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TEXAS GROUNDWATER PROTECTION COMMITTEE

Report to the 88th Legislature

MEMBER AGENCIES

Texas Commission on Environmental Quality

Texas Water Development Board

Railroad Commission of Texas

Texas Department of State Health Services

Texas Department of Agriculture

Texas State Soil and Water Conservation Board

Texas Alliance of Groundwater Districts

Texas A&M AgriLife Research

Bureau of Economic Geology of
The University of Texas at Austin

Texas Department of Licensing and Regulation

Prepared by the Texas Groundwater Protection Committee

Activities and Recommendations of the Texas Groundwater Protection Committee

Report to the 88th Legislature

Prepared by
Texas Groundwater Protection Committee

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Abbreviations

ACTF	Agricultural Chemicals Task Force
AgriLife Extension	Texas A&M AgriLife Extension Service
AgriLife Research	Texas A&M AgriLife Research
ASR	Aquifer Storage and Recovery
AWRS	Abandoned Well Reporting System
BEG	Bureau of Economic Geology of The University of Texas at Austin
BMPs	Best Management Practices
DSHS	Texas Department of State Health Services
EPA	Environmental Protection Agency
ET	Evapotranspiration
FAQs	Frequently Asked Questions
FTE	Full-Time Equivalent
FY	Fiscal Year
GCD	Groundwater Conservation District
GWI	Groundwater Issues Subcommittee
IPD	Interagency Pesticide Database
Joint Report	*Joint Groundwater Monitoring and Contamination Report*
LBB	Legislative Budget Board
LPST	Leaking Petroleum Storage Tank
PFAS	Per- and Polyfluoroalkyl Substances
PMP	Pesticide Management Plan
POE	Public Outreach and Education Subcommittee
QA	Quality Assurance
RRC	Railroad Commission of Texas
SMP	State Management Plan
Strategy	*Texas Groundwater Protection Strategy*
TAGD	Texas Alliance of Groundwater Districts
TCEQ	Texas Commission on Environmental Quality
TDA	Texas Department of Agriculture
TDLR	Texas Department of Licensing and Regulation
TDS	Total Dissolved Solids
TGPC or committee	Texas Groundwater Protection Committee

TNRCC	Texas Natural Resources Conservation Commission
TSSWCB	Texas State Soil and Water Conservation Board
TWC	Texas Water Code
TWDB	Texas Water Development Board
TWON	Texas Well Owner Network
USGS	United States Geological Survey
WCAC	Water Conservation Advisory Council

Executive Summary

This report describes the Texas Groundwater Protection Committee (TGPC) activities during 2021 and 2022, discusses selected groundwater protection issues, and provides recommendations to improve groundwater protection for the 88th Texas Legislature's consideration. The Texas Commission on Environmental Quality (TCEQ) prepared the report for the TGPC. The report fulfills the requirements of Texas Water Code (TWC), Section 26.405.

The TGPC has reviewed its statutory guidance and recommends that the legislature reconsider the TGPC's membership and review its present powers and duties. The recommendations include the following:

- Add the Texas Parks and Wildlife Department as a TGPC member.
- Amend language to move the annual TGPC *Joint Groundwater Monitoring and Contamination Report* (*Joint Report*) due date from April to June.
- Amend language about pesticide management plans.
- Amend language about groundwater contamination notices.
- Establish a statewide fund to plug abandoned water wells.
- Amend the statute to require sellers to disclose all known water wells during the real estate disclosure process.
- Establish a statewide evapotranspiration (ET) network.
- Support agency programs or initiatives on groundwater.

The state agency members of TGPC also recommend favorable consideration of their appropriation requests that would provide funds necessary to carry out their existing groundwater protection programs.

As part of the *Texas Groundwater Protection Strategy* AS-188, the Groundwater Issues (GWI) Subcommittee continued to develop white papers on the groundwater issues listed in their biennial activity plan. During the last biennium, three GWI Subcommittee white papers with recommendations were approved, bringing the total number to seven. White paper topics include Priority Groundwater Management Areas, on-site sewage facilities (OSSFs), per- and polyfluoroalkyl substances (PFAS), transboundary aquifers, wellhead impacts from flooding, ET networks, and aquifer storage and recovery (ASR).

