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**Texas Agricultural
Experiment Station**

**Bureau of Economic Geology of
The University of Texas at Austin**

**Texas Department of
Licensing and Regulation**

**ACTIVITIES OF THE
TEXAS GROUNDWATER
PROTECTION COMMITTEE**

**REPORT TO THE
79TH LEGISLATURE**

Prepared by the
Texas Groundwater Protection Committee

Activities of the Texas
Groundwater Protection
Committee: Report to the 79th
Texas Legislature



Prepared by
Texas Groundwater Protection Committee



Texas Groundwater Protection Committee

<http://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

Activities of the Texas Groundwater Protection Committee was developed and produced by the Texas Groundwater Protection Committee (TGPC) in fulfillment of requirements in Section 26.405 of the Texas Water Code. 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 the views and policies of each participating organization. The effort was partially funded by the U.S. Environmental Protection Agency.

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EXECUTIVE SUMMARY

This report was prepared for submission to the 79th Texas Legislature by the Texas Groundwater Protection Committee (TGPC). The TGPC prepared the report in accordance with Section 26.405 of the Texas Water Code (TWC). The report provides recommendations to improve groundwater protection for Legislative consideration and describes the TGPC's activities for the two preceding years.

Recommendations to the 79th Texas Legislature

Eleven groundwater protection recommendations are presented for legislative consideration. In support of the *Texas Groundwater Protection Strategy (Strategy)* prepared by the TGPC in 2003, the recommendations request additional funding in four topical areas: improved groundwater data collection and management, increased public outreach on groundwater issues, coordinated groundwater research, and strengthened programmatic areas for groundwater conservation and water quality protection. Some of these recommendations can be found in the Legislative Appropriation Requests of the individual agencies.

Improving Groundwater Data Collection and Management:

- Conversion of State Water Well Reports to Electronic Format/Database
- Groundwater Availability Models (GAM) Funding
- Data Collection to Support GAM Program
- Expanded Funding for Groundwater Sampling for Water Quality and Water Availability

Increasing Public Outreach on Groundwater Issues:

- Groundwater Quality Education Programs
- Securing Sustainable Water Supplies for Rural Texas Communities

Coordinating Research:

- Characterization of Brackish Water and Disposal of Desalination Reject Water in Saline Aquifers and Depleted Oil and Gas Reservoirs
- Collaborative Agricultural and Hydrogeologic Studies on Nitrate in Texas Groundwater

Strengthening Programmatic Areas:

Groundwater Conservation

- Brush Control Funding to Increase Groundwater Yield
- On-Farm Agricultural Best-Management Practices Incentives through Creation of a Water Conservation Plan Program

Water Quality Protection

- Abandoned Water Well Plugging Fund

TGPC Activities 2003-2004

TGPC meetings and presentations. During the biennium, the Texas Commission on Environmental Quality (TCEQ), Railroad Commission of Texas, and Texas Water Development Board gave presentations to the TGPC on new or improved groundwater-related activities and initiatives. The presentations served to broaden interagency awareness and coordination.

Subcommittee and Work Group Activities. Through the use of subcommittees the TGPC has begun to implement the *Strategy*. The subcommittees addressed specific groundwater-related and program development issues and have brought the result of their work to the full TGPC for discussion or action.

- ***Agriculture Chemicals Subcommittee*** is implementing the generic pesticide state management plan (SMP), which has received United States Environmental Protection Agency (EPA) concurrence. Working through its task forces, the Subcommittee has developed plan components for future pesticide-specific SMPs.
- ***Data Management Subcommittee*** continues to prepare the annual *Joint Groundwater Monitoring and Contamination Report*. In addition, the subcommittee coordinated the assessment of the groundwater quality of the state's aquifers. This effort is an integral part of the state's groundwater protection strategy and the collection of groundwater data for the biennial Water Quality Inventory report, which is prepared and sent to EPA to fulfill requirements of Section 305(b) of the Clean Water Act.
- ***Nonpoint Source Subcommittee*** provided input for the Nonpoint Source Pollution Management Program Annual Report to the EPA. In addition, the subcommittee updated the state nonpoint source assessment of groundwater conditions and nonpoint source management strategy for groundwater resources. The subcommittee also facilitated the review and submission of nonpoint source project proposals for the annual EPA Clean Water Act, Section 319 (h) funding cycle, and

provided input related to groundwater to both the Texas State Soil and Water Conservation Board (TSSWCB) and the TCEQ.

- **Legislative Report Subcommittee** developed, for full-TGPC approval, groundwater protection recommendations for legislative consideration.
- **Abandoned Well Closure Task Force** developed the necessary procedures, educational, and technical information to promote the landowner-initiated closure or plugging of abandoned water wells. The Task Force has been replaced by the Public Outreach and Education Subcommittee.
- **Public Outreach and Education Subcommittee** is in the process of developing and implementing educational outreach programs for landowners concerning groundwater protection and environmental health issues; and is facilitating interagency communication and coordination to provide support for landowner educational outreach projects.
- **Groundwater Research Subcommittee** identifies projects where shared resources between agencies could support research to solve problems that are common to many TGPC committee members, including identifying opportunities for cooperatively applying to federal agencies for pass-through monies.

Rules Regarding Notification of Groundwater Contamination. The TGPC adopted rules implementing House Bill 3030, 78th Legislature, 2003, in October 2003. The legislation added §26.408 to TWC, Chapter 26, requiring the TGPC to establish the form and content of the written notice that TCEQ provides to the owner of a private drinking water well that may be affected by contamination. In addition these notices are sent to the appropriate groundwater conservation district.

Public Records

The TCEQ administers the activities of the TGPC in accordance with TWC, §26.403. TCEQ maintains membership information, provides meeting information, prepares and maintains meeting records, maintains meeting and correspondence files, supports the TGPC's web site, and distributes publications for the TGPC and its subcommittees.

Educational Outreach

The TGPC conducts ongoing efforts to provide educational outreach on groundwater protection issues for the following topics:

- **The State Management Plan for Pesticides in Groundwater.** TGPC facilitated a project for collecting data on the occurrence of the herbicide atrazine in the state's aquifers. The Agricultural Chemicals Subcommittee's atrazine work includes

both data collection and assessment of groundwater in aquifers of the Texas Panhandle. TGPC has also been involved in educating agricultural producers about best management practices to prevent atrazine contamination of groundwater in the High Plains.

- ***Abandoned water well closure demonstrations.*** Multiple demonstrations of the proper methods to close abandoned water wells have been conducted in the Texas Panhandle and in the central part of the state. The demonstrations are designed to illustrate the methods that a landowner may use to plug an abandoned water well, as detailed in the TGPC's *Landowner's Guide to Plugging Abandoned Water Wells*.

Annual Joint Groundwater Monitoring and Contamination Reports

The TGPC produced and published two monitoring and contamination reports during the previous two years: *Joint Groundwater Monitoring and Contamination Report-2002* (TGPC, 2003) and *Joint Groundwater Monitoring and Contamination Report-2003* (TGPC, 2004). The reports describe the status of groundwater monitoring programs and groundwater contamination cases documented or under enforcement by the participating agencies for the calendar year.

State Management Plan for Pesticides in Groundwater

TCEQ is charged under TWC, §26.407 to develop management plans for agricultural chemicals, with the advice of the TGPC, which address chemicals such, as pesticides, that may threaten groundwater quality. The goal of the SMP is to protect the existing quality of groundwater and to prevent the degradation of state groundwater resources. The SMP describes the general policies and regulatory approaches the state will use to protect groundwater resources from risk of contamination by pesticides.

Texas Groundwater Protection Strategy

The TGPC issued a revised *Texas Groundwater Protection Strategy* in February of 2003 which addressed seven components that reflect the state's approach to groundwater protection. The committee is addressing the gaps in programs that were identified during the development of the *Strategy* through its subcommittees and through the recommendations to the Legislature contained in this report.

RECOMMENDATIONS TO THE 79TH TEXAS LEGISLATURE

High-quality groundwater resources are of vital importance to the state's economy and the public health and welfare. As required by TWC, §26.045, the TGPC submits the following groundwater protection recommendations for legislative consideration. More detailed information is contained in the discussions which follow.

These eleven recommendations support the *Texas Groundwater Protection Strategy* prepared by the TGPC in 2003. The recommendations address the following areas:

Improving Groundwater Data Collection and Management:

- Conversion of State Water Well Reports to Electronic Format/Database
- Groundwater Availability Models (GAM) Funding
- Data Collection to Support Groundwater Availability Modeling (GAM) Program
- Expanded Funding for Groundwater Sampling for Water Quality and Water Availability

Increasing Public Outreach on Groundwater Issues:

- Groundwater Quality Education Programs
- Securing Sustainable Water Supplies for Rural Texas Communities

Coordinating Research:

- Research on Characterization of Brackish Water and Disposal of Desalination Reject Water in Saline Aquifers and Depleted Oil and Gas Reservoirs
- Collaborative Agricultural and Hydrogeologic Studies on Nitrate in Texas Groundwater

Strengthening Programmatic Areas:

Groundwater Conservation

- Brush Control Funding to Increase Groundwater Yield
- On-Farm Agricultural Best-Management Practices (BMPs) Incentives through Creation of a Water Conservation Plan Program

Water Quality Protection

- Abandoned Water Well Plugging Fund

While the TGPC's recommendations represent the majority opinion of the membership of the committee, they do not necessarily reflect the views and policies of each participating organization. The recommendations are not listed in priority order.

Improving Groundwater Data Collection and Management

Conversion of State Water Well Reports to Electronic Format/Database

Issue

There are an estimated 800,000+ water well reports (WWRs) in paper format maintained at the Texas Commission on Environmental Quality (TCEQ) which can not be accessed in a digital format. These WWRs are widely used by TGPC member agencies, groundwater conservation districts (GCDs), and the public to support environmental regulatory activities and research programs.

Recommendation

Funding should be made available to make this information accessible in an electronic format. This multi-agency project would: 1) capture and convert 800,000+ paper water well documents to a digitized format; 2) develop and maintain a web-accessible database for use by the public, stakeholder agencies, and GCDs; and 3) create a backup medium for storage and record preservation. Project costs for the biennium are estimated at \$340,000.

Background

State law and Texas Department of Licensing and Regulation (TDLR) rules specify the form and content of WWRs. Water well drillers, pump installers and/or the well owners are required to prepare and submit the reports to TDLR and TCEQ. The reports provide valuable scientific information on geology and occurrence of groundwater throughout the

state and on the construction and use of water wells. WWRs are records of the drilling and include information such as well location, strata encountered, construction, and the date of completion of a water well. The information in these reports is used in assessments of: groundwater occurrence and usability; groundwater geology for contamination and facility investigations; and water use. The reports are widely used by Texas Water Development Board (TWDB), TDLR, Railroad Commission of Texas (RCT), TCEQ, Bureau of Economic Geology (BEG), GCDs, universities, water well drillers, environmental consultants, and landowners. Other state and federal agencies and those that research property transactions also use the reports.

Currently, WWRs are maintained in all three of the above-mentioned agencies both electronically and in hard copy formats. The TWDB maintains approximately 130,000 located water well records in digital format. TDLR maintains a relatively new database of electronically submitted report forms numbering several thousand. There are an estimated 800,000 water wells reports housed at the TCEQ, that are paper documents which can not be accessed in digital format.

TCEQ regulatory programs require the development of site specific groundwater data for different types of waste management permits and site remediations. WWRs are heavily used by TCEQ's regulated community. TDLR uses the WWRs in their regulation of licensed well drillers and pump installers. TWDB use the WWRs as basic data to model groundwater systems and develop information on water availability. Other agencies also utilize the data on special projects. WWRs are heavily used by GCDs to understand groundwater movement and availability for their well use permitting functions. Recent legislation (House Bill 3030, 78th Regular Session, TWC, §26.408) requires notices to private well owners and GCDs of groundwater contamination. These WWR files can be useful in determining occurrence of groundwater and if it is being used and more recent files can be utilized to identify well owners for notice purposes.

Converting all available paper WWR information into electronic format will improve accessibility and provide for records preservation. The incorporation of the information in a web-accessible database similar to the database and web interface maintained by TWDB for their inventory of wells would provide access to the information for all agency uses and most groundwater districts and consultants. Web-based access would save agency staff and storage costs.

TCEQ, TDLR, and TWDB are the three agencies that could jointly develop the project. TCEQ would secure and fund a contract service company for the electronic scanning and data entry portion of this project. TCEQ, TDLR, and TWDB will share the task for quality assurance of the

data entry ensuring that the information is complete and accurate. The TWDB would be responsible for the development of the Web site and links to an online database for use by the public and stakeholder agencies. Backup tapes would be generated and stored off site to ensure protection in accordance with TCEQ's vital records program and disaster recovery. TCEQ will maintain, perform current updates of all information into the database.

Groundwater Availability Models (GAM) Funding

Issue

Groundwater Availability Models provide valuable information to the citizens of Texas as they consider the adequacy of groundwater supplies over a 50-year planning period. The TWDB initiated GAM development with funding provided in the 76th Legislature for planning that began under Senate Bill 1, 75th Legislature. However, available funding will not allow completion of models of the minor aquifers. Additional funding for Fiscal Year 2006 and beyond is needed to complete groundwater availability models for the state's minor aquifers.

Recommendation

Continue funding the TWDB's GAM program to ensure completion of the models for the state's minor aquifers and to maintain and improve the completed models as additional information on the aquifers is gathered.

The TWDB's FY 2006-2007 Legislative Appropriation Request to fund the GAM program is \$1,514,600. In addition, the TWDB has submitted an exceptional item request of \$685,400 to restore full funding to the program in the 2006 – 2007 biennium.

Background

In Senate Bill 2, the 77th Legislature amended TWC, §16.012, to require that the executive administrator of the TWDB "...obtain or develop groundwater availability models for major and minor aquifers in coordination with GCDs and regional water planning groups." The Legislature's requirement that the models of the major aquifers be completed no later than October 1, 2004 has been accomplished by the TWDB. The expectations that GAM would 1) include substantial stakeholder input; 2) produce standardized, thoroughly documented, and publicly available numerical groundwater flow models; and 3) be capable of providing predictions of groundwater availability through 2050 have been met.

In order to ensure that the same level of effort is performed to complete models for the minor aquifers, funding is needed for the continued completion, development, and maintenance of GAM beyond Fiscal Year 2005. This continued development and maintenance will allow for refinement of aquifer characteristics such as hydraulic parameters, surface-groundwater interactions, recharge, pumping characteristics, evapotranspiration, and boundary conditions. This information, some of which will come from GCDs and Regional Water Planning Groups, will be used to update GAMs. Funds will be used, in part, to support the transfer of GAM models and related technology to the GCDs and other local and regional entities.

