the TDA. This process ensures these products have met all USEPA requirements for registration and use.

Pesticide Label Compliance and Enforcement: The agency has responsibility and authority under the Texas Agricultural Code to enforce pesticide labels, which include directions and precautions that directly or indirectly reduce the potential of groundwater contamination.

Pesticide Applicator Training: All prospective users of restricted-use or state-limited-use pesticides are required to obtain an applicator's license. This process includes training in the proper and legal use of pesticides, applicator testing, and continuing education.

Risk Assessment: The TDA assesses the potential impacts of agricultural chemicals on human health and the environment, including groundwater quality. Other potential water quality issues resulting from pesticide specific use exemption (referred to as Section 18) are also routinely evaluated.

Pesticide Management Plan for Prevention of Pesticide Contamination of Ground Water (PMP): The TDA serves as chair of the PMP Task Force, under the authority of the Texas Groundwater Protection Committee. Staff participates on several interagency subcommittees and task forces charged with conducting various aspects of the State's generic PMP.

These activities are conducted to ensure compliance with federal and state laws and regulations relating to the use of pesticides and the protection of groundwater resources. In addition, the TDA also provides support and assistance in all state environmental projects where agricultural pesticide use and regulation are of concern.

Status of Groundwater Monitoring Programs. The TDA does not routinely conduct groundwater monitoring for pesticides. The agency relies on monitoring data generated by the Texas Commission on Environmental Quality and Texas Water Development Board to identify watersheds and pesticides of concern. In addition, monitoring data of federal, local, and private entities are also evaluated when available. At that point, the TDA may address the situation through any or all of its regulatory activities as well as coordinate preventative educational and best management efforts with other government, educational, and/or private entities.

Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board (TSSWCB) was created in 1939 by the Texas Legislature to organize the State into soil and water conservation districts (SWCDs) and to serve as a centralized agency for communicating with other state and federal entities as well as the Texas Legislature. Headquartered in Temple, Texas, the TSSWCB offers technical assistance to the states' 217 SWCDs and maintains regional offices in strategic locations in the State to help carry out the agency's water quality responsibilities. The TSSWCB is governed by a seven-member board composed of two Governor appointees and five landowners elected throughout Texas by more than 1,000 SWCD directors.

The TSSWCB is the lead agency for the planning, management and abatement of agricultural and silvicultural nonpoint source pollution, and administers the Texas Brush Control Program. The TSSWCB has no statutory authority in the area of point source pollution, including misuse or accidents involving agricultural chemicals that are defined as point source pollution. The Board cooperates with the TDA and TCEQ in instances of point source agricultural chemical pollution. The TSSWCB also works with other state and federal agencies on NPS issues as they relate to Water Quality Standards and Criteria, Total Maximum Daily Loads, and Coastal Zone Protection. The TSSWCB works to ensure SWCDs and local landowners are adequately represented in these matters that could have a significant impact on future conservation and utilization of natural resources.

The TSSWCB has authority to establish water quality management plans in areas that have developed, or have the potential to develop, agricultural or silvicultural nonpoint source water quality problems. This program provides, through local soil and water conservation districts, development, supervision and monitoring of individual water quality management plans for agricultural and silvicultural lands. Besides their involvement in the abatement of nonpoint source pollution, the Board also helps to preserve groundwater resources with its Cost Share Program and Brush Control Program. The Cost Share Program funds up to 75 percent of the implementation costs for a Water Quality Management Plan which is developed and approved by the Board. This plan represents a commitment by the landowner to use the best management practices for their land uses available, as laid out in the plan, in order to protect their land and water resources from erosion, pesticide contamination, and over use. The Brush Control Program also protects groundwater resources by controlling invasive brush species which use large amounts of water. By controlling the brush in an area and restoring the native grasses, more water is available to recharge the aquifer below.