The Public Outreach and Education (POE) Subcommittee has developed 46 Frequently Asked Questions (FAQs). FAQs are the most cost-effective means of outreach and are posted on the TGPC website,[1] along with nine links to member agency FAQs. The POE Subcommittee continues to support statewide water well screening events and

[1] https://tgpc.texas.gov/

provides the public with groundwater information through exhibit booths at conferences statewide.

The TGPC produced and published the annual *Joint Report* in 2021 and 2022. In 2021 about 45,000 monitor wells were monitored for groundwater quality statewide per regulatory requirements. The reports document a two-year decrease in cases: 3,035 groundwater contamination cases in 2020 (down from 3,085 in 2019) and 2,929 cases in 2021. The most common contaminants originated from leaking petroleum storage tanks (LPSTs). For 2021, about 81 percent of the cases were under TCEQ jurisdiction and 19 percent were under Railroad Commission of Texas (RRC) jurisdiction. During fiscal years 2021 and 2022, TCEQ mailed 789 notices for 93 cases of groundwater contamination that might affect private drinking water wells.

The Agricultural Chemicals Task Force, as part of the GWI Subcommittee, continued its support of statewide protection of groundwater from pesticide contamination. The GWI Subcommittee reviewed and approved the annual groundwater pesticide monitoring plans which includes cooperative monitoring between TCEQ and the Texas Water Development Board (TWDB). Exhibit booths at several conferences provided pesticide-related groundwater information to the public.

Introduction

This report was prepared for the 88th Texas Legislature by the Texas Groundwater Protection Committee (TGPC), as required by TWC, Section 26.405. The purpose of this report is to describe TGPC activities conducted in 2021 and 2022 and provide recommendations to improve groundwater protection for consideration by the 88th Legislature. This is the 17th TGPC biennial report provided to the Texas Legislature. A summary of the Texas Groundwater Protection Policy and creation, membership, and duties of the TGPC follows.

Texas Groundwater Protection Policy

The 71st Legislature established the policy of non-degradation 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 value 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.
- The importance of existing and potential uses of groundwater supplies to the economic health of the state.

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

TGPC Creation and Membership

The Texas Legislature created the TGPC and established its membership in 1989 and amended the membership in 1993 and 1999. The TGPC includes members from ten state agencies or organizations. State law designates TCEQ as the lead agency, and the executive director as the TGPC's chair.

The Executive Administrator of the Texas Water Development Board (TWDB) is designated as the TGPC's vice chair. The other members of the TGPC are:

- Executive Director of the Railroad Commission of Texas (RRC)
- Commissioner of Health of the Texas Department of State Health Services (DSHS)
- Deputy Commissioner of the Texas Department of Agriculture (TDA)
- Executive Director of the Texas State Soil and Water Conservation Board (TSSWCB)
- Representative selected by the Texas Alliance of Groundwater Districts (TAGD)
- Director of Texas A&M AgriLife Research (AgriLife Research)
- Director of the Bureau of Economic Geology (BEG) of The University of Texas at Austin
- Representative of the Water Well Drillers and Pump Installers Program at the Texas Department of Licensing and Regulation (TDLR)

Members serve on the TGPC in addition to their normal agency duties and each agency must provide additional staff as necessary for the TGPC to carry out its responsibilities. All members may designate a representative to the TGPC, but they remain responsible for the representative's acts and decisions. Appendix 1 lists the current members and their designated representatives. Detailed groundwater protection program descriptions for all the member agencies and organizations are developed on an annual basis by the TGPC and included in the annual *Joint Report*.[2]

TGPC Statutory Charges

The TGPC implements the state's groundwater protection policy by identifying opportunities to improve existing groundwater quality programs and promoting inter-agency coordination. In addition to developing its biennial report to the Texas Legislature, the TGPC's major responsibilities are to:

- Coordinate groundwater protection activities of the member agencies and organizations.
- Develop and update a comprehensive state groundwater protection strategy to coordinate groundwater protection activities, prevent contamination, and conserve groundwater resources.
- Publish an annual groundwater monitoring and contamination report that describes the current monitoring programs of each member agency and the status of groundwater contamination cases documented or under enforcement during the calendar year.