Data Collection to Support Groundwater Availability Modeling (GAM) Program

Issue

The GAM program has relied heavily on existing data from published reports and databases because the data collection to support the models has been limited. The next phase of the program could be significantly enhanced by incorporating various field studies to reduce model uncertainties. Future efforts should focus on estimating evapotranspiration, recharge, and hydraulic parameters such as hydraulic conductivity and storage capacity.

Recommendation

A data collection program should be established to support the TWDB's GAM program to increase confidence in water availability estimates and reduce uncertainties. Field studies on estimation or monitoring of evapotranspiration, recharge, and hydraulic parameter through pumping tests should be initiated.

The funding level required for this work is \$1 million per year. This program would be administered by the TWDB.

Background

The GAM program has made substantial advances in providing valuable information on groundwater availability in Texas. However, the process of developing these models has shown the gaps in our knowledge and uncertainties in water availability estimates. To reduce such uncertainties would require additional data collection on fluxes such as evapotranspiration, recharge, and pumping tests to estimate permeability. In addition, downhole geophysical logging could provide valuable information for the modeling studies. Such a program could be conducted on individual aquifers. The existing models could be used to optimize the

location of field studies that would provide the greatest improvements on water availability estimates.

Improving our estimates of how much water is entering and leaving aquifers would provide significant benefits to the GAM program. A number of approaches could be used to improve estimates of various parameters. Information on spatial and temporal variability in recharge zone of aquifers would be very valuable in understanding how much water is entering aquifers and how it is related to climate and land use/land cover. Information in the relative magnitude of groundwater discharge such as evapotranspiration within riparian zones adjacent to streams and as baseflow is limited. Satellite approaches ground referenced with monitoring data should be used to quantify groundwater evapotranspiration. Information on the hydraulic conductivity and storage capacity of aquifers could be improved with additional pumping test analyses. The proposed measurement program would significantly enhance existing GAM models and improve our understanding of water availability in Texas aquifers.

Expanded Funding for Groundwater Sampling for Water Quality and Water Availability

Issue

The adequate management of groundwater resources requires a good understanding of how much water enters the aquifers as recharge and how this recharge varies spatially across the aquifers. In addition, the ability to provide the best estimate of the availability and quality of drinking water resources and the amount of funding that will be needed to treat water, such as groundwater with radioactive isotopes, before use requires more accurate water quality characterization.

Recommendation

Expand funding of the TWDB's groundwater sampling program to ensure better estimates of recharge and better estimates of water quality.

The TWDB's Legislative Appropriation Request for the 2006-2007 biennium, \$384,000 for groundwater quality sampling, remains at the same level requested in the four previous bienniums. Additional funding of \$200,000 would allow dating of unique radio isotopes to aid in recharge determinations and the analysis of radioactive isotopes that present health concerns.

Background

Estimates of recharge are currently available for all major aquifers of Texas. Recharge can be estimated using a number of methods, including numerical modeling, base-flow discharge, isotopes, flow of water in the vadose zone, and other methods. However, all these methods have limitations. Uncertainties in estimates for regional hydraulic conductivity, for example, can impair the use of numerical modeling to estimate aquifer recharge. The best approach is to make combined use of as many methods as possible. Isotope data, when used in conjunction with other methods for computing recharge, can help refine the estimates currently available. Analysis of groundwater samples for isotopes on an aquifer-wide basis can help provide further insight into recharge estimates and distribution, groundwater residence times, and flow paths. This knowledge should result in more refined and accurate groundwater models developed as part of the GAM program at the TWDB. Sampling for these in selected aquifers could more than double current individual sample cost.

The ambient groundwater sampling program conducted by the TWDB for the past 15 years concentrates on collecting a representative number of samples from every major and minor aquifer on a cyclical basis. All samples are analyzed for dissolved inorganic constituents that have primary and secondary drinking water standards. The TWDB samples the most comprehensive suite of analytes of any state or local agency.

Individual sample analysis cost rose five percent in the last year after remaining relatively stable from 1999 through 2004. Analysis of additional inorganic constituents for which the U.S. Environmental Protection Agency (EPA) has recently adopted new maximum contaminant level (MCLs) will add to sampling costs. New MCLs have been established for uranium, combined radium-226 and radium-228, gross alpha particle activity (including radium-226 but excluding radon and uranium), all of which occur naturally in some of the state's major and minor aquifers. Sampling for these could add 25 percent to individual sample costs.

Increasing Public Outreach on Groundwater Issues

Groundwater Quality Education Programs

Issue

To best protect groundwater quality, a variety of education programs are needed to transmit information to the public, to provide resources for water resources managers and agency personnel, and to demonstrate use of innovative technologies and management strategies.

Recommendation

Expand existing groundwater quality education program by a factor of approximately four with an appropriation of \$250,000 per year. Funds would be used to facilitate groundwater education, demonstration, and outreach efforts to be administered by the Texas Water Resources Institute with input from other state entities and the committee.

Background

Several groundwater education programs are already in place, led both by Texas Cooperative Extension (TCE) and several other agencies and entities. Some of the broad topics addressed by these education programs include the following:

- Protection of drinking water wells.
- Ways to protect the area around wellheads from contamination.
- Proper selection, use, and management of on-site wastewater treatment systems.
- Actions agricultural producers can take to reduce pesticide use and limit the risk of degrading groundwater quality.
- Abandoned well plugging demonstrations and how individuals can take groundwater quality samples.

These educational programs need continued financial support to achieve long-term results. In addition, new efforts are needed to address emerging issues such as:

- Preparing individuals and groundwater suppliers to deal with threats to water quality.
- Explaining economic benefits of protecting groundwater quality.
- Encouraging stakeholders to participate in discussions about current groundwater quality and quantity issues and help identify future water needs.
- Identifying new and emerging technologies that have a significant potential to treat and remove groundwater contaminants.

Securing Sustainable Water Supplies for Rural Texas Communities

Issue

Many Texas communities need assistance in making long-term decisions about development of sustainable, economical water supplies. This assistance can bridge the gap between general recommendations developed by regional water planning groups and detailed plans for water supplies that are normally provided by engineering consulting firms.

Recommendation

Fund the Texas Agricultural Experiment Station's (TAES) legislative appropriation request of \$1 million per year for an exceptional item titled "Securing Sustainable Water Supplies for Rural Texas Communities." TAES, in cooperation with other agencies, will work with communities to quantify opportunities for fostering use of brackish groundwater, saline surface water, produced waters, industrial wastewaters, and municipal effluents as alternative sources of water for individuals, communities, and industries.

These sources will supplement existing water supplies and provide "drought proof" sources of water for regions throughout Texas.

Background

This recommendation is part of TAES legislative appropriation request in support of the State Water Plan and the State Water Conservation Implementation Task Force's recommendations. Strategies are being developed to help communities learn more about and take advantage of non-traditional sources of water (i.e., treated wastewater; brackish groundwater; saline surface water; water conservation; rainwater harvesting).

While use of these waters offers great potential to address water shortages, efforts must be made to ensure that use of these sources does not impair or threaten groundwater or surface water quality.

To facilitate more widespread use of these new sources of water, several issues will need to be addressed. Some of these include the following:

- Identifying economic, technical, and environmental obstacles and barriers that limit use of these water sources.
- Evaluating how rules and policies of regulatory agencies can be altered to promote widespread use of impaired waters.
- Determining and monitoring how treatment and use of impaired waters may affect groundwater and the environment.

- Assessing whether communities will accept these new sources of water.

Coordinating Research to Benefit TGPC Members

Research on Characterization of Brackish Water and Disposal of Desalination Reject Water in Saline Aquifers and Depleted Oil and Gas Reservoirs

Issue

A comprehensive understanding of brackish water resources in Texas is required to optimize the use of this resource and to minimize negative impacts to fresh water aquifers. In addition, current federal rules and regulations make it difficult to rapidly obtain permits at the state level to dispose of desalination reject waters into depleted oil and gas reservoirs and saline aquifers. Research to characterize brackish water resources and to develop a sound science basis for change in federal programs is needed to develop brackish water resources and facilitate safe underground disposal of reject waters.

Recommendation

Fund collaborative research by the University of Texas-Austin and Texas A&M University to characterize brackish water resources and identify issues and technical barriers to facilitate disposal of concentrates and brines resulting from desalination processes into saline aquifers and depleted oil and gas reservoirs.

Funding at the level of \$500,000 per year would complement and match federal funds currently being used by the universities to develop advance desalination technologies.

Background

A reconnaissance study by the TWDB provided preliminary data on characteristics of brackish water resources in Texas. However, the level of detail provided by this study is insufficient to develop these resources. Information on the quantity and quality of this resource is required to optimize management of its use. Information on hydraulic and hydrochemical characteristics of brackish water resources is limited because previous development programs have not targeted this resource. Therefore, innovative approaches will have to be developed to characterize this resource. Information on the quantity of this resource is important for development and also to assess potential impacts of development on fresh water aquifers. Characterizing water quality of

brackish resources is essential to determine if the residue might be classified as hazardous because of concentration of different elements. Spatial variability in water chemistry will also be invaluable to ensure that the desalination plant can treat the variable types of water that may be utilized.

Recently, significant advances have been made in technologies needed to treat and reuse industrial waste waters, brackish groundwater, and saline surface water. The University of Texas - Austin and Texas A&M University have recently received grants from the Department of Energy totaling approximately \$1.4 million to develop advanced technology to lower the costs of membrane desalination of salt water, waste water, and oilfield brine.

Despite these advances in technology, the treatment and use of these impaired waters has not yet become widespread in Texas. A major obstacle is the rules and policies of federal regulatory agencies that restrict disposal of concentrates and reject waters resulting from desalination into wells and geologic formations.

At a policy level, the EPA allows disposal of oilfield associated waste back into oil and gas bearing formations from whence they came (Class II wells). However, EPA requires the use of Class I wells (hazardous or nonhazardous waste) for similar brine disposal of concentrates from desalination processes not associated with oil and gas production. The permitting process for disposal in Class I wells is more costly and time consuming than the process used to permit Class II wells.

Similar and streamlined regulatory treatment of waste, regardless of the source, would facilitate the development of desalination technology. Strategies to facilitate disposal of concentrates generated by treatment of these saline waters which would allow desalination concentrates to be safely disposed of in geologic formations that already contain saline water (i.e., depleted oil and gas zones and saline aquifers) should be developed.

At the technology level studies are needed to test, evaluate, and monitor long-term field performance of proposed desalination technologies and to evaluate how deep injection of reject waters may protect the surface environment while also protecting existing groundwater resources. Monitoring of disposal wells is needed to determine if these practices may have any adverse effects on groundwater quality. Data are needed on operating costs associated with these technologies and the kinds of geologic formations that are appropriate to receive reject waters.

Collaborative Agricultural and Hydrogeologic Studies on Nitrate in Texas Groundwater

Issue

Elevated nitrate concentrations in Texas' groundwater is a widespread problem. Groundwater which contains a nitrate concentration greater than 10 milligrams per liter (mg/L) nitrate (as N) is a health hazard to human fetuses and infants under three months of age and could cause death from methemoglobinemia or blue-baby disease. High nitrates in drinking water have been linked with cancer of the stomach and esophagus.

In the past, nitrate levels have been evaluated by agricultural scientists who focus on near surface soils and hydrogeologists who focus on groundwater. However, there is very little understanding of nitrate transport mechanism between the soil to the groundwater. As a result, it is unclear how to design and implement management practices to mitigate or reduce the problem.

Recommendation

Collaborative research between agricultural scientists and hydrogeologists to evaluate transport processes of nitrate from soils to underlying aquifers should be funded. The integration of these two disciplines should significantly advance our understanding of nitrate loading to aquifers and the transport processes between soils and aquifers. Initial studies should be focused in the Seymour aquifer, where high levels of nitrates are recorded. Field and modeling studies are recommended to support best management practices to reduce aquifer nitrate concentrations or to mitigate its effects.

The level of funding required for this study is \$1 million for the biennium. The program would be administered by the Texas Water Resources Institute.

Background

Elevated nitrate concentrations are widespread in Texas aquifers, particularly in the Seymour, Southern High Plains and Southern Gulf Coast aquifers. Developing best management practices to reduce nitrate levels in aquifers requires a thorough understanding of the source of nitrate contamination and transport processes from soils to underlying aquifers. Nitrate sources can be subdivided into natural or man-made.

Natural sources of nitrate have been attributed to large accumulations of nitrate in soils prior to cultivation and release of these nitrates caused by cultivation. This process has been invoked to explain high nitrate levels in the Seymour aquifer. Studies of nitrate levels in soils in natural settings

that have never been cultivated show high nitrate levels in desert settings in Nevada and in grassland settings in Kansas. Studies beneath irrigated settings in Nevada indicate that irrigation displaces these high nitrate levels downward into the underlying aquifer. However, very limited studies of natural settings in Texas do not reveal large accumulations of nitrate that could explain current elevated nitrate levels in the aquifers. Additional studies of soil nitrate in natural settings are required to further evaluate the potential for natural source of elevated nitrate levels in aquifers in Texas.

If there are no natural sources, then more detailed evaluation of anthropogenic inputs of nitrate are required to develop best management practices to reduce nitrate loading to aquifers. Such analyses would focus on septic tank and agricultural sources and would include evaluation of different irrigation practices on nitrate loading.

Initial studies should focus in the Seymour aquifer. The last detailed evaluation of nitrate levels in the Seymour groundwater was conducted in the early 1970s and current information on spatial distribution of elevated nitrate in the aquifer is limited. This groundwater analysis program should be supplemented by detailed soil studies to assess different sources of nitrate in the system and to leverage on an existing study on irrigation practices being conducted by the Texas State Soil and Water Conservation Board (TSSWCB). The proposed program would focus on linking the studies in the soil zone to the underlying aquifer by conducting detailed measurements and monitoring in this zone. This evaluation of groundwater nitrate could then be expanded to other aquifers with high nitrate levels, such as the Southern High Plains and Southern Gulf Coast Aquifers. The results of these studies would provide valuable guidance to those involved in developing best management practices to reduce nitrate loading to aquifers.

Strengthening Programmatic Areas

Groundwater Conservation

Brush Control Funding to Increase Groundwater Yield

Issue

The U.S. Department of Agriculture's Natural Resource Conservation Service (NRCS) estimates that brush in Texas uses approximately 10 million acre-feet (over three trillion gallons) of water annually. Control of brush offers a cost-effective means for significantly increasing the availability of both ground and surface water for the growing needs of Texans.

Recommendation

Continue to fund the TSSWCB State Brush Control Program and to expand it as funds become available in areas where it is found to be cost effective and will increase long term availability of groundwater by increasing recharge of aquifers.