Status of Groundwater Monitoring Programs: The TSSWCB has funded two projects to assess the impacts of best management practices (BMPs) on groundwater quality. The first project is being conducted by the Texas Cooperative Extension (TCE) to demonstrate the effectiveness of BMPs to reduce nitrate in groundwater. The second project is being conducted by Texas Water Resources Institute (TWRI) in conjunction with Haskell SWCD, Wichita Brazos SWCD, and California Creek SWCD. The purpose of this project is to educate and provide technical and financial assistance to irrigators to develop and implement water quality management plans (WQMPs) to reduce nitrate levels in the Seymour Aquifer. The TSSWCB continues

to participate with the Agricultural Chemicals Subcommittee of the Texas Groundwater Protection Committee in the development of site-specific monitoring plans for atrazine as needed as well as co-chair the NPS Task Force of the Texas Groundwater Protection Committee.

Texas Alliance of Groundwater Districts

Program Description (General). The Texas Alliance of Groundwater Districts (TAGD), formerly the Texas Groundwater Conservation Districts Association, was formed on May 12, 1988. Its membership is restricted to groundwater conservation districts in Texas who have the powers and duties to manage groundwater as defined in Chapter 36 TWC. TAGD is organized exclusively for charitable, educational, or scientific purposes within the meaning of Section 501 (c) (3) of the Internal Revenue Code. As such it can accept tax exempt donations and use these donations to educate the public to the growing need for water conservation and groundwater protection.

The purpose of TAGD is to educate the public and further groundwater conservation and protection activities, and to provide a means of communication for the exchange of information between individual districts as well as the general public. The TAGD maintains contact with members of the private sector and various local, state, and federal officials and their agencies in order to obtain timely information on activities and issues relevant to groundwater districts. To date, there are 73 district members of the Texas Alliance of Groundwater Districts, and 4 temporary, non-voting member districts. A map and legend showing groundwater conservation district members of the TAGD are included in Appendix 6. Contacts for the groundwater conservation districts are listed in Appendix 7.

The districts are created by the Legislature or by the TCEQ with the purpose and responsibility of preserving and protecting groundwater. Groundwater districts can be created by one of three procedures: (1) special water districts can be established through action of the legislature; (2) districts can be created through a petitioning process filed with the TCEQ by property owners based on Section 36.013 TWC; and (3) districts can be created in priority groundwater management areas through procedures initiated by the TCEQ. In the last case, extensive local participation is included through management advisory committees. Districts are local or regional in their jurisdiction and have, for the most part, elected boards of directors. Among their legislatively granted authorities is the power to monitor groundwater quality. A number of districts also have the authority to bring civil court proceedings for injunctive relief against an entity causing groundwater contamination.

Status of Groundwater Monitoring Programs (General). District groundwater monitoring programs are primarily of a reconnaissance nature. Most programs are designed to track water quality trends and identify possible contaminants with minimal expenditure of resources. Generally the sampling and analytical procedures and equipment employed are less sophisticated and accurate than the sampling and laboratory procedures required to document or prove contamination. However, some districts have monitoring programs with highly accurate and sophisticated sampling and laboratory procedures similar to those of the TWDB. These districts are monitoring any changes in ambient or natural water quality conditions on a long-term basis. Groundwater studies of specific areas, contaminants, or constituents are also conducted by some districts. District groundwater quality monitoring can be used to identify problems that may then be referred to appropriate state agencies for more detailed investigation and analysis.

Status of Groundwater Contamination (General). There is one case of groundwater contamination reported by the members of TAGD listed in Table 3 under the appropriate heading to indicate the individual district. The Evergreen Underground Water Conservation District (EUWCD) has documented one groundwater contamination case in FY 06. Action was completed in one case in FY 05.