[2] www.tceq.texas.gov/groundwater/groundwater-planning-assessment/sfr-056-joint-groundwater-monitoring-contamination-report

- Prescribe by rule the reporting form and report contents for TCEQ to provide a notice of groundwater contamination to the owners of private drinking water wells.
- Advise TCEQ on the development of plans for the protection and enhancement of groundwater quality pursuant to federal statute, regulation, or policy, including management plans for the prevention of water pollution by agricultural chemicals and agents.

Most of the powers and duties of the TGPC outlined in the Texas Water Code have not changed since enacted in 1989. TGPC duties related to the annual groundwater monitoring and contamination report were amended in 1995, and responsibilities related to notices of groundwater contamination were added in 2003.

Figure 1. Texas Groundwater Protection Committee home page[3], June 2022

[3] www.tgpc.texas.gov/

Recommendations to the 88th Texas Legislature

High-quality groundwater resources are of vital importance to the state's economy and the public health and welfare. The TGPC submits the following groundwater protection recommendations for legislative consideration. Although the TGPC's recommendations represent the majority opinion of the membership, they do not necessarily reflect the views and policies of each participating organization. These recommendations are broadly organized into four sections, below.

I. Review of Statute

In preparation of this report, the TGPC reviewed TWC, Sections 26.401 through 26.408. Based on this review of the statute, the TGPC offers the following observations and recommendations.

Section 26.401, Legislative Findings

The state's groundwater protection goal and policy have stood without change since enacted in 1989. The TGPC affirms these findings are still valid and notes an emphasis on groundwater quality protection. The legislative findings are silent on groundwater quantity and groundwater conservation issues; however, a requirement to include guidelines for groundwater conservation in the state's groundwater protection strategy appears in Section 26.405. This requirement is discussed in the following review of that section. The TGPC believes a statement from the legislature clarifying the committee's intended role in groundwater conservation and quantity management, if any, would be appropriate.

Section 26.403, Creation and Membership of TGPC

The Texas Legislature created the TGPC in response to environmental protection regulations that became federal law in the 1970s and 1980s. The legislature spread state responsibilities to implement the federal programs among many state agencies. In 1989, the legislature tasked the TGPC with coordinating the state's groundwater protection activities. At its inception, the TGPC was composed of the chief executives of the Texas Water Commission (TCEQ predecessor), TWDB, RRC, TSSWCB, Texas Department of Health (now DSHS), Deputy Commissioner of the TDA, and a representative of the Texas Groundwater Conservation Districts Association (now TAGD). The state agencies are subject to the legislative sunset review process and have undergone multiple reviews since 1989.

In 1993, the Texas Legislature consolidated most of the state's environmental protection activities and programs into the Texas Natural Resource Conservation Commission (TCEQ immediate predecessor). During the same year, the legislature added research organization members from the BEG and AgriLife Research to TGPC.

The legislature added the TDLR, which includes the Water Well Drillers and Pump Installers Program, to TGPC in 1999.

The TGPC has determined that once again, additions to committee membership may be warranted. Legislative findings in Section 26.401(b) include: "the legislature determines that, consistent with the protection of the public health and welfare, the propagation and protection of terrestrial and aquatic life, … it is the goal of groundwater policy in this state that the existing quality of groundwater not be degraded."

Because of the Texas Parks and Wildlife Department's responsibilities and expertise for the propagation and protection of terrestrial and aquatic life, the TGPC recommends that the legislature consider expanding committee membership to include this agency.

Section 26.405, Powers and Duties of TGPC

Most of the powers and duties of the TGPC outlined in the Texas Water Code have not changed since enacted in 1989. In Section 26.405 (2), there is no timetable for the development and maintenance of the required groundwater protection strategy.