The TSSWCB is requesting approximately \$3.7 million in its base funding for FY06/07 for brush control. Included in TSSWCB legislative request is an exceptional item for \$12 million for additional brush control activities. The requested funding would be for financial and technical assistance for brush control projects.

Background

In 1985, the Legislature, created the Texas Brush Control Program. The goal is to enhance the state's water resources through selective control of brush species. The TSSWCB is designated as the agency responsible for administering the program and is given authority to delegate responsibility for administering certain portions of the program to local soil and water conservation districts (SWCDs).

In 1986, the TSSWCB prepared and adopted a State Brush Control Plan. The plan includes a comprehensive strategy for managing brush in areas where brush is contributing to a substantial water conservation problem and designates areas of critical need in the state in which to implement the brush control program. It was last revised in January 2002.

The Agriculture Code also requires the TSSWCB to submit a report on the activities of the brush control program to the Governor, the Speaker of the House, and the Lieutenant Governor before January 31 of each year. The Agricultural Code also created a cost share program for brush control, created the Brush Control Fund, limits the cost share rate to 70% of the total cost of a practice, and limits the cost share program to critical areas designated by the TSSWCB and to methods of brush control approved by the TSSWCB. It also establishes criteria for approving applications, setting priorities, and contracting for cost sharing.

To complete the ongoing brush control projects in the Twin Buttes, Pecos River, and Pedernales watersheds would require approximately \$15,000,000.

Before beginning a brush control project, a feasibility study is conducted on the watershed to estimate the probable water yield and cost of the water resulting from the project. These feasibility studies include extensive hydrologic and economic modeling. To complete the brush control for water yield recommended in the completed feasibility studies would

require substantial investment over the next ten years. These watersheds and cost from the feasibility studies are:

Table 1. Watersheds and Cost from the Feasibility Studies

Watershed	Total Cost (\$)	Average Cost (\$/ac-ft)
Lake Brownwood	49,948,000	37.95
Fort Phantom Hill Reservoir	10,189,000	29.45
Lake Arrowhead	17,546,000	14.83
Palo Pinto Reservoir	14,332,000	24.09
Frio River Basin	65,368,000	36.95
Nueces River Basin	250,311,000	46.62
Wichita River Basin	43,395,000	36.59
Canadian River Basin	77,845,000	111.37
Edwards Aquifer		
• Hondo watershed	2,176,000	29.92
• Medina watershed	10,658,000	26.68
• Sabinal watershed	5,714,000	42.04
• Seco Creek watershed	1,665,000	35.33
• Upper Frio watershed	8,387,000	51.65
• Upper Nueces watershed	85,889,000	97.51

On-Farm Agricultural BMP Incentives through Creation of a Water Conservation Plan Program

Issue

In the 2006 Regional Water Plan, it is reported that in 2000, over 10 million acre-feet of water was used for irrigation. Municipal water usage was reported to be approximately 4 million acre-feet in 2000. However, municipal water usage is expected to double by 2060. Increasing the efficiency of irrigation water usage while maintaining the current level of irrigated land will help ensure the availability of water for Texas' growing population.

Recommendation

Fund a cost-share program for on-farm best management practices (BMPs) to implement water conservation plans on irrigated agricultural lands through the TSSWCB. These plans would be similar to the

TSSWCB water-quality management plans but would require only those BMPs that have a water conservation component.

Cost estimates of a water conservation plan program that ranges from \$100,000 per biennium for implementing 10 water conservation plans per year using existing staff to \$2,414,000 per biennium for implementing 200 plans which would require funding for an additional technical employee in each TSSWCB regional office in irrigated areas.

Background

A water conservation plan is a management plan that comprises a collection of BMPs that are appropriate to the agricultural operation. The plan is developed by the farmer or rancher in cooperation with a planner or technician with TSSWCB, SWCD, or NRCS. If it meets all technical criteria, it is then certified by TSSWCB. The practices that have a cost to implement may be eligible for cost-share assistance. To be eligible for cost-share assistance, the farmer or rancher would have to agree to implement and maintain the plan for the expected life of the practices. After an eligible practice is implemented and implementation is certified by the SWCD, the producer may receive cost-share assistance for that practice. A plan must clearly demonstrate water savings for it to be certified by TSSWCB or to be eligible for cost-share assistance.

These plans would be developed and implemented through existing TSSWCB regional offices and SWCD's that currently work with farmers to implement water-quality management plans and administer the TSSWCB water-quality cost-share program. TSSWCB regional offices working in areas with significant irrigation agriculture are located in Hale Center, Harlingen, Wharton, and Dublin.

Costs are estimates based on TSSWCB's experience with the water quality management plan program. There is a wide variety in the number of plans that can be developed by an employee, depending on the complexity of the plan, the size of the operation, the number of BMPs, and the type of irrigation systems that are involved. The cost-share per plan can also vary widely for the same reasons.

Implementing a state water conservation plan program will allow the most effective use and attract federal funds through partnerships with the U.S. Department of Agriculture's NRCS and the EPA in those areas where program goals coincide.

Water Quality Protection

Abandoned Water Well Plugging Fund

Issue

Numerous state and local programs have identified abandoned and/or deteriorated water wells as having a significant, or potentially significant, negative impact on the quality of groundwater in the state. Abandoned water wells serve as conduits or channels for contamination to reach groundwater, may be used for illegal dumping, and in the case of large diameter wells, can also be a hazard to human and animal life. Financial resources are not currently available to provide assistance to landowners, GCDs, and local governments to plug abandoned water wells.

Recommendation

The Legislature may want to consider providing financial incentives for a need-based abandoned and/or deteriorated water well plugging fund.

Well plugging costs to landowners (well owners) can range from approximately \$100 to in excess of \$120,000 per well. Cost is based on well depth, size of casing, and complexity of properly plugging the well in compliance with 16 TAC §76.1004 water well plugging specifications.

Fund disbursement would be contingent upon prioritization of potential groundwater quality impacts, hazards, and the landowner's assets.

The plugging fund program should be administered by the TDLR, the agency currently responsible for the oversight of water well drillers, well drilling and well plugging. TDLR cooperation with local GCDs to disburse monies for the plugging of abandoned and/or deteriorated water wells located within GCD jurisdiction would be established. Furthermore, the funds would be disbursed on a regional geographic model based on the areas of selection for member appointment to the Water Well Driller Advisory Council.

Background

Abandoned and deteriorated water wells remain at the top of the list of potential groundwater contamination sources, which landowners can identify and eliminate. Uncapped, non-cemented, deteriorated, or uncased wells provide a direct path to groundwater from activities at the surface. Deteriorated wells completed in more than one water-bearing zone may allow poorer-quality water from one zone to commingle with and impact the other(s). Abandoned domestic, municipal, industrial, irrigation, and livestock wells, and unplugged test-holes pose threats to groundwater quality. Abandoned water wells exist in every county of the state and impact all of the state's aquifers.

The Abandoned Well Notification and Enforcement Program, administered by the TDLR utilizing the Water Well Driller/Pump Installer Program (WWD/PI Program) investigates, compiles, identifies, and processes abandoned water well notifications and enforcement cases. Groundwater quality degradation, due in part to abandoned water wells, has also been documented by GCDs, the BEG, TWDB studies, and the TCEQ Source Water Assessment and Protection Program. Furthermore, Senate Bill 279 of the 78th Legislature (TDLR's Sunset Bill) enhanced the investigatory procedures and referrals of documented abandoned and/or deteriorated wells. A Memorandum of Understanding (MOU) has been developed to coordinate the efforts of the TDLR, GCDs, and the field offices of the TCEQ relating to investigative procedures for referrals of complaints regarding abandoned and/or deteriorated wells.

The exact number of water wells in the state is unknown. However, based on TWDB records and the TDLR/TWDB Online Well Report Submission and Retrieval System; since 1965 (the initial date when well reports were required to be submitted to the state) and through FY 04; 647,507 State of Texas Well Reports (for water wells drilled) have been submitted (which is not 100% of the wells drilled, since 1965). It is conservatively estimated that there are 150,000 abandoned and/or deteriorated water wells located in the state.

Texas Occupations Code §1901, Water Well Drillers, requires landowners or other persons who possess an abandoned and/or deteriorated well to have the well plugged or capped under standards and procedures adopted by the TDLR (16 TAC §76.1004). Texas Occupations Code §1901 authorizes the TDLR to assess administrative and civil penalties against persons who do not comply with the provisions of the chapter. However, these provisions represent a financial burden and provide little incentive for owners of abandoned wells to voluntarily plug abandoned wells. Also, consideration should be given to the origin of groundwater contamination in the water well to be plugged.

Educational efforts, such as the "*Landowner's Guide to Plugging Abandoned Water Wells*" and associated video, may initiate some abandoned well plugging. However, a funding source to assist landowners with abandoned well plugging efforts would result in an increase in the number of well pluggings and thus decrease the threats to groundwater quality.

The abandoned well plugging fund could be a pilot project whereby, the TDLR in conjunction with GCDs would prioritize the abandoned and/or deteriorated water wells with regard to the potential of impacts to

groundwater quality and/or human health. Fund disbursement would be contingent upon this prioritization and the landowner's assets. The development of the plugging fund would provide criteria for the landowner or person possessing the abandoned and/or deteriorated water well who "does not have sufficient assets to plug the well." When making application for abandoned water well plugging fund disbursement, the applicant would be required to submit a signed and notarized affidavit stating that they are financially incapable of plugging the well. The development of the plugging fund would also provide for a disbursement ceiling approved by the TDLR executive director. Requests for amounts above the set ceiling would require Texas Commission of Licensing and Regulation approval.

INTRODUCTION

Groundwater is a vitally important resource in Texas. It is a major source of the water used by Texans for domestic, municipal, industrial, and agricultural purposes. In 1999, Texans used about 16 million acre-feet of water, of which 9.3 million acre-feet, or 58 percent, was derived from groundwater sources. Approximately 78 percent of groundwater use was for irrigation, with the remainder used for municipal supplies, rural and domestic consumption, rural livestock, electric utility, and industry. In 1999, approximately 36 percent of municipal water in Texas was obtained from groundwater sources.

The major and minor aquifers within the state furnish this vast groundwater resource. These aquifers underlie approximately 76 percent of the state's 266,807 square mile surface area. Major aquifers are defined as producing large quantities of water in a comparatively large area of the state, whereas minor aquifers produce significant quantities of water within smaller geographic areas or small quantities in large geographic areas. Minor aquifers are very important, as they may constitute the only significant source of water supply in some regions of the state. Nine major aquifers and 21 minor aquifers have been delineated within the state. Current maps of the major and minor aquifers are available on the TWDB's Web site at <http://www.twdb.state.tx.us/mapping/index.asp>.

The state's major and minor aquifers are composed of many rock types, including limestones, dolomites, sandstones, gypsum, alluvial gravels, and igneous rocks. Other undifferentiated, local aquifers may represent the only source of groundwater where major or minor aquifers are absent. These local aquifers, which provide groundwater that is utilized for all purposes, vary in extent from being very small to encompassing several hundred square miles.

Creation and Mandate

In March 1985, the Texas Department of Water Resources, a predecessor to the TCEQ and the TWDB, received a grant from the EPA to improve coordination of groundwater protection activities undertaken by state agencies. In response to this federal mandate, the interagency Groundwater Protection Committee was established.

The TGPC was formally created by the 71st Legislature in 1989. The TGPC was created to bridge gaps among existing state water and waste regulatory programs in order to focus protection on the groundwater

resource and to optimize water quality protection by improving coordination among agencies involved in groundwater activities. House Bill 1458 (codified as TWC, §§26.401-26.407) established the TGPC and outlined its powers, duties, and responsibilities. Upon creation, the TGPC effectively replaced and continued the efforts of the predecessor Groundwater Protection Committee.

The state's groundwater protection policy was adopted by the Legislature as part of the Act that created the TGPC. The policy sets out nondegradation of the state's groundwater resources as the goal for all state programs. The state's groundwater protection policy recognizes:

- the variability of the state's aquifers in their potential for beneficial use and susceptibility to contamination,
- the importance of protecting and maintaining present and potentially usable groundwater supplies,
- the need for keeping present and potential groundwater supplies reasonably free of contaminants for the protection of the environment and public health and welfare, and
- the importance of existing and potential uses of groundwater supplies to the economic health of the state.

The policy states that discharges of pollutants, disposal of wastes, and other regulated activities be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard. The use of the best professional judgment by the responsible state agencies in attaining the goal and policy is also recognized.

The TGPC actively seeks to implement this policy by identifying opportunities to improve existing groundwater quality programs and promote coordination between agencies. The TGPC also strives to identify areas where new or existing programs could be enhanced to provide additional needed protection. The major responsibilities of the TGPC are listed in Table 2.

Table 2. Major Responsibilities of the TGPC

Coordinate groundwater protection activities of the agencies represented on the committee
Develop and update a comprehensive groundwater protection strategy for the state
Study and recommend to the legislature groundwater protection programs for each area in which groundwater is not regulated, and file with the Governor, Lieutenant Governor, and Speaker of the House of Representatives a biennial report of the TGPC's activities and any recommendations for legislation for groundwater protection
Publish an annual monitoring and contamination report describing the current status of groundwater monitoring programs of each member agency and groundwater contamination cases documented or under enforcement during the calendar year
Advise the Texas Commission on Environmental Quality on the development of plans for the protection and enhancement of groundwater quality including management for the prevention of groundwater pollution by agriculture chemicals and agents

TGPC Membership

TWC, §26.403, identifies the agencies listed in Table 3 for TGPC membership. The TCEQ is designated as the lead agency, with the Executive Director designated as the TGPC's chairman. The Executive Administrator of the TWDB is designated as the TGPC's vice chairman.

Table 3. Texas Groundwater Protection Committee Membership

<i>Executive Director of the Texas Commission on Environmental Quality</i>
<i>Executive Administrator of the Texas Water Development Board</i>
<i>Executive Director of the Railroad Commission of Texas</i>
<i>Commissioner of Health of the Department of State Health Services</i>
<i>Deputy Commissioner of the Department of Agriculture</i>
<i>Executive Director of the Texas State Soil and Water Conservation Board</i>
<i>Representative selected by the Texas Alliance of Groundwater Districts</i>
<i>Director of the Texas Agricultural Experiment Station</i>
<i>Director of the Bureau of Economic Geology of the University of Texas at Austin</i>
<i>Representative of the Department of Licensing and Regulation</i>

The TWC allows each member of the TGPC to designate a personal representative of the member's agency to represent the member on the

TGPC. The current TGPC members and their designated representatives are listed in Appendix 1.