Barton Springs/Edwards Aquifer Conservation District

Program Description. The Barton Springs/Edwards Aquifer Conservation District monitors the status of the Barton Springs segment of the Edwards Aquifer. The jurisdiction of the District covers parts of four counties including southern Travis, northern Hays, and minor portions of western Bastrop, and Caldwell counties. Routine tasks include monitoring pumping volumes from permittees, measuring water levels, collecting water samples, and performing water-quality analysis on existing and newly drilled wills within the District. Field parameters of pH, conductivity, and temperature are measured using a Eureka Manta water-quality probe. A small laboratory has been equipped by the District to measure the presence or absence of coliform bacteria, to count the number of indicator coliform colonies, and to measure levels of various basic water constituents such as nitrate, iron, chloride, fluoride, and sulfate using a Hach DR 2010 spectrophotometer. Several wells are equipped with continuous temperature/electrical conductivity probes to indicate changes in water quality.

The District has been involved in a joint groundwater study with the Texas Water Development Board (TWDB) since 1998. As part of this study, sampling is conducted for about 20 wells and springs for field parameters, nutrients, and trace metals. Additionally, the District has received grant funding from the TWDB for a more comprehensive list of groundwater parameters in 1990, 1993 and 1994 including pesticides, trace metals, radionuclides, petroleum hydrocarbons, and organics. A comprehensive list of parameters was analyzed from 28 wells and six springs in 2001. This study was part of an EPA 319h grant administered by the TCEQ to study non-point source pollution. The results of that study indicate that groundwater contaminant levels in most of the sampled wells and springs are low compared to EPA MCLs. Nine parameters were detected at levels above the TCEQ Surface Water Standards. However, samples were collected under one set of flow conditions and contaminant concentrations could vary significantly under different flow conditions. Additionally, lower levels of contaminants may be present in some samples that could not be detected due to limitations of laboratory Method Detection Levels. The District maintains a list of wells and springs "of concern" with regards to contamination on which to focus future sampling events or analyses.

Between 1996 and 2000 the District conducted groundwater dye tracing studies funded by a 319(h) grant from the Environmental Protection Agency and administered through the TCEQ. The results of this investigation were submitted to the TCEQ in August 2001. The results of this study indicate rapid groundwater velocities from recharge features to wells and springs within this karst system. The rapid travel rates and direct hydraulic connection of recharge areas to wells and springs make this aquifer extremely susceptible to contamination from a variety of sources. For example, there are periodic occurrences of increased bacteria levels in wells and springs after rainfall and subsequent recharge events.

The District conducts continuous monitoring of water levels in about 25 wells throughout the Edwards and Trinity aquifers. One of these wells (Lovelady monitor well, 58-50-301), plus discharge from Barton Springs, are used for drought declarations. The District has produced potentiometric maps of the Barton Springs Segment of the Edwards Aquifer during different aquifer conditions. The most recent of these comprehensive synoptic water-level measuring events was conducted in August 2006 under moderately low groundwater level conditions.

Panhandle Ground Water Conservation District

Program Description. The Panhandle Groundwater Conservation District serves all or parts of Armstrong, Carson, Donley, Gray, Hutchinson, Potter, Roberts, and Wheeler counties. The office is centrally located in White Deer, Texas. The District monitors water levels and water quality in wells completed in the Ogallala, Blaine, Dockum, Whitehorse, and Seymour aquifers.

The District's water quality program includes the following:

- Operation of an in-house water analysis lab
- Annual sampling and analysis from selected wells
- Analysis of individual wells on a request basis
- Preparation of water quality maps
- Monitoring water quality samples and analysis results collected by other agencies operating within the District
- Participation in water quality studies with other agencies.

The District collected over 1100 annual water level measurements during 2005. Monthly water level measurements were collected from 43 wells located near or within large municipal water supply projects. The District is currently analyzing the effects of water withdrawals by this project on water quality using the information collected by these measurement programs. Along with our monthly measurements, four data recorders and four real time recorders have been installed on strategic monitoring wells near the Roberts County project and throughout the District.

According to the 2006 Water Quality Season, some wells exceeded drinking water standards in mineral content. Based on the state's secondary drinking standards, of the 233 samples collected by the District, 18 were high in iron, 22 high in sulfate, 7 high in chloride, 0 high in nitrate, and 2 high in fluoride. Of the high-iron samples, 9, or 50%, were windmills. Windmills have a tendency to be higher in iron content due to rusting discharge pipes.