In 2018, the TGPC updated the *Texas Groundwater Protection Strategy* (*Strategy*). This new updated *Strategy* is a dynamic document modeled around the topics being discussed in the TGPC Groundwater Issues Subcommittee. This procedural document outlines how groundwater issues are identified and evaluated, as well as the processes by which information is exchanged and recommendations are made to protect the groundwater resources in the state.

This same subsection of the statute includes a provision for the *Strategy* to contain guidelines "for the conservation of groundwater." This provision is outside of the findings in Section 26.401, and outside of the realm of groundwater quality protection.

Recognizing the importance of conservation to meet future demand, the 80th Regular Session of the Texas Legislature (2007) via the passage of Senate Bill 3 and House Bill 4, created the Water Conservation Advisory Council (WCAC). The legislature created the WCAC to provide the Governor, Lieutenant Governor, Speaker of the House of Representatives, legislature, TWDB, TCEQ, political subdivisions, and the public with the resource of a select council with expertise in water conservation. The WCAC includes most of the TGPC member agencies.

As the WCAC's focus extends well beyond groundwater conservation, the TGPC coordinates with the WCAC on matters related to groundwater conservation and endorses the following WCAC legislative recommendations.

- Continue to support the Texas Alliance for Water Conservation which promotes water conservation through best management practices and new technologies through general revenue appropriations deposited to the Agricultural Water Conservation Fund and distributed through the TWDB's Agricultural Water Conservation Grants Program.

- Support the Texas Project for Ag Water Efficiency for the education, research, and development of agricultural water conservation initiatives throughthe TWDB's Agricultural Water Conservation Grants Program.

Section 26.406, Groundwater Contamination Information and Reports; Rules

When this statute was crafted, the legislature required the TGPC "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." Because of the inter-agency coordination needed to compile the information for this report, and the amount of data manipulation and editing necessary to publish the report, the April 1 deadline has been consistently difficult to achieve. The TGPC has contemplated establishing an electronic database, administered by TCEQ, and shared by member agencies, to track groundwater contamination case information. This initiative will continue.

The TGPC recommends amending the statute as follows:

"Sec. 26.406. GROUNDWATER CONTAMINATION INFORMATION AND REPORTS; RULES. (a) Each state agency having responsibilities related to the protection of groundwater 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.

(b) For purposes of this section, the agencies identified as having responsibilities related to protection of groundwater include the commission, the Department of Agriculture, the Railroad Commission of Texas, and the State Soil and Water Conservation Board.

(c) In conjunction with the commission, the committee shall publish not later than [~~April~~] June 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 agency at regulated facilities or in connection with regulated activities;

(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 periods 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; and

(4) be published on the committee's website.

(d) The committee shall adopt rules defining the conditions that constitute groundwater contamination for purposes of inclusion of cases in the public files and the joint report required by this section."

Section 26.407, Protection and Enhancement Plans

This statute was intended to address the plans for dealing with impacts to groundwater from pesticides i.e., State Management Plan (SMP) or Pesticide Management Plan (PMP) for Prevention of Pesticide Contamination of Groundwater. The TGPC developed the SMP, but the final federal rules for the plan never fully materialized. Although the TGPC and TCEQ maintain the plans that were developed and continue a monitoring program for pesticides in groundwater, there is no federal or state "driver" behind this mandate.

The TGPC recommends amending the statute as follows:

"Sec. 26.407. PROTECTION AND ENHANCEMENT PLANS. (a) The commission, with the advice of the committee, [~~shall~~] may develop plans, except for those plans required by Section 201.026, Agriculture Code, for the protection and enhancement of water quality pursuant to federal statute, regulation, or policy, including management plans for the prevention of water pollution by agricultural chemicals and agents."

Section 26.408, Notice of Groundwater Contamination

This statute requires TCEQ to make every effort to provide notice, via first class mail, to each owner of a private drinking water well that may be affected by contamination once TCEQ receives notice from another agency or independently documents a case of groundwater contamination. The notice must be provided within 30 days of TCEQ's determination or receipt of information from another agency. Additionally, notice must also be provided to any applicable Groundwater Conservation District (GCD).