The regulatory protection of groundwater is primarily the responsibility of the TCEQ. Certain groundwater-related regulatory activities are under the jurisdiction of the RCT, the Texas Department of Agriculture (TDA), the Department of State Health Services (DSHS), the TSSWCB and the TDLR. The TWDB has monitoring authorities in regard to groundwater but does not possess the statutory authority to regulate activities that may contaminate groundwater. The Texas Alliance of Groundwater Districts (TAGD), as an organization, has no regulatory or enforcement authority, but individual groundwater districts have limited authorities for action with regard to groundwater contamination. The TAES and the BEG conduct research activities related to groundwater. A brief description of groundwater-related responsibilities, protection programs, and research conducted by the agencies represented on the TGPC follows.

Texas Commission on Environmental Quality

The Texas Commission on Environmental Quality has the responsibility for the majority of the state's environmental and water quality regulatory programs. The TCEQ implements a variety of programs which address groundwater protection and focus on both prevention of contamination and remediation of existing problems. The major areas of jurisdiction affecting groundwater include wastewater and storm water permitting, the Edwards aquifer protection program, the petroleum storage tank (PST) program, underground injection control, surface water rights permitting, the oversight of public drinking water systems, the on-site wastewater program, solid and hazardous waste disposal, and remediation programs.

As the state lead agency for water quality and environmental protection, the TCEQ administers both state and federally mandated programs. Federal programs include the Resource Conservation and Recovery Act for the management of municipal and industrial wastes; the Comprehensive Environmental Response, Compensation, and Liability Act or Superfund environmental cleanup program; the Clean Water Act for managing pollutant releases to state waters; the Safe Drinking Water Act for the protection of public drinking water supplies; and the development of pesticide management plans for groundwater under the Federal Insecticide, Fungicide, and Rodenticide Act. TCEQ has responsibilities and authorities under state law provided in the TWC and the Texas Health and Safety Code for a number of programs addressing water resource management, waste management, and environmental protection.

The TCEQ is headed by a three-member commission and organized into major functional program areas. The Office of Permitting, Registration, and Remediation is responsible for permitting facility operations which include provisions for the prevention of groundwater impacts and for remediation and corrective action to address groundwater contamination. The Office of Compliance and Enforcement is responsible for assuring that regulated entities comply with permits and agency rules including provisions related to groundwater quality protection through: a network of agency regional offices, facility inspections, enforcement proceedings, and professional licensing. The Office of Environmental Policy, Analysis and Assessment is responsible for the functions of environmental assessment, program planning, and the development of policy and regulations and providing support for the TGPC. Outreach and technical assistance are responsibilities in each of the program areas directed to specific stakeholder and regulated communities. TCEQ also has outreach programs targeting small business and local government technical assistance.

Texas Water Development Board

The Texas Water Development Board, created in 1957, is the state agency responsible for statewide water planning; collection and maintenance of water resource information; and administration of financial assistance programs for water supply, water quality, flood control, and agricultural water conservation projects. The TWDB is responsible for the development of the State Water Plan to provide for the orderly development, management, and conservation of the state's water resources. TWDB provides support to regional water planning groups for the development of regional water plans that serve in preparing the State Water Plan.

The TWDB, in support of its water planning and data collection responsibilities, conducts an active groundwater resource assessment program. The TWDB conducts studies to assess the state's aquifers, including occurrence, availability, quality, and quantity of groundwater present. It also identifies major groundwater-using entities and current and projected demands on groundwater resources. The TWDB conducts statewide groundwater level measuring and groundwater quality sampling programs as a part of its assessment effort. The groundwater quality sampling program permits the TWDB to: 1) monitor changes, if any, in the ambient quality of groundwater over time; and 2) establish, as accurately as possible, the baseline quality of groundwater occurring naturally in the state's aquifers.

As a significant part of the water planning process, the TWDB supports a GAM Program, an initiative to develop state-of-the-art, publicly available numerical groundwater flow models. GAMs provide reliable information on groundwater availability in Texas to ensure adequacy of supplies or recognition of inadequacy of supplies throughout the State Water Plan's 50 year planning horizon. The TWDB has completed 17 models covering all nine of the state's major aquifers as of October, 2004, and is now working on models for the 21 minor aquifers.

Railroad Commission of Texas

The Railroad Commission of Texas regulatory authority includes oil and gas exploration and production, surface mining and mine reclamation, and pipelines. Oil and gas-related environmental regulations under the RCT include well-drilling and completion; well-plugging; surface storage, treatment, and disposal of oil and gas wastes; oil spill response; management of hazardous oil and gas wastes; disposal of non-hazardous oil and gas wastes by injection; underground injection of fluids for enhanced recovery of hydrocarbons; underground hydrocarbon storage; solution mining of brine; and site remediation of the afore-mentioned activities. The RCT offers technical guidance through its oil and gas waste minimization program. Environmental activities related to surface mining include surface coal and uranium mine operations, and mine land abandonment. Pipeline regulations are primarily safety regulations, although the routes of new pipelines are reviewed for environmental risk.

Permits to drill oil, gas, and related wells are issued only after the applicant has submitted a letter from the TCEQ that provides information on the depth of usable quality groundwater. The information is used to ensure that the well is constructed and cemented in a manner that protects groundwater. Similarly, the information is used to ensure that plugs are set to isolate and protect groundwater during plugging operations. Knowledge of the presence of shallow groundwater and the recharge areas of aquifers is vital to the regulation of surface storage and disposal of oil and gas wastes. Underground injection, hydrocarbon storage, and brine mining are primarily groundwater protection regulations federally delegated under the Safe Drinking Water Act. The RCT requires remediation of sites contaminated by oil and gas exploration, production, disposal, and pipeline operations to prevent groundwater contamination or to mitigate groundwater contamination. Remediation projects include operator-initiated clean-up and state-funded clean-ups, if no responsible party exists. Oil spills must be reported, managed and remediated in accordance with state regulations.

The Site Remediation Section of the RCT is responsible for the state-funded cleanup of abandoned oil field pollution sites (State-Funded Cleanup Program) and the oversight and monitoring of complex pollution cleanups conducted by responsible operators (Operator Cleanup Program). In addition, the Site Remediation Section administers the Voluntary Cleanup Program for contaminated property under the RCT's jurisdiction. The goal of these programs is to control or cleanup oil and gas waste or other materials that are causing or likely to cause the pollution of surface or subsurface water, to ensure human health and safety and to protect the environment.

A groundwater impact assessment is performed as part of surface mining permitting process. Permits contain plans to protect the groundwater resources in the area of the permit. Groundwater may be removed during the mining activities; however, if those activities adversely impact a used groundwater resource, then the impacts must be mitigated. Abandoned mines are closed to protect natural resources and the public.

Texas Department of Agriculture

The Texas Department of Agriculture has lead authority for pesticide regulation in Texas. TDA recognizes certain pesticides as potential groundwater contaminants and has the primary responsibility of preventing unreasonable risk to human health and the environment from the use of pesticides. To reduce the potential of groundwater contamination by pesticides the agency conducts a variety of activities such as product registration to ensure pesticides have met all EPA requirements for use, pesticide label compliance and enforcement, pesticide applicator licensing, and risk assessment of potential impacts of agricultural chemicals on human health and the environment.

The use of weather-modification technology is being evaluated in the state as mandated by the Texas Legislature. Ten rain-enhancement projects are now operating in Texas, covering some 51 million acres from the Caprock in the Texas High Plains to the coastal prairies south of San Antonio and the lower Rio Grande basin. These projects are designed to be integral parts of a long-term, water-management strategy by water conservation districts and other water-management authorities to replenish fresh-water supplies in aquifers and reservoirs, as well as to help meet the water needs of agriculture, industry, and municipalities.

The Texas Legislature established the Prescribed Burning Board (PBB) and directed its administration through the TDA. The PBB sets standards for prescribed burning; coordinates training, certification, and

recertification of burn managers; and sets minimum insurance requirements for prescribed burn managers. Prescribed burning is a standardized, accepted rangeland management practice. The controlled application of fire is utilized to meet a variety of *Texas Groundwater Protection Strategy* objectives including the conservation of water resources by mitigating the undesirable impact of vegetation requiring intensive water consumption.

These mandated programs are augmented by TDA's initiatives in riparian invasive species control efforts. Staff address regulatory issues; provide technical expertise on human health, environmental, endangered species as well as other non-target effects by pesticides; and facilitate coordination of invasive species control projects.

Department of State Health Services

The Department of State Health Services, 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 and the Community Hygiene Group under the Inspections Unit enforces rules on Polychlorinated Biphenyls (PCBs) on behalf of the federal government. This federally funded program regulates the control and inventory of PCBs and enforces the cleanup of spills that sometimes involves groundwater monitoring. The Policy Standards and Quality Assurance Unit oversees programs for youth camps, childcare centers and investigates public health nuisance complaints.

The DSHS Division of Regulatory Services Radiation Branch regulates radioactive materials, including uranium recovery and radioactive waste disposal. The Radiation Branch monitors groundwater for radionuclides

on a routine basis at several facilities. 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.

Texas State Soil and Water Conservation Board

The Texas State Soil and Water Conservation Board was created in 1939 by the Texas Legislature to organize the state into 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 state's 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 (NPS) 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 NPS water quality problems. This program provides, through local SWCDs, development, supervision and monitoring of

individual water quality management plans for agricultural and silvicultural lands.

Besides their involvement in the abatement of NPS 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.

Texas Alliance of Groundwater Districts

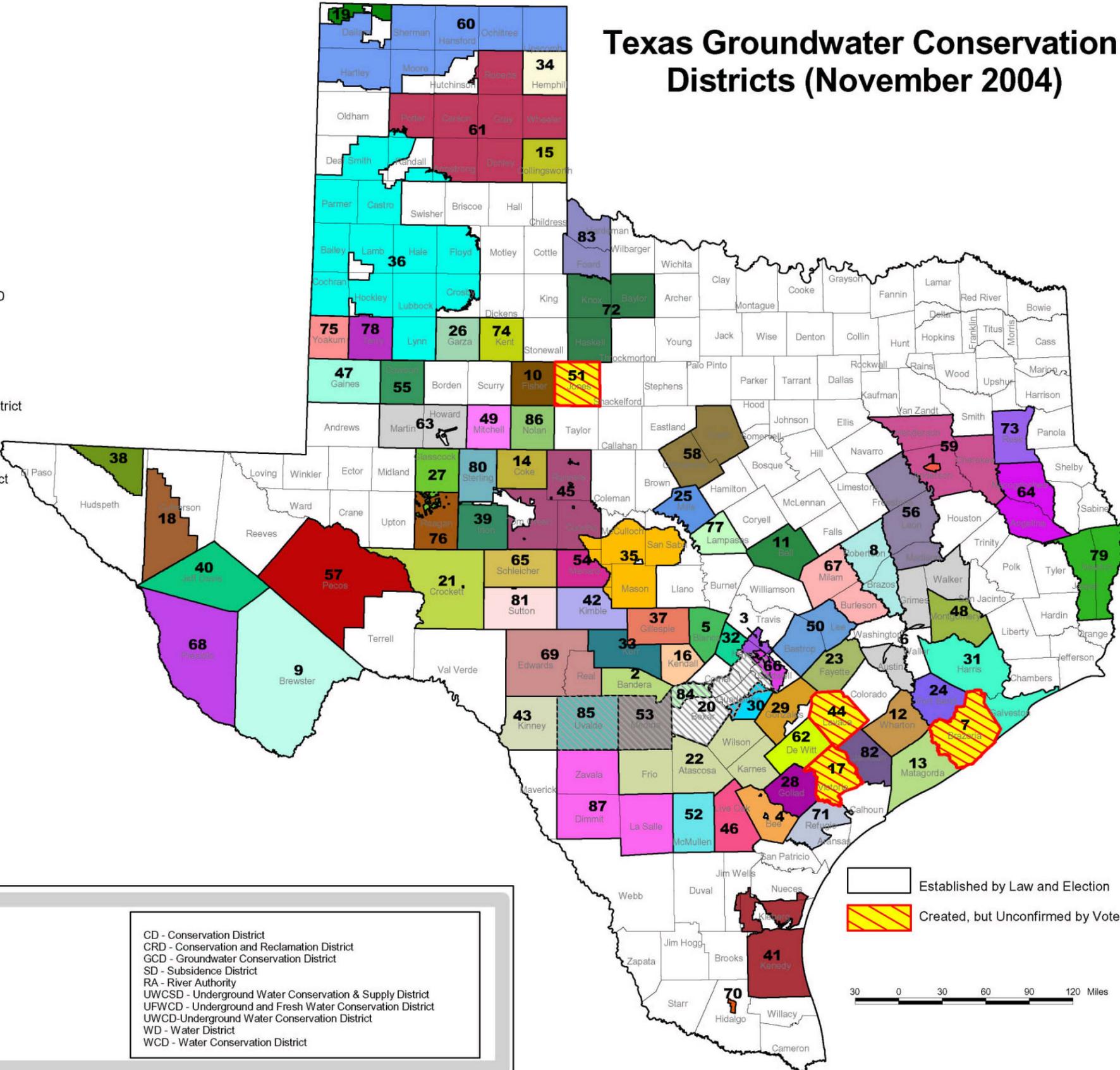
The Texas Alliance of Groundwater Districts, formerly the Texas Groundwater Conservation Districts Alliance, was formed on May 12, 1988. Its membership is restricted to GCDs in Texas who have the powers and duties to manage groundwater as defined in TWC, Chapter 36. TAGD is organized exclusively for charitable, educational, or scientific purposes within the meaning of Section 501(c)(3) of the Internal Revenue Code.

The TAGD was formed to further the purposes of groundwater conservation and protection activities. TAGD provides a means of communication and exchange of information between individual GCDs on issues ranging from the day-to-day operation of local groundwater management to statewide groundwater resource policy issues. Members of TAGD are part of a network in which valuable technical and operational experience is available to members and the interested public. TAGD maintains contact with members of the private sector and various elected, local, state, and federal officials, providing them with timely information on activities and issues relevant to groundwater management. Members of TAGD also serve on various local, state, and federal agency committees and subcommittees, providing input and information on behalf of member districts. To date, there are 74 district members of the TAGD. A current listing of Texas Groundwater Conservation Districts is depicted in Figure 1.