The District tested total of 321 samples in the 2006 Water Quality Season, including 88 samples which were brought to the office by individuals to be analyzed.

Since it was an even-numbered year, (i.e. 2006), samples were taken from even-numbered state wells along with the state wells that have a history of high mineral concentration. This year, samples were collected over a two and a half month period. During this period, a total of 641 hours were spent gathering samples, analyzing samples in the laboratory and entering data. We continue to keep the cost as low as possible.

Texas Agricultural Experiment Station

Regulatory Programs. The Texas Agricultural Experiment Station has no regulatory authority and does no regulatory monitoring. Groundwater samples may be collected and analyzed in connection with the conduct of research investigations.

Program Description. The Texas Agricultural Experiment Station (TAES) is the official agricultural research agency in Texas. Headquartered at Texas A&M University, the TAES promotes food and fiber production that emphasizes water conservation and the protection of natural resources. The TAES operates a system of 13 research centers which are located in the major land and natural resource regions of Texas. The Texas Water Resource Institute is an administrative unit of the TAES that guides internal water-related research.

Broad goals of the TAES groundwater research program are to protect, preserve, and efficiently use water resources, and to develop sustainable agricultural production systems. Groundwater programs of the TAES stress the development of management strategies, technologies, and educational programs to support sustainable agriculture.

The TAES groundwater quality research focuses on reductions in chemical use; the control, fate, and transport of agricultural chemicals; and the remediation of contaminated groundwaters.

Major efforts are underway to develop strategies to manage brush species on rangelands to increase water yields and protect water quality; to manage livestock wastes from concentrated animal feeding operations to prevent water contamination; and to develop crop production technologies that produce high yields while minimizing the loss of pesticides, chemicals and nutrients into ground and surface-waters.

The following examples are of recent TAES groundwater related research activities:

The fate and transport of atrazine in and through soils are under study in the Brazos River Basin. These soils are intensively farmed and may provide pathways for chemical transport to shallow alluvial aquifers;

Rice water management strategies are being developed that lower pesticide needs, increase recycling and water conservation, and reduce risks of surface and groundwater contamination;

Researchers are utilizing genetic engineering to identify genes in bacteria and fungi that have the potential to degrade groundwater contaminants;

Research activities on animal waste management are now directed toward development of technologies to reduce phosphorus loading to soils and surface waters,

Computer simulation models are being used to assess the impact of agricultural practices on the environment. For example, such models are now being used to identify cropping and chemical management strategies that

may be appropriate for environmentally sensitive areas like the Seymour aquifer and the Texas Coastal Bend;

Future professionals are trained through undergraduate and graduate education and research programs at Texas A&M University and other System Institutions. Many of fhe TAES researchers at Texas A&M University in College Station also hold teaching appointments, thus providing the latest research results to students;

The TAES research efforts are complimented by the programs of the Texas Cooperative Extension (TCE). For example, TCE specialists produce easy-to-read fact sheets and other publications for specific clientele, including agricultural producers. Other TCE activities include field demonstrations and educational programs for youth and adults, and;

TCE specialists are providing leadership in development of a video tape and education program on plugging abandoned wells to protect groundwater quality. Specialists are also providing technical leadership for development of pesticide-specific management plans for the state.

Status of Groundwater Monitoring Programs. The TAES has no regulatory monitoring authority. The TCE operates soil and water testing laboratories in College Station. The facilities provide information on potential groundwater quality problems to thousands of rural Texans. Results from the water tests are available in a database format so that water-quality trends can be identified.

Bureau of Economic Geology

Program Description. The Bureau of Economic Geology, established in 1909, is a research entity of the University of Texas at Austin and functions as the State Geological Survey. The Bureau recently became part of the Jackson School of Geosciences. The Bureau conducts basic and applied research projects, including environmental site assessment and investigations of ground-water resources and ground-water quality, in support of other State agency missions. The Bureau's hydrogeologic and environmental efforts during 2006 continued emphasis on hydrogeologic study of issues related to naturally occurring contaminants such as arsenic and groundwater recharge.