The TGPC recognizes the importance of this statute in protecting Texas citizens; however, more flexibility on the notification process would be helpful to expedite the process and better fulfill the spirit of the law. There is no comprehensive list of private water well owners in the state, and TCEQ staff must go to significant lengths to find mailing addresses for them. In the case of rental properties with private wells, some of which are owned by large out-of-state corporations, notifying the owner may not mean notifying the persons using the water. Other direct means such as a door hangtag or personal delivery methods are effective ways of notifying private water well owners.

The Legislative Budget Board (LBB) *Staff Report 4830, Improve State and Public Groundwater Quality Information, April 2019* (*2019 LBB Staff Report*)[4] suggested amending this statute 'to remove the requirement that notification of potential contamination must be sent to well owners via postal mail. Other direct means such as email, a doorknob hanger, or other delivery methods may be more effective and

[4] www.lbb.texas.gov/Documents/Publications/Staff_Report/2019/4753_Groundwater_Quality_Info.pdf

expeditious ways of notifying private water well owners.' The report noted that no significant fiscal impact is anticipated because of this statutory change.

The TGPC recommends that the statute be amended as follows:

"Sec. 26.408. NOTICE OF GROUNDWATER CONTAMINATION. (b) Not later than the 30th day after the date the commission receives notice under Subsection (a) or obtains independent knowledge of groundwater contamination, the commission shall make every effort to give notice of the contamination by first class mail or other direct means to each owner of a private drinking water well that may be affected by the contamination and to each applicable groundwater conservation district."

II. Abandoned Water Well Plugging and Education

The TGPC has long recognized abandoned domestic, municipal, industrial, irrigation, and livestock water wells as one of the most significant threats to Texas groundwater quality. Abandoned wells function as surface contaminant conduits to groundwater. Large diameter abandoned wells are also hazardous to humans and animals.

The *2019 LBB Staff Report* suggested establishing a statewide abandoned water well plugging program and fund, held outside of the General Revenue Fund but retained within the state Treasury. This program would be administered by GCDs within their territories and by TDLR in areas of the state that are not served by a GCD.

The report assumed that TDLR would require two additional full-time equivalent (FTE) positions for a Hydrologist II and an Administrative Assistant III for a cost of approximately $135,987.00 per fiscal year. It assumed that the agency would contract the plugging of abandoned wells to licensed water well drillers or pump installers.

An estimated one-time cost to adjust the Texas Well Report Submission and Retrieval System and set up a payment portal through Texas.gov would be $19,920. TDLR's related administrative and contract functions would be paid from revenue deposited to the new fund. The report assumed that the number of abandoned wells addressed for the first two years would be 50 per year, increasing to 150 per year in subsequent years.

GCD involvement in administering this program may also affect the number of abandoned wells to be addressed per year, the impact of which cannot be determined. One method to fund a statewide program would require a fee to be collected for construction of new wells, to be remitted to the state and proportionally distributed by TDLR to GCDs. This fee could be based on the number of abandoned wells identified in the GCD. The fee would offset the cost of administering the program to make it revenue-neutral for the state.

The *2019 LBB Staff Report* suggested an additional method to fund a statewide program that would use existing state revenue sources, which could be derived from General Revenue Funds or from repurposing an alternate revenue source, such as amending statute to expand the allowable use of the General Revenue–Dedicated Account No. 655.

Program funds should be disbursed 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. The TDLR should work cooperatively with local GCDs to disburse monies for the plugging of abandoned or deteriorated water wells within the GCD's jurisdiction. Also, the funds could be disbursed on a regional geographic model based on the areas of selection for member appointment to the Water Well Driller Advisory Council.

TGPC recommends that the legislature provide positive incentives for landowner-initiated closure of abandoned or deteriorated water wells through the establishment of a statewide abandoned water well plugging fund.

To support the abandoned water well plugging program, the TGPC further recommends continued legislative support for the Texas Well Owner Network (TWON) outreach program that is currently carried out by Texas A&M AgriLife Extension Service (AgriLife Extension) in coordination with the Texas Water Resources Institute. The TWON program should continue to provide educational publications and other resources that can be used by the public, county extension agents, and other local and regional agencies to educate water well owners on how to protect their drinking water and facilitate the proper plugging and management of abandoned water wells.