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Texas Groundwater Conservation Districts (November 2004)

- | | | | |
|----|----------------------------------------------------|----|---------------------------------|
| 1 | Anderson County UWCD | 46 | Live Oak UWCD |
| 2 | Bandera County RA & GWD | 47 | Llano Estacado UWCD |
| 3 | Barton Springs/Edwards Aquifer CD | 48 | Lone Star GCD |
| 4 | Bee GCD | 49 | Lone Wolf GCD |
| 5 | Blanco-Pedernales GCD | 50 | Lost Pines GCD |
| 6 | Bluebonnet GCD | 51 | Lower Seymour GCD |
| 7 | Brazoria County GCD | 52 | McMullen GCD |
| 8 | Brazos Valley GCD | 53 | Medina County GCD |
| 9 | Brewster County GCD | 54 | Menard County UWCD |
| 10 | Clear Fork GCD | 55 | Mesa UWCD |
| 11 | Clearwater UWCD | 56 | Mid-East Texas GCD |
| 12 | Coastal Bend GCD | 57 | Middle Pecos GCD |
| 13 | Coastal Plains GCD | 58 | Middle Trinity GCD |
| 14 | Coke County UWCD | 59 | Neches & Trinity Valleys GCD |
| 15 | Collingsworth County UWCD | 60 | North Plains GCD |
| 16 | Cow Creek GCD | 61 | Panhandle GCD |
| 17 | Crossroads GCD | 62 | Pecan Valley GCD |
| 18 | Culberson County GCD | 63 | Permian Basin UWCD |
| 19 | Dallam County UWCD No. 1 | 64 | Pineywoods GCD |
| 20 | Edwards Aquifer Authority | 65 | Plateau UWC and Supply District |
| 21 | Emerald UWCD | 66 | Plum Creek CD |
| 22 | Evergreen UWCD | 67 | Post Oak Savannah GCD |
| 23 | Fayette County GCD | 68 | Presidio County UWCD |
| 24 | Fort Bend Subsidence District | 69 | Real-Edwards C and R District |
| 25 | Fox Crossing Water District | 70 | Red Sands GCD |
| 26 | Garza County UFWCD | 71 | Refugio GCD |
| 27 | Glasscock County GCD | 72 | Rolling Plains GCD |
| 28 | Goliad County GCD | 73 | Rusk County GCD |
| 29 | Gonzales County UWCD | 74 | Salt Fork UWCD |
| 30 | Guadalupe County GCD | 75 | Sandy Land UWCD |
| 31 | Harris-Galveston Coastal SD | 76 | Santa Rita UWCD |
| 32 | Hays Trinity GCD | 77 | Saratoga UWCD |
| 33 | Headwaters UWCD | 78 | South Plains UWCD |
| 34 | Hemphill County UWCD | 79 | Southeast Texas GCD |
| 35 | Hickory UWCD No. 1 | 80 | Sterling County UWCD |
| 36 | High Plains UWCD No.1 | 81 | Sutton County UWCD |
| 37 | Hill Country UWCD | 82 | Texana GCD |
| 38 | Hudspeth County UWCD No. 1 | 83 | Tri-County GCD |
| 39 | Irion County WCD | 84 | Trinity Glen Rose GCD |
| 40 | Jeff Davis County UWCD | 85 | Uvalde County UWCD |
| 41 | Kenedy County GCD (Exact boundaries not available) | 86 | Wes-Tex GCD |
| 42 | Kimble County GCD | 87 | Wintergarden GCD |
| 43 | Kinney County GCD | | |
| 44 | Lavaca County GCD | | |
| 45 | Lipan-Kickapoo WCD | | |



Texas Commission on Environmental Quality



This map was prepared by the TCEQ for display purposes only. No claims are made to the accuracy or completeness of the information shown herein nor is this map suitable for any other use. The scale and location of mapped data are approximate. The groundwater conservation district boundaries are not land survey data and may not accurately depict legal descriptions. For more information about this map, please contact TCEQ Groundwater Planning and Assessment Team at (512) 239-4510.

Map printed November 15, 2004

CD - Conservation District
 CRD - Conservation and Reclamation District
 GCD - Groundwater Conservation District
 SD - Subsidence District
 RA - River Authority
 UWCSD - Underground Water Conservation & Supply District
 UFWCD - Underground and Fresh Water Conservation District
 UWCD - Underground Water Conservation District
 WD - Water District
 WCD - Water Conservation District

Established by Law and Election
 Created, but Unconfirmed by Voters

30 0 30 60 90 120 Miles

Back of Figure 1

Texas Agricultural Experiment Station

The Texas Agricultural Experiment Station is the official agricultural research agency in Texas. TAES has no regulatory authority. Headquartered at Texas A&M University, TAES promotes food and fiber production while emphasizing water conservation and the protection of natural resources. TAES operates a system of 14 research centers which are located in the major land and natural resource regions of Texas. The Texas Water Resources Institute is an administrative unit of 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 TAES stress the development of management strategies, technologies, and educational programs to support sustainable agriculture. 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 solid and liquid wastes from livestock production and processing to prevent water contamination; to develop crop production technologies that produce high yields while minimizing the loss of pesticides, chemicals and nutrients into ground and surface waters; and, to manage contaminants produced during industrial and urban activities.

TAES also trains future professionals through undergraduate and graduate education and research programs at Texas A&M University and other System institutions. Many TAES researchers at Texas A&M University in College Station hold teaching appointments, thus providing the latest research results to students.

TAES research efforts are complemented by the programs of the Texas Cooperative Extension (TCE), also a component of the Texas A&M University System. TCE conducts educational programs on management strategies and best management practices to protect groundwater resources. TCE specialists produce easy-to-read fact sheets and other publications for specific clientele, including agricultural producers. Other activities include field demonstrations and educational programs for youth and adults. The TCE has no regulatory authority.

Bureau of Economic Geology

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. BEG is one of three member institutions within the Jackson School of Geosciences. One of the goals of the Jackson School is to conduct research related to water issues in Texas with some internal funding for these programs. The BEG conducts basic and applied research projects related to water resources and contaminant transport in support of other State and Federal agencies. It is not a regulatory agency and has no groundwater protection regulatory programs but supports the agencies that fulfill these functions.

The BEG serves as a valuable resource for geologic maps and reports that provide the framework for many environmental studies. The state geological mapping program focuses on developing maps of different geologic units and works with other state agencies to identify priority areas related to environmental issues. The core repository at the BEG contains an extensive collection of cores from many of the geologic units in the state. One of the strengths of environmental studies conducted by the BEG is the integration of geology and hydrology.

Groundwater resources are the focus of several studies conducted by the BEG. Groundwater models have been developed by BEG scientists of many of the major aquifers in the state, including the northern Ogallala, Trinity, Carrizo-Wilcox, Edwards (Barton Springs segment), and Gulf Coast aquifers as part of the TWDB GAM program.

The BEG also has unique capabilities in unsaturated zone hydrology including physical, chemical, and isotopic analysis and modeling. The unsaturated zone is extremely important because many contaminants originate near the land surface and have to be transported through the unsaturated zone to reach the water table. In addition, groundwater recharge generally occurs through the unsaturated zone and is a critical issue for assessing groundwater availability in the state. Examples of previous studies in unsaturated zone hydrology include characterization of water fluxes related to proposed low-level radioactive waste disposal sites, quantification of contaminant transport related to the U.S. Department of Energy's Pantex Plant, and estimation of recharge for groundwater modeling studies and for aquifer vulnerability to contamination.

The BEG has conducted many studies evaluating contaminant transport in the state. Examples of the types of studies include evaluation of sources of nitrate contamination in major aquifers for the TCEQ, delineation of salinity contamination related to oil and gas production activities for the

RCT, assessment of transport processes at the Department of Energy's Pantex Plant, and evaluation of benzene plumes related to underground fuel tanks. Results of the benzene plume study were extremely valuable for TCEQ in developing remediation protocols with respect to leaking PSTs.

One of the missions of the BEG is public outreach. In its role as the State Geological Survey, the BEG responds to questions and requests for information from other institutions and the public. The BEG participates in many public education programs, including efforts to engage kindergarten through 12th grade students and teachers in scientific discovery. The BEG has been actively involved in organizing and promoting Earth Science Week, celebrated both nationally and internationally, which highlights the ways the earth sciences affect our daily lives and features an annual career fair.

Texas Department of Licensing and Regulation

The Texas Department of Licensing and Regulation's Water Well Driller/Pump Installer Program (WWD/PI Program) maintains the Water Well Drillers Advisory Council; investigates all alleged violations of Chapters 1901 and 1902 of the Texas Occupations Code and 16 TAC Chapter 76 (Water Well Drillers and Pump Installers Rules); investigates consumer complaints filed against regulated well drillers/pump installers; and randomly inspects wells to insure compliance with well construction standards. Investigations also include compliance with rules requiring isolation of zones containing undesirable or poor quality water to prevent commingling with and degradation of fresh water zones. 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. In an area where groundwater contamination has been confirmed, the WWD/PI Program notifies licensees of the contamination by letter, including instructions on how to complete wells in the area to avoid further contamination. The WWD/PI Program also works with federal, numerous state and local entities in the area of groundwater protection.

The WWD/PI Program administers the Abandoned Well Notification and Enforcement Program. Abandoned or deteriorated wells are reported to the TDLR by drillers, pump installers, and neighbors who discover them. The WWD/PI Program contacts the landowners by letter to notify them of the requirement to plug or bring the wells into compliance not later than 180 days from the time of the notice. Only licensed water well drillers, licensed pump installers, or the landowner whose property contains an abandoned or deteriorated well may plug or bring the well into

compliance. All must submit a State of Texas Plugging Report to the TDLR no later than 30 days after the well is plugged or capped. Information is available, from the TDLR and the TGPC, to landowners wishing to plug their own wells. Also, a joint MOU has been developed to coordinate the efforts of the TDLR, the field offices of the TCEQ, and GCDs, relating to investigative procedures for referrals of complaints regarding abandoned and/or deteriorated wells.

Federal Involvement and Coordination

Since 1985, EPA grants administered under Section 106 of the Clean Water Act have promoted and funded coordination of groundwater protection activities of federal and federally-delegated regulatory programs, and the development of a groundwater protection strategy.

The TGPC actively coordinates with federal agencies on groundwater protection issues that affect the state. The TGPC has taken leadership initiative with federal agencies on the development of a state groundwater protection strategy 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 Federal Insecticide, Fungicide, and Rodenticide Act 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 have participated in various TGPC-sponsored projects, providing groundwater expertise and opportunities for state input in federally sponsored research.

TGPC ACTIVITIES 2003 – 2004

Actions on Recommendations to the 78th Legislature

The 78th Legislature indirectly addressed one of the four recommendations forwarded by the TGPC in December, 2002 (TGPC, 2003a). The Sunset Advisory Commission Report (February 2002) on the TDLR highlighted the lack of manpower to find and close abandoned water wells as an issue needing attention. To provide additional resources to find and to properly cap or plug abandoned and/or deteriorated wells, Senate Bill 279, 78th Legislature, 2003, added Section 1901.257 to the Texas Occupations Code. This section requires the TCEQ and the TDLR, by rule, to adopt or revise a joint MOU to coordinate efforts of the TDLR, the field offices of the TCEQ, and GCDs, relating to investigative procedures for referrals of complaints regarding abandoned and/or deteriorated wells. The bill also requires each GCD in which an abandoned and/or deteriorated well is located to join the MOU adopted by the TCEQ and the TDLR and provides that GCDs may enforce compliance with statutes relating to the plugging of abandoned and/or deteriorated water wells within their boundaries.

Meetings and Presentations

In accordance with TWC, §26.404, the TGPC is subject to Chapters 2001, 551, and 552 of the Government Code relating to administrative procedures. In addition to the public notification of meetings in the *Texas Register*, a notice of a committee meeting, including the proposed meeting agenda, are provided to all individuals on the TGPC's mailing list. Meeting notices are also posted on the TGPC's Internet homepage.

As required by TWC, §26.404, the TGPC met quarterly during the 2003–2004 biennium for a total of eight meetings. Regularly scheduled items on the TGPC's agenda include subcommittee reports, presentations and round table discussions, business, information exchange, announcements, and public comment.

During the biennium, various agencies and groups gave presentations to the TGPC on new or improved groundwater-related activities and initiatives. The presentations serve to broaden interagency awareness and coordination. Presentations to the TGPC during the 2003–2004 biennium included the following:

- An overview on changes between the old and the new TGPC Web site (www.tgpc.state.tx.us);
- A TCEQ presentation on the results of an ongoing study of the occurrence of perchlorate in the High Plains Ogallala Aquifer conducted by Texas Tech University. The project was under contract with TCEQ and funded through grants from the EPA;
- Member agency roundtable discussion of groundwater legislation passed by the 78th Legislature;
- A TCEQ presentation on the progress of its Source Water Assessment and Protection Program required by the Safe Drinking Water Act of 1996;
- The RCT presented a program discussing land surface subsidence in west Texas;
- A TWDB presentation on various desalination projects in Texas; and
- Overview of the TCEQ's Supplemental Environmental Projects (SEP) Program.

Subcommittees and Work Groups

Subcommittees and work groups are created at the call of the chairman, and with the approval of the TGPC. The subcommittees address specific groundwater-related issues and program development. The subcommittees provide reports of their activities to the TGPC at its regularly scheduled meetings. At its meetings, the TGPC considers the findings and recommendations of the subcommittees, and after holding discussion, takes action as it finds appropriate. The public is encouraged to fully participate on and serve in the subcommittee process. The subcommittees and task forces listed in Table 4 were used by the TGPC during the 2003–2004 biennium.

Table 4. Active Subcommittees, 2003 - 2004 Biennium

<p>Agricultural Chemicals Subcommittee, consisting of: State Management Plan Task Force Education Task Force Site Selection Task Force Data Evaluation and Interpretation Task Force Best Management Practices Task Force</p>
Data Management Subcommittee
Nonpoint Source Task Force
Legislative Report Subcommittee
Abandoned Well Closure Task Force
Public Outreach and Education Subcommittee
Groundwater Research Subcommittee

Agricultural Chemicals Subcommittee

The Agricultural Chemicals Subcommittee was created to coordinate the development and implementation of the generic state management plan (SMP) for pesticides in groundwater and the subsequent pesticide-specific SMPs. The subcommittee meets quarterly and is composed of representatives from interested agencies serving on the full TGPC, the Texas Agricultural Extension Service, and the Structural Pest Control Board. A technical advisory group of interested parties, including federal agencies, other state agencies, producer groups, environmental groups, and the agricultural chemical industry has served the subcommittee to provide expertise and perspective during the development of the generic SMP.

The Agricultural Chemicals Subcommittee has designated five work groups: the State Management Plan Task Force, the Educational Task Force, the Site Selection Task Force, the Data Evaluation and Interpretation Task Force, and the Best Management Practices Task Force.

- The State Management Plan Task Force is responsible for writing and revising generic and pesticide-specific SMPs.
- The Education Task Force is responsible for developing SMP-related educational information and materials and coordinating educational outreach through public presentations, displays, applicator certification curriculum development, and brochures.
- The Site Selection Task Force is responsible for identifying and delineating vulnerable geographic areas for conducting

pesticide-specific groundwater monitoring. The Site Selection Task Force also plans groundwater monitoring strategies, and, if contamination is discovered, determine sampling strategies for determining the extent of contamination.