Status of Groundwater Monitoring Programs. As part of sponsored-research projects, Bureau staff measure ground-water quality and water levels in selected public and private wells. These projects cover many different parts of Texas. Most water-quality data collected in these studies consist of pH, temperature, conductivity, major and minor inorganic ions, total organic carbon, isotopes, and other constituents of interest. Data are used to interpret rates and modes of hydrologic processes and the source and movement of groundwater. Project-specific data are collected in data reports or topical reports. Periodically, the digitized data are compiled for inclusion in the TNRIS data system.

Status of Groundwater Contamination. The Bureau of Economic Geology is not a regulatory agency and has no ground-water protection regulatory programs. Consequently, the Bureau does not have regulatory jurisdiction over contamination cases that might be detected in the course of its hydrogeologic investigations. Any detection of contamination is referred to the proper regulating or sponsoring agency.

Texas Department of Licensing and Regulation

Program Description. Water Well Drillers/Pump Installers. The need for identification and protection of the state's groundwater resources was recognized by the Legislature through the creation of the Water Well Drillers Board (Board) in 1965. In 1991, the 72nd Legislature expanded the Board's functions to include licensing and regulation of water well pump installers.

Senate Bill 1955 (75th Legislature, 1997) transferred the Water Well Driller Advisory Council and the Water Well Driller/Pump Installer Section from the Texas Natural Resource Conservation Commission to the Texas Department of Licensing and Regulation (TDLR) effective September 1, 1997.

The Water Well Driller/Pump Installer Section maintains communications with the Council, industry, various state agencies, and groundwater conservation districts and investigates all alleged violations of Chapters 1901 and 1902 of the Texas Occupations Code and 16 Texas Administrative Code Chapter 76 (Rules). The Section also investigates consumer complaints filed against water well drillers, pump installers, and performs compliance investigations of water, monitor, injection, and dewatering wells to insure compliance with well construction standards.

Investigations include, but are not limited to, surface completions, depth of annular cement, regulated distances from contamination sources and property lines, abandoned and deteriorated water wells, and licensing requirements. In addition, rules requiring isolation of zones containing undesirable or poor quality water are enforced to prevent commingling with and degradation of fresh water zones.

The TDLR's Water Well Driller/Pump Installer Section staff also administers the Abandoned Well Notification Program. Chapters 1901 and 1902 of the Texas Occupations Code authorize this function. Investigations are conducted and landowners are notified that within one-hundred eighty (180) days of notification, the abandoned and/or deteriorated water well must be plugged, completed, or capped in accordance with 16 Texas Administrative Code Chapter 76 specifications.

Violations of Chapters 1901 and 1902 of the Texas Occupations Code and the Rules are enforced by the TDLR's Enforcement Division through TDLR orders requiring administrative penalties and corrective actions or referral to the Office of the Attorney General. Investigations that involve groundwater contamination are referred to the appropriate state agency with jurisdiction for the activity believed to be the cause of the contamination.

Status of Groundwater Monitoring Programs. The Water Well Driller/Pump Installer Section does not conduct or require groundwater monitoring. At the end of December 2006, there were 2,331licensed professionals including drillers, pump installers, and apprentices regulated by the TDLR/Water Well Driller/Pump Installer Section.

During 2006, there were 219 investigations conducted by Water Well Driller/Pump Installer Program, Field Office, or Enforcement Division staff with all documented violations either remediated or in the enforcement process. Investigations refer to the

information gathering activities conducted in response to complaints received by the TDLR. Compliance investigations refer to on-site inspections of wells that are randomly chosen from the State of Texas Well Reports that are submitted to the TDLR.

23 abandoned wells were reported in 2006 and all are in various stages of notification, investigation or completion (plugged or brought into compliance).

Section, Field Office, and/or Enforcement Division staff collected 82 water well (groundwater) samples in response to complaints received in 2006.