Another opportunity to increase awareness of the dangers of and landowner obligations is during the real estate transaction process. With the continued rapid growth in many parts of Texas, these transactions provide a unique chance to educate potential purchasers about any abandoned water wells that may be on the property.

In addition, the *2019 LBB Staff Report* suggested amending statute to increase information about abandoned water wells that is reported to buyers and to the state during the real estate disclosure process and require that TDLR be notified if an abandoned water well is identified. If one is found and disclosed, it would be required that the seller convey to the buyer the legal consequences before the final sale, and TDLR must be notified immediately of this condition. This notification could be communicated online through TDLR's Abandoned Well Reporting System (AWRS). Any individual who finds an abandoned or deteriorated water well can report it through the AWRS. The report assumed this effort can be absorbed within existing resources, and no significant fiscal impact is anticipated.

The TGPC recommends that the legislature amend the statute to require sellers to disclose all known water wells, whether active or abandoned, during the real estate disclosure process and to require that TDLR be notified if an abandoned water well is identified.

Over the last few years, the TGPC has become aware that some landowners do not realize their liability associated with converting an abandoned oil well into a water well, a process that requires an application to the RRC on Form P-13 - *Application of Landowner to Condition an Abandoned Oil Well for Fresh Water Production.*

A typical water well in Texas ranges from 30 to 1,100 feet in depth. Oil wells are different from water wells because they are much deeper (the average depth of Texas

oil and gas wells is 6,000 feet), and many penetrate injurious water zones that contain saltwater and hydrocarbon constituents. RRC regulations require oil and gas well drillers to plugback to the usable quality water zone, which can sometimes be over 5,000 feet deep. Plugging back to the usable zone, as determined by the RRC's Groundwater Advisory Unit, when converting an oil well to a freshwater well is a requirement in response to the damage caused by West Texas wildcat oil wells drilled in the 1950s.

When a landowner signs a Form P-13, they assume certain responsibilities for plugging the re-conditioned water well, should the water well become deteriorated and threaten groundwater resources. It is important for the landowner to understand the liability for owning an abandoned oil well that has been converted into a water well and the potential costs to plug the well should it become deteriorated. To this end, TGPC will update its existing Frequently Asked Questions (FAQ) document, *Can I Convert an Abandoned Oil or Gas Well Into a Water Well*.[5] TGPC recommends the RRC develop and add a similar Form P-13 FAQ to their website.

III. Evapotranspiration Network

Evapotranspiration (ET) is a key parameter used in the management of both agricultural and urban irrigation, commonly referred to as irrigation scheduling. The purpose of proper irrigation scheduling is to apply only the amount of water needed by the crop or plants at that point in time. Applying excess water wastes limited groundwater resources, and the resulting runoff and deep percolation carries water-soluble fertilizers, pesticides, and herbicides which can make their way into aquifers. Without ET data, irrigation decisions are often made using non-scientific methods resulting in excessive amounts of runoff and deep percolation. Deep percolation or aquifer recharge can affect groundwater quality. Similarly, the WCAC shared the same concern and recommended in its legislative report the incorporation of a statewide ET network into the TexMesonet program.

The TGPC recommends that the legislature:

- **Establish a statewide ET Network that provides timely and accurate crop/plant ET values to agricultural and urban irrigators so they can better manage their water use.**
- **Identify the agencies responsible for the ET Network and provide funding for its operation and maintenance.**
- **Provide funding for research of Texas-specific crop/plant ET coefficients.**

[5] https://tgpc.texas.gov/POE/FAQs/OG_ConvertWaterWell_FAQ.pdf

IV. Support of Agency Programs

State agency members of the TGPC have submitted their appropriation requests to the legislature that would provide the funds necessary to carry out existing groundwater protection programs. State funding may allow an agency to leverage the monies with additional federal funding from the U.S. Geological Survey (USGS), U.S. Environmental Protection Agency (EPA), or other federal agencies to implement these activities.

The TGPC recommends that the legislature continue to support, through legislative appropriations and expanded