- The Data Evaluation and Interpretation Task Force, if monitoring reveals contamination, evaluates the quality of the data and interpret the available information to determine the probable source and cause of the contamination. The task force also coordinates the state's response, under the SMP, to groundwater contamination.
- The Best Management Practices Task Force is responsible for developing the preventive component of the generic SMP and identifying pesticide-specific and area-specific BMPs that can be used to prevent or curtail pesticide contamination of groundwater.

The Agricultural Chemicals Subcommittee developed the state's generic SMP, which has received EPA concurrence. Working through its task forces and federal guidelines for the generic SMP, the subcommittee is further developing plan components for future pesticide-specific SMPs. Work efforts have been underway in three areas: 1) ambient and vulnerable area groundwater monitoring for priority pesticides, 2) investigative efforts to develop responses to reported pesticide detections, and 3) the identification of BMPs for specific problem areas.

Data Management Subcommittee

The Data Management Subcommittee is charged with improving the sharing of data between levels of government, the academic community, and the private sector. The subcommittee provides recommendations for the continuing improvement of groundwater data collection and assessment for the state's groundwater protection programs.

The subcommittee's initial goals were to develop ways of linking and sharing groundwater data and to develop standards to facilitate the sharing of information. In 1995, the subcommittee developed a data dictionary which provides groundwater professionals in Texas with specific guidelines that describe a standardized framework for collecting and storing information on groundwater in the state. Over the next two years, the Data Management Subcommittee will be reviewing the TGPC's existing data dictionary, and making recommendations for revisions to keep up with technological changes that have taken place since its publication. Areas under review include the minimum data elements

needed to accommodate geospatial data acquired by Global Positioning Systems (GPS) and used in Geographic Information Systems (GIS).

The Data Management Subcommittee has been charged with designing and facilitating a formal committee process for the coordination and integration of groundwater data collection. In working to address this charge, the Data Management Subcommittee prepares the annual *Joint Groundwater Monitoring and Contamination Report*. In addition, the subcommittee coordinates the assessment of the groundwater quality of the state's aquifers as an integral part of the state's groundwater protection strategy. The collection of groundwater data for the biennial Water Quality Inventory report, that is prepared and sent to EPA to fulfill requirements of Section 305(b) of the Clean Water Act, is also a responsibility of the Data Management Subcommittee.

Nonpoint Source Task Force

The purpose of the Groundwater Nonpoint Source Task Force, chaired by the TSSWCB, is to facilitate and formalize the groundwater NPS program in Texas and to provide support and guidance for the groundwater NPS management policy of the state. The primary goal of the Task Force is to prevent/abate NPS pollution of groundwater. The subcommittee is charged with ensuring consistency of activities with the NPS management Plan and the Groundwater Protection Plan. The Task Force provided input for the Nonpoint Source Pollution Management Program Annual Report to the EPA; updated the state NPS assessment of groundwater conditions and NPS management strategy for groundwater resources; facilitated the review and submission of NPS project proposals for the annual EPA Clean Water Act, Section 319 (h) funding cycle; and provided input related to groundwater to the TSSWCB and the TCEQ for their management plans.

Legislative Report Subcommittee

The Legislative Report Subcommittee is biennially charged with facilitating the TGPC's efforts in publishing the legislative report required by TWC, §26.405. The subcommittee is specifically charged to review the draft report's contents, revise the scope of the report as needed, and develop, for full-TGPC approval, groundwater protection recommendations for legislative consideration.

Abandoned Well Closure Task Force

The Abandoned Well Closure Task Force (predecessor to the Public Outreach and Education Subcommittee) was created to coordinate a specific educational outreach initiative. The purpose of the Task Force was to develop the necessary procedures, educational, and technical information required to promote the landowner-initiated closure or plugging of abandoned water wells; develop a curriculum for well-closure presentations or workshops; and design well-closure seminars and demonstrations to be conducted throughout the state. The Task Force was composed of several TGPC member agencies, the Texas Agricultural Extension Service, U.S. Department of Agriculture's NRCS, Texas Farm Bureau, Water Well Drillers Advisory Council, and Texas Rural Water Association.

Public Outreach and Education Subcommittee

The Public Outreach and Education Subcommittee (formerly the Abandoned Well Closure Task Force) was formed in October 2003, to coordinate educational outreach initiatives. The purpose of the subcommittee is to develop and implement educational outreach programs for landowners concerned with groundwater protection and environmental health issues; and to facilitate interagency communication and coordination to provide support for landowner educational outreach projects.

The subcommittee has been charged with developing educational materials, coordination of outreach programs, and special projects. Special effort is devoted to areas of the state with high levels of naturally occurring constituents of concern such as arsenic and radionuclides and landowners with on-site wastewater treatment in rapidly growing suburban fringe areas.

The subcommittee works in cooperation with the TCE, TCEQ, TDLR, and the On-Site Wastewater Research Council to develop educational materials and facilitate development of outreach programs to address the following items: abandoned well closure, private well owner drinking water health impacts, OSSF maintenance by the home owner, domestic drinking well sampling, and the TEX*A*Syst groundwater quality protection program.

Groundwater Research Subcommittee

The purpose of the Groundwater Research Subcommittee is to act as a formal mechanism for identifying interagency research needs and providing a coordinated approach for discussion with potential funding sources. The subcommittee identifies projects where shared resources could support research to solve problems that are common to many TGPC members, including identifying opportunities for cooperatively applying to federal agencies for pass-through monies. The subcommittee facilitates cooperation by identifying ways to join forces with state or federal agencies, local governmental entities, and universities on research efforts. The subcommittee identifies research and program needs and helps focus the efforts of the researchers on meeting these needs. In areas where overlapping research initiatives are discovered, the subcommittee will facilitate communication among the various research organizations.

Rules Regarding Notification of Groundwater Contamination

House Bill 3030, 78th Legislature, 2003, added §26.408 to TWC, Chapter 26. The new section requires state agencies to notify the TCEQ if a case of groundwater contamination under TWC, §26.406(a), is documented that may affect a drinking water well; requires the TCEQ to make every effort to provide notice to the owners of private drinking water wells that may be affected by the contamination and to applicable GCDs by first-class mail within 30 days of receiving a notification or of obtaining independent knowledge of groundwater contamination; and requires the TGPC to prescribe by rule, the form and content of the groundwater contamination notice.

The TGPC adopted rules establish the form and content of the notices that are to be provided by TCEQ. New 31 TAC §601.10, Form and Content of Groundwater Contamination Notice, in new Subchapter B, Notice of Groundwater Contamination (Appendix 2) went into effect November 12, 2003. The rule prescribes the form and content of a written notice to be provided by TCEQ to the owner of a private drinking water well that may be affected by contamination and to each applicable GCD. The written notice must contain the following information: the name of the contaminant or contaminants, the range of analytical results for the contaminant or contaminants measured in the area or well to date, possible health effects of the contaminant or contaminants, possible source or sources for this type of contamination, suggested actions and precautions potentially impacted well owners could take, and who to contact for more information.

The rule uses the existing definition of contamination contained in 31 TAC §601.3(7), Definitions. Under that definition, contamination is the detrimental alteration of the naturally occurring physical, thermal, chemical, or biological quality of groundwater. Furthermore, the definition of groundwater contamination is limited to: contamination reasonably suspected of having been caused by activities or by entities under the jurisdiction of the agencies on the committee having responsibilities related to the protection of groundwater; and groundwater that contains a concentration of less than, or equal to, 10,000 mg/L of dissolved solids, or to groundwater with greater than 10,000 mg/L of dissolved solids that is currently extracted for beneficial use such as domestic, industrial, or agricultural purposes, or is hydrologically connected with, and has the potential for contaminant movement to, a surface water body or another zone of groundwater that has a concentration of less than, or equal to, 10,000 mg/L of dissolved solids. An exception to the definition is provided in the case of an underground source of drinking water granted an aquifer exemption by TCEQ with concurrence from the EPA.

Public Records

The TCEQ administers the activities of the TGPC in accordance with TWC, §26.403. The TCEQ maintains a mailing list of TGPC members, designated and alternate members, subcommittee members, agency staff, and interested parties for meeting notification and correspondence. The TCEQ provides meeting information through the *Texas Register* for public notification, maintains audio tapes of TGPC meetings, prepares meeting records for TGPC meetings, and maintains meeting and correspondence files for the TGPC and its subcommittees. The TGPC's publications are available through the TCEQ's Agency Communications Division. Publications include: *Activities of the Texas Groundwater Protection Committee- Report to the 78th Legislature* (TGPC, 2003a), *Texas Groundwater Protection Strategy* (TGPC, 2003b), *Joint Groundwater Monitoring and Contamination Report-2002* (TGPC, 2003c), and *Joint Groundwater Monitoring and Contamination Report-2003* (TGPC, 2004) (See Appendix 3). Information is also made available to the public through the TGPC Web site at <http://www.tgpc.state.tx.us>. Information regarding groundwater monitoring programs and groundwater contamination incidents are maintained individually by the participating agencies and districts.

EDUCATIONAL OUTREACH

State Management Plan for Pesticides in Groundwater

The state's generic Pesticide Management Plan, the *Texas State Management Plan for the Prevention of Pesticide Contamination of Groundwater*, has received concurrence from EPA, and was published in late 2000. A set of slides and an outlined presentation have been prepared to familiarize special interest groups and the general public with the development and implementation of the generic SMP. In addition, presentations have been prepared and given at various educational events describing the results of the Agricultural Chemicals Subcommittee's pesticide groundwater monitoring. TGPC facilitated a project for collecting data on the occurrence of atrazine in the state's aquifers. The committee's atrazine work includes both data collection and assessment of groundwater in aquifers of the Texas Panhandle. TGPC has also been involved in educating agricultural producers about best management practices to prevent atrazine contamination of groundwater in the High Plains.

Abandoned Well Closure Activities

Recognizing the dangers to human health and groundwater quality that abandoned water wells pose, the TGPC established and charged the Abandoned Well Closure Task Force (now the Public Outreach and Education Subcommittee) with developing educational materials to promote the low-cost, landowner-initiated closure (capping or plugging) of abandoned water wells. State law requires landowners, who possess an abandoned or deteriorated well, to have the well plugged or capped under TDLR standards. The landowner is liable for any water contamination or injury due to such wells.

The task force developed a technical guidance document to assist landowners in plugging abandoned water wells. The technical guidance document, entitled *Landowner's Guide to Plugging Abandoned Water Wells*, was published and is distributed to member agencies and is also available on the TGPC home page. The task force, in cooperation with the TCE and TCEQ, designed and produced a video cassette in 2000 highlighting landowner closure of abandoned water wells. This instructional video cassette has been included in the TCE educational series, *Tex-A-Syst*. The videotape has been distributed to member agencies and TCE field personnel. Copies are also available from the WWD/PI Program of the TDLR. Both audio and video public service

announcements were also developed for use with the guidance document and video.

During the period of this report, multiple demonstrations of the proper methods to close abandoned water wells have been conducted in the Texas Panhandle and in the central part of the state. Most of these demonstrations have been arranged by local GCDs, and carried out by TCE staff and licensed water well drillers. The demonstrations are designed to actively illustrate the methods that a landowner may use to plug an abandoned water well, as detailed in *Landowner's Guide to Plugging Abandoned Water Wells*.

Currently, the Public Outreach and Education Subcommittee is developing an educational outreach plan for abandoned well closures. This includes updating the existing well-owner's guide. There are also plans to conduct five educational demonstration closures in FY 2005.

TGPC Internet Homepage

The TGPC's home page is located at <http://www.tgpc.state.tx.us>. The home page provides links to the member agencies' home pages and recent TGPC publications. The site also provides general information about the TGPC, the subcommittees, records of TGPC meetings, the TGPC's Groundwater Classification System, TGPC rules, meeting announcements and locations, and opportunities for the public to provide comments or seek inclusion on the TGPC's mailing list. The site also contains groundwater protection information on several topics of general interest such as: on-site systems, oil and gas production, pesticides, and water wells.

Quarterly Rulemaking Update

The TGPC member agencies use the quarterly meetings to share and discuss current and ongoing rule development relating to the protection of groundwater. Agencies which are proposing new rules or are amending existing rules generally provide a description of the rule, its purpose and a rule development time line. This allows the other agencies the opportunity to ask specific questions about the rule under development and about their opportunities to provide comments on the rule.

ANNUAL JOINT GROUNDWATER MONITORING AND CONTAMINATION REPORTS

TWC, §26.406 requires the TGPC to publish an annual groundwater monitoring and contamination report to:

- describe the current status of groundwater monitoring activities conducted by or required by each agency at regulated facilities or associated with regulated activities;
- contain a description of each case of groundwater contamination documented during the previous calendar year;
- contain a description of each case of contamination documented during previous periods for which enforcement action was incomplete at the time of issuance of the preceding report; and
- indicate the status of enforcement action for each case of contamination which is listed.

The TGPC produced and published two monitoring and contamination reports during the previous two years: *Joint Groundwater Monitoring and Contamination Report-2002* (TGPC, 2003) and *Joint Groundwater Monitoring and Contamination Report-2003* (TGPC, 2004). The reports describe the status of groundwater monitoring programs and groundwater contamination cases documented or under enforcement by the participating agencies for the calendar year. Groundwater protection program descriptions for each contributing agency or organization are included. The reports also contain individual groundwater contamination case descriptions, listed by county, for each contributing agency with regulatory groundwater protection authority. The individual case descriptions provide the enforcement status for each case.

Groundwater Monitoring

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

- regulatory agencies requiring or conducting groundwater monitoring to assure compliance with guidelines and regulations for the protection of groundwater from discharges of contaminants;

- agencies or entities conducting groundwater 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.

Each regulatory agency that 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. The criteria used to assess the need for groundwater monitoring vary among the regulatory entities. The report for 2003 describes 14 regulatory monitoring programs in two state agencies monitoring changes in groundwater quality for permit and operational requirements at approximately 18,000 facilities statewide. Data indicates that an estimated 60,000 monitor and water wells are being used for groundwater monitoring purposes at these facilities. The majority (greater than 98 percent) of the facilities being monitored are under the jurisdiction of the TCEQ, with the remainder under the jurisdiction of the RCT.

Agencies or entities including the TWDB, GCDs, and the USGS conduct groundwater monitoring to assess ambient or existing groundwater quality conditions and to track changes in water quality over time. 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. TWDB monitoring programs address ambient groundwater quality and assess the occurrence of particular constituents.

The TWDB sampled approximately 690 sites in 2003. These sites, along with additional chemical analyses obtained from cooperative entities, comprise the ambient groundwater quality sampling program. As data are obtained from cooperators, the actual number of analytical results obtained from sites sampled in 2003 will be greater. Water-quality data collected under this program are entered in the TWDB groundwater database, scanned for an image file available for use by TWDB staff, and filed in the Board's Located Well Data file room. These sites have accurate latitude and longitude data for use with GIS applications.

Groundwater Contamination

Groundwater contamination, as defined by the TGPC (TGPC Rules, 31 TAC Chapter 601, Appendix 2) for inclusion in the annual 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 state agencies. The TGPC recognizes that groundwater contamination may result from many sources, including:

- agricultural activities;
- commercial and business endeavors;
- current and past oil and gas production and related practices;
- domestic activities;
- industrial and manufacturing processes; and
- natural sources that may be influenced by, or may result from, human activities.

The contamination cases identified in the annual reports 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.

There were 7,069 documented groundwater contamination cases in the annual report for 2002 and 6,750 in 2003. Approximately 96.2 percent of the documented cases were under the jurisdiction of the TCEQ. The remainder of the cases were under the jurisdiction of the RCT (with approximately 3.7 percent) and the GCDs that make up the TAGD (with less than 1 percent).

Table 5 lists the documented groundwater contamination cases reported by each agency with enforcement jurisdiction. The total number of cases documented during 2002 and 2003 by each agency and program are listed. The percentage of the total number of documented cases attributable to each agency and program are also given for 2002 and 2003. The net change and percentage change from 2002 to 2003 for each agency and program are also shown.

As Table 5 illustrates, the reports for 2002 and 2003 have continued to document the large number of groundwater contamination impacts from leaking underground storage tanks. In 2003, there were 67,282 facilities containing registered storage tanks. Approximately 95 percent of the

regulated storage tanks contain petroleum products, with the remainder containing regulated hazardous substances. As reported by the TCEQ, the number of documented groundwater contamination cases resulting from storage tank system failures declined from 5,285 in 2002 to 4,815 in 2003. This is down from a high of 5,540 cases in 2001. These cases represent 73.3 percent of the total number of documented contamination cases in 2002 and 71.3 percent of the total cases in 2003. While the number of documented contamination cases from storage tanks is very high, it can be directly linked to the large number of regulated facilities and the monitoring requirements in effect for these systems.

Not reflected in the table of the most recent changes are the changes from the 2001 report. There was an increase in the number of cases reported by the RCT. The case count rose 11.1 percent between 2002 and 2003. Most of these cases fell under the jurisdiction of the Oilfield Cleanup Program. Other agency programs with increased case counts included the Voluntary Cleanup/Innocent Owner Program and Water Quality Assessment Section at TCEQ, showing 25.1 percent and 33.3 percent increases, respectively, between 2002 and 2003.

The most common contaminants reported in 2003 included gasoline, diesel fuel, and other petroleum products due to the large number of petroleum storage tank system related cases. Less common contaminants reported included gasoline constituents, organic compounds (such as phenol, trichloroethylene, carbon tetrachloride, dichloroethylene, and naphthalene), pesticides (such as alachlor, atrazine, bromacil, dicamba, and prometon), creosote constituents, solvents, heavy metals, and sodium chloride.

As required by TWC, §26.046, the report indicates the status of enforcement action for each instance of groundwater contamination. For purposes of the report, enforcement action includes any agency action which accomplishes or requires the identification, documentation, monitoring, assessing, or remediation of groundwater contamination. In general, regulatory programs are structured to achieve the desired degree of environmental protection and mitigation with the lowest possible level of agency oversight, and while the status of a contamination case may remain at an agency action level for a long period of time, physical activities related to the assessment and remediation may change often. The comparison of the level of agency action and the status or level of contamination assessment and mitigation allows a one-to-one correspondence between an agency's response (enforcement status) and the completion of the discrete phases in the progression of contamination investigation (activity status).

Table 5. Groundwater Contamination Cases by Jurisdictional Agency, 2002 - 2003

Agency/Program	Total No. of Cases		Net Change	Percent Change (total cases)	Percent of Total	
	2002	2003	2002-2003	2002-2003	2002	2003
Texas Commission on Environmental Quality						
Remediation Division - Corrective Action Section	538	532	-6	-1.1	7.6	7.9
Remediation Division - Petroleum Storage Tank Section	5185	4815	-370	-7.1	73.3	71.3
Remediation Division - Superfund Cleanup Section	59	61	2	3.4	0.8	1.0
Remediation Division - Superfund Site Discovery and Assessment Team	19	14	-5	-26.3	0.3	0.2
Remediation Division - Voluntary Cleanup / Innocent Owner Program	267	334	67	25.1	3.8	5.0
Remediation Division - Voluntary Cleanup Program	640	627	-13	-2.0	9.0	9.3
Remediation Division - Voluntary Cleanup Brownfields Site Assessment	10	10	0	0	0.1	0.1
Technical Analysis Division - Water Quality Planning and Assessment Section	50	50	0	0	0.7	0.7
Water Permits and Resource Management Division/Water Quality Division - Water Quality Assessment Section	6	8	2	33.3	0.1	0.1
Water Permits and Resource Management Division/Water Supply Division - Public Drinking Water Section	35	16	-19	-54.3	0.5	0.2
Waste Permits Division - Municipal Solid Waste Section	19	21	2	10.5	0.3	0.3
Waste Permits Division - Industrial and Hazardous Waste Section	0	0	0	0	0	0
Enforcement Division	4	3	-1	-16.7	0.1	0.1
Field Operations Division	6	5	-1	-16.7	0.1	0.1
Subtotal	6838	6496	-342	-5.0	96.7	96.2
Railroad Commission of Texas Oil and Gas Division	225	250	25	11.1	3.2	3.7
Texas Alliance of Groundwater Districts	6	4	-2	-50	0.1	0.1
Total	7069	6750	-319	-4.5	100	100

Table 6 presents the activity status of documented groundwater contamination cases during 2003. The table indicates the total number of documented cases by the agency and division or program with jurisdictional authority and indicates the activity status for the cases. Once groundwater contamination has been confirmed, either the regulated entity or the agency will address a groundwater contamination incident following a general sequence of actions until the investigation concludes no further action is necessary.

All of the 6,750 cases listed in the 2003 report have documented groundwater contamination, or were reported as having documented contamination in previous reports. As Table 6 indicates, "no activity" has occurred in 91 reported cases that are awaiting confirmation of contamination. Contamination is confirmed (validated) in 464 cases. The largest number of cases (3,810) are involved in ongoing investigations. Additionally, 244 cases are in corrective action planning. Action has been implemented in 925 cases, and 373 cases have an activity status of "monitor action." No further action is necessary for 725 cases that are designated as "action completed." No activity status was given for an additional eight cases in which information was lacking concerning the 2003 activity status at the site.

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 trend had held since the Committee began publishing the report in 1989, but in 2000 the trend reversed. In 2002, 739 cases listed with action completed, and only 582 reported new cases. In 2003, 725 cases were listed with action completed, and only 464 new cases reported. The number of new cases had annually decreased up to 1994, but increased in 1995, 1996, 1997, 1998 and 1999, before falling sharply in 2000 and decreasing since then. At this time, insufficient data exists to determine whether this situation is due to groundwater protection programs implemented by regulatory agencies, or simply due to a "maturing" of monitoring and enforcement programs that results in fewer occurrences of contamination being discovered and placed under enforcement. The number of cases where action has been completed has annually increased (with exception in 1994, and a slight decline in 1997), which would suggest that regulatory programs are "maturing."

Table 6. Documented Groundwater Contamination Cases by Agency/Activity Status, 2003

Agency/Division	Total Cases (2003) ¹	New Cases (2003) ²	Activity Status Code ³							
			0	1	2	3	4	5	6	None
Texas Natural Resource Conservation Commission/Texas Commission on Environmental Quality										
Enforcement Division	3	0	0	1	1	0	1	0	0	0
Field Operations Division	5	0	1	0	4	0	0	0	0	0
Remediation Division - Corrective Action Section	532	20	9	22	186	115	128	141	23	1
Remediation Division - Petroleum Storage Tanks Section	4815	223	0	347	3307	0	579	0	576	0
Remediation Division - Superfund Cleanup Section	61	2	0	11	36	27	19	60	6	0
Remediation Division - Superfund Site Discovery & Assessment	14	4	0	2	0	0	0	1	0	7
Remediation Division - Voluntary Cleanup Section	627	93	75	45	241	60	105	76	74	0
Remediation Division -Voluntary Cleanup/Innocent Landowner	334	69	4	330	0	0	0	0	1	0
Remediation Division - Voluntary Cleanup Section/Brownfields Site Assessment	10	3	1	2	6	0	0	0	4	0
Technical Analysis Division	50	0	0	36	10	0	6	10	0	0
Waste Permits Division - Underground Injection Control	0	0	0	0	0	0	0	0	0	0
Waste Permits Division - Municipal Solid Waste Section	21	2	1	0	5	3	10	10	2	0
Water Quality Division	8	2	0	0	1	0	5	7	0	0
Water Supply Division	16	11	0	0	0	0	0	0	16	0
Subtotal	6496	424	91	796	3797	205	851	305	702	8
Railroad Commission of Texas/Oil and Gas Division	250	35	0	25	13	39	72	68	20	0
Texas Alliance of Groundwater Districts	4	0	0	0	0	0	1	0	3	0
Total	6750	464	91	821	3810	244	925	373	725	8

Notes:

1. Total number of groundwater contamination cases documented or under enforcement during calendar year 2001.
2. Number of new cases documented or under enforcement during calendar year 2001.
3. Activity Status Codes: 0—No Activity; 1—Contamination Confirmed; 2—Ongoing Investigation; 3—Corrective Action Planning; 4—Corrective Action Implementation; 5—Monitoring Action; 6—Action Completed Facilities may have more than one Activity Status Code

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STATE MANAGEMENT PLAN FOR PESTICIDES IN GROUNDWATER

Proposed Federal Rule

On June 26, 1996, under its authority granted by Federal Insecticide, Fungicide, and Rodenticide Act, the EPA published a proposed rule in the *Federal Register* on pesticides and groundwater SMP regulation. The EPA has determined that, due to their groundwater contamination potential, some pesticides commonly used nationwide may pose an unreasonable adverse effect on the environment, and should be banned unless effective local management measures are developed and implemented through state pesticide-specific management plans. Alachlor, atrazine, metolachlor, and simazine are the first four pesticides to be identified as problem pesticides under this proposed rule.

Under the proposed rule, to preserve the continued use of the EPA-listed pesticides, a state will need to develop pesticide-specific SMPs that address the potential for groundwater contamination for each pesticide. The EPA has asked states to develop two different kinds of SMPs: a generic plan and pesticide-specific plans.

EPA is still considering adoption of a final rule but is studying the possibility of some changes such as the inclusion of surface water protection requirements or the method used to determine which pesticides are subject to the rule.

Texas State Management Plan for the Prevention of Pesticide Contamination of Groundwater

Plan Development

TCEQ is charged under TWC, §26.407 to develop management plans for agricultural chemicals, with the advice of the TGPC, which address chemicals such, as pesticides, that may threaten groundwater quality. Specifically, these plans are developed for the protection and enhancement of water quality pursuant to federal statute, regulation, or policy, and include management plans for the prevention of water pollution by agricultural chemicals and agents.

At the request of TCEQ, the TGPC developed the *Texas State Management Plan for Prevention of Pesticide Contamination of Groundwater* (SMP). This plan, as a generic management plan for the state,

will serve to guide the development of pesticide-specific SMPs as needed. The plan was developed as a joint effort of the agency members of the Agricultural Chemicals Subcommittee. The plan received input from agricultural producers, manufacturers, and environmental interest groups. The TGPC effort considered the guidance provided by the EPA's *Ground-Water Protection Strategy* and the *Final Guidance for Pesticides and Ground-Water State Management Plans*. The effort is an update of the *Texas State Management Plan for Agricultural Chemicals in Ground Water*, published by the TGPC in 1991.

The goal of the SMP is to protect the existing quality of groundwater and to prevent the degradation of state groundwater resources. This goal does not mean zero-contaminant discharge, but rather that the normal use of pesticides be conducted in a manner that will maintain present groundwater uses and not impair potential uses of groundwater or pose a public health hazard. All usable and potentially usable groundwater resources are subject to the same protection afforded by the state's nondegradation policy goal.

The SMP describes the general policies and regulatory approaches the state will use to protect groundwater resources from risk of contamination by pesticides. The document describes a generic coordinating mechanism among all responsible and participating agencies during the implementation of the SMP and provides for specific responses when it is deemed necessary to develop a pesticide-specific SMP. The SMP reflects the state's philosophy toward groundwater protection and recognizes the importance of agricultural resources to the state's economy.

Groundwater Monitoring Plan for Atrazine

Monitoring efforts have been significantly enhanced through a cooperative sampling effort among the TWDB, a number of GCDs, and TCEQ. The TWDB or a GCD obtains a sample and the TCEQ conducts the screening analyses for atrazine. Through this cooperative effort approximately 542 samples were obtained in 2002, 482 samples in 2003, and 452 samples through October of 2004. Using an immunoassay screening method, all 1,476 of these samples were analyzed for atrazine and metolachlor. Over the last five years, all of the aquifers that the TWDB normally monitors have been screened for atrazine and metolachlor. Thus far, cooperative monitoring has revealed a number of atrazine detections in the central panhandle but only an occasional low-level detections of atrazine or metolachlor in the rest of the state. The cooperative monitoring atrazine detections lie in the same region of the panhandle as previous investigative monitoring detections. All but one of the cooperative monitoring detections have been below the maximum contaminant level for drinking water (MCL).

Response to Contamination

The state's response to a confirmed pesticide contamination of groundwater is outlined in the generic SMP. The determination of the appropriate response considers a number of key issues: whether the contamination is from a point or nonpoint source; the extent of the contamination; the level of contamination, either above or below the drinking water MCL or health advisory level (HAL); the travel time from the application of the pesticide at or near the soil surface until it reaches the water table; and, whether the source of contamination was the result of present usage of the pesticide or usage under previous labels, which allowed greater levels of use.

A careful assessment is necessary to answer these questions and determine what if any changes in usage (such as the application of best management practices) will diminish the contamination. The responses to be made under specific conditions are outlined in the generic SMP and would be set out in more detail in a pesticide-specific SMP under a final EPA rule.

Investigative and follow-up monitoring efforts have been conducted at five sites in the central panhandle since 1998 to address atrazine detections under the generic SMP in public water supply wells. Atrazine was first detected in several wells through the Public Drinking Water Monitoring Program. The vast majority of atrazine detections were below the drinking water MCL. Initially, only two wells had laboratory-confirmed concentrations of atrazine above the MCL. Since then, one private domestic well and at least two private monitoring wells have exceeded the MCL for atrazine. Affected public water supply systems took appropriate actions (some wells have been taken off-line/removed from service) and are delivering drinking water that is within public health standards.

The investigations indicate that most of the atrazine contamination cases are due to point sources, such as an improperly abandoned water well which may have served as an atrazine migration pathway. There is some possibility of NPS contamination where the source of atrazine may be agricultural fields or storm water runoff collection in playa lake basins where public water wells are located. Recommendations have been developed by the Agricultural Chemicals Subcommittee related to the suspected point source activities and educational and other appropriate regulatory activities have been initiated. Regional best management practices are also being developed for the impacted sites. Additional work is planned to further assess the possibility of NPSs. Additional data is being entered into the Inter-agency Pesticide Database and once completed, a detailed assessment and report should better indicate program changes and direction for later years.

TEXAS GROUNDWATER PROTECTION STRATEGY

Background

The Legislature charged the TGPC with developing and updating a comprehensive groundwater protection strategy for the state that provides guidelines for the prevention of contamination and for the conservation of groundwater and provides for the coordination of the groundwater protection activities of the agencies represented on the TGPC.

With the recent state focus on the need for assuring a high quality supply of groundwater and recognizing the programmatic changes that have occurred since the state's first groundwater protection strategy was developed in 1988, the TGPC decided in January 2001 to update the state's groundwater strategy. The TGPC issued the revised *Texas Groundwater Protection Strategy* (TGPC, 2003b) in February of 2003.

State Groundwater Protection Strategy

In developing the *Strategy*, the TGPC recognized that the state has numerous successful groundwater programs spread among local and state governmental agencies, and research institutions. Therefore, a key part of the *Strategy* is documenting how the current regulatory, outreach, and research programs work to protect groundwater resources. A second fundamental component of the *Strategy* is the identification of protection gaps in program implementation or coordination. TGPC believes that this approach to developing the *Strategy*, grounded firmly within the existing policy and programmatic directions given by the Legislature, resulted in a document that sets realistic objectives for success and provides a road map for action over the next five years (the TGPC's short-term planning horizon) (See table 7).

Table 7. Major Strategy components

Details the state's groundwater protection goal as established by the Legislature; explains the state's efforts to characterize the occurrence, quality, and quantity of groundwater resources and discusses various assessment approaches used in program implementation
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 <i>Strategy</i>
Proposes for inclusion in the next <i>Strategy</i> an identification and ranking of significant threats to the state's groundwater resource, consideration of the vulnerability of groundwater resources to such threats, and a prioritization of actions to address those threats
Provides recommendations and possible actions to protect groundwater

Implementation of Strategy Recommendations

Over the past two years, the TGPC revised its subcommittee structure to implement the *Strategy's* recommendations. Two new subcommittees were created, the Groundwater Research Subcommittee and the Public Outreach and Education Subcommittee. These two subcommittees and the Data Management Subcommittee were charged with implementing specific recommendations given in the *Strategy*. The charges to the Agricultural Chemicals Subcommittee and the Nonpoint Source Task Force were reviewed and revised to provide assistance and further coordination for addressing recommendations and issues identified in the *Strategy*. The subcommittees were given the ongoing responsibility to report quarterly at the TGPC's regularly scheduled meeting on subcommittee activities. A discussion of the progress in implementing the *Strategy's* recommendations follows.

Strengthen Communication with the State's Water Planning Efforts

Strategy Recommendation

The TGPC needs to strengthen the lines of communication and information sharing with the Regional Water Planning Groups. This lack of communication between these two groups is a gap in the TGPC's ability to coordinate the state's groundwater protection strategy with the state's water supply planning efforts led by the TWDB.

Response

The TWDB representative of the committee reports quarterly on the status of Regional Water Planning Group activities and the TWDB's Groundwater Availability Modeling efforts.

Improve Groundwater Data

Strategy Recommendation

Gaps exist in the data collection and data assessment processes. The existing ambient groundwater monitoring program needs more resources to sample additional sites to provide a better picture of ambient groundwater conditions statewide. The suite of chemicals that are analyzed needs to be expanded to include organic and synthetic chemicals. While site specific assessment of "hazardous wastes" in groundwater is covered by a number of state and federal programs, other substances in groundwater, such as nitrate and arsenic, that may be deemed "naturally occurring" need better assessment. The TGPC should develop recommendations on the design of an ambient groundwater monitoring system that will meet the needs of all member agencies. Any new monitoring of domestic water wells would be on a voluntary landowner participation basis.

Response

Charges to the Data Management Subcommittee were revised to focus on the *Strategy* recommendations. The Subcommittee was charged to facilitate interagency groundwater data communication; provide an ongoing process for data collection and compilation for the TGPC to assess water quality for the state's aquifers and identify potential threats to groundwater quality; represent the TGPC in or before data management advisory workgroups; and implement recommendations regarding data management as identified in the *Texas State Groundwater Protection Strategy*. The ultimate goal is to make the data more accessible, usable and valid, not just today but in future program use.

The Data Management Subcommittee has coordinated review efforts for three groundwater quality related reports, the TGPC's *Joint Groundwater*

Monitoring and Contamination Reports for 2003 and 2004 and the groundwater portion of TCEQ's Water Quality Inventory Report to the EPA. The Subcommittee has also prepared an update of the GIS Groundwater Data Dictionary which serves as a guide to member agencies and others for the formatting of electronic groundwater and well data. The Data Dictionary is intended to promote consistency in data collection and management so that information is more usable and comparable. The Subcommittee has established coordination with the Texas Water Quality Monitoring Council through appointing a representative to attend Council meetings and congresses.

The Subcommittee, with assistance from a TCEQ subcontractor, has begun development of the first stage of a cooperative statewide groundwater monitoring strategy. The strategy when adopted by the TGPC would combine elements of the state's current ambient groundwater monitoring program, the state's public drinking water monitoring program, and enhancements for monitoring a wider array of constituents. The monitoring strategy would include more focused monitoring efforts in areas identified with water quality problems. A second phase of monitoring strategy development would include methods for assessing the monitoring data to identify problem areas and potential actions to address problems.

The *Strategy* recognized gaps in data collection efforts, in the conversion of data to electronic format, and in data management. TGPC Legislative recommendations under the section titled Improving Groundwater Data Collection and Management address improving data collection and management with a focus on data needed for TWDB Groundwater Availability Models and data accessibility for water well files.

Coordinate Research

Strategy Recommendation

Traditional groundwater research organizations, generally associated with universities, in both the agricultural and natural resource sectors, have developed the experience, infrastructure, and technical expertise needed to address complex research needs. However, there is no formal mechanism to link the agencies on the TGPC that need to have research performed together with the organizations that are capable of performing the research. The TGPC should form a research subcommittee to identify interagency research needs and to provide a coordinated approach for discussion with federal agencies for funding. The results of this work should be shared with the TCEQ for its consideration under the research model authorized under TWC, §§5.1191 - 5.1193.

Response

The Groundwater Research Subcommittee was created and charged to act as a formal mechanism for identifying interagency research needs and providing a coordinated approach for discussion with potential funding sources. The subcommittee should identify research and program needs and help focus the efforts of the researchers on meeting these needs. In areas where overlapping research initiatives are discovered, the subcommittee should facilitate communication between various research organizations. The Subcommittee should identify projects where shared resources could support research to solve problems that are common to many committee member agencies, including identifying opportunities for cooperatively applying to federal agencies for pass-through monies.

The Subcommittee has developed and discussed research needs identified by member agencies and have identified research needs of common interest to committee member agencies. The Subcommittee prepared several research and funding related recommendations which were presented to and adopted by the TGPC as Legislative Recommendations under the section, Coordinating Research, in this report.

Increase Public Outreach

Strategy Recommendation

Virtually all water used in rural homes which are not on a public drinking water system comes from domestic/private water wells. There are no specific programs which routinely examine the quality of groundwater being consumed by Texans utilizing these wells. More water quality information is needed to develop assessments of water quality and health risk for the domestic/private well owner segment of the population. The state should undertake a voluntary program targeted at private well owners, designed to identify problem areas and assist private well owners in understanding these groundwater quality issues.

Response

The Public Outreach and Education Subcommittee was created and charged to develop and implement educational outreach programs for landowners concerned with groundwater protection and environmental health issues; and to facilitate interagency communication and coordination to provide support for landowner educational outreach projects. Activities include developing educational materials, coordination of outreach programs and special projects. Special effort should be devoted to areas of the state with high levels of naturally occurring constituents of concern such as arsenic and radionuclides and landowners with on-site wastewater treatment in rapidly growing suburban fringe areas. One specific charge is an update of the Abandoned Well Closure Guidance Document developed by its predecessor, the Abandoned Well Closure Task Force.

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APPENDIX 1 - TEXAS GROUNDWATER PROTECTION COMMITTEE MEMBERSHIP

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APPENDIX 2 - TEXAS GROUNDWATER PROTECTION COMMITTEE RULES

Title 31. NATURAL RESOURCES AND CONSERVATION

Part XVIII. TEXAS GROUNDWATER PROTECTION COMMITTEE

Chapter 601. GROUNDWATER CONTAMINATION REPORT

Subchapter A. GENERAL PROVISIONS RELATING TO PUBLIC FILES AND JOINT REPORT

§601.1. Purposes of Rules.

The purpose of these sections is to implement duties and responsibilities assigned to the committee under the Texas Water Code, §26.406, concerning the maintenance by certain state agencies of public files containing documented cases of groundwater contamination and the publication by the committee, in conjunction with the commission, of annual groundwater monitoring and contamination reports and to establish general policies of the committee to guide such implementation.

§601.2. Applicability.

These rules specifically apply to each state agency or organization having membership on the committee. The committee is composed of the Texas Natural Resource Conservation Commission (or effective September 1, 2002, the Texas Commission on Environmental Quality), the Texas Department of Health, the Texas Department of Agriculture, the Railroad Commission of Texas, the Texas Water Development Board, the Texas Alliance of Groundwater Districts, the Texas Agricultural Experiment Station, the Bureau of Economic Geology of the University of Texas at Austin, the State Soil and Water Conservation Board, and the Water Well Drillers and Water Well Pump Installers Program of the Texas Department of Licensing and Regulation.

§601.3. Definitions.

The following words and terms, when used in this chapter, shall have the following meanings unless the context clearly indicates otherwise.

(1) Act--House Bill 1458 (71st Session) codified as Texas Water Code §§26.401 - 26.407.

(2) Commission--Texas Natural Resource Conservation Commission (or effective September 1, 2002, the Texas Commission on Environmental Quality).

(3) Committee--Texas Groundwater Protection Committee.

(4) Documented groundwater contamination--A case of groundwater contamination where an agency has an established procedure for making a determination based on the quality of groundwater and the information pertinent to making the determination is maintained by the agency under §601.4(b) of this title (relating to Public Files).

(5) Enforcement action--Any action of the agencies, identified in §601.2 of this title (relating to Applicability), which accomplishes or requires the identification, documentation, monitoring, assessing, or remediation of groundwater contamination.

(6) Groundwater--Water below the land surface in a zone of saturation.

(7) Groundwater contamination--The detrimental alteration of the naturally occurring physical, thermal, chemical, or biological quality of groundwater. Furthermore, 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 or by entities under the jurisdiction of the agencies identified in §601.4(b) of this title (relating to Public Files), except in the case of an underground source of drinking water granted an aquifer exemption by the commission with concurrence from the United States Environmental Protection Agency in accordance with 40 Code of Federal Regulations, Parts 144, 145, and 146, and 30 TAC Chapter 331 (Underground Injection Control); and affecting groundwater which contains a concentration of:

(A) less than or equal to 10,000 milligrams per liter (mg/liter) of dissolved solids; or

(B) greater than 10,000 mg/liter if it is:

(i) currently extracted for beneficial use such as domestic, industrial, or agricultural purposes; or

(ii) hydrologically connected with, and with the potential for contaminant movement to, a surface water body or another zone of groundwater which has a concentration of less than or equal to 10,000 mg/liter of dissolved solids.

§601.4. Public Files.

(a) Subject to the limitations provided by the Texas Water Code, §§26.401-26.407 (the Act), and the Open Records Act, Texas Civil Statutes, Article 6252-17a, information collected, assembled, or maintained by the committee and the

agencies having responsibilities related to protection of groundwater under the Act is public record open to inspection and copying during regular business hours.

(b) Each agency having the responsibilities related to the protection of groundwater under the Act shall maintain a public file of all documented cases of groundwater contamination that are reasonably suspected of having been caused by activities regulated by the agency.

§601.5. Joint Groundwater Monitoring and Contamination Report.

In conjunction with the commission, the committee shall publish not later than April 1 of each year a joint groundwater monitoring and contamination report covering the activities and findings of the committee made during the previous calendar year. The report must:

(1) describe the current status of groundwater monitoring programs conducted by or required by each committee agency or organization at regulated facilities or in connection with regulated facilities;

(2) contain a description of each case of groundwater contamination documented during the previous calendar year and of each case of groundwater contamination documented during previous years for which enforcement action was incomplete at the time of issuance of the preceding report; and

(3) indicate the status of enforcement action for each case of groundwater contamination that is included in the report.

Subchapter B. NOTICE OF GROUNDWATER CONTAMINATION

§601.10. Form and Content of Groundwater Contamination Notice.

When notice of groundwater contamination, as defined in §601.3(7) of this title (relating to Definitions), is provided under Texas Water Code, §26.408 to the owner of a private drinking water well that may be affected by the contamination and to each applicable groundwater conservation district, the notice shall:

(1) be in writing; and

(2) contain, at a minimum, the following information:

(A) the name of the contaminant or contaminants;

- (B) the range of analytical results for the contaminant or contaminants measured in the area or well to date;
- (C) possible health effects of the contaminant or contaminants;
- (D) possible source or sources for this type of contamination;
- (E) suggested actions and precautions potentially impacted well owners could take; and
- (F) who to contact for more information.

APPENDIX 3 - 2003-2004 PUBLICATIONS OF THE TGPC

Activities of the Texas Groundwater Protection Committee- Report to the 78th Legislature, 2003a: TCEQ Publication Number SFR-047/02, January 2003.

Texas Groundwater Protection Strategy, 2003b: TCEQ Publication Number AS-188, February 2003.

Joint Groundwater Monitoring and Contamination Report-2002, 2003c: TCEQ Publication Number SFR-056/02, June 2003.

Joint Groundwater Monitoring and Contamination Report-2003, 2004: TCEQ Publication Number SFR-056/03, June 2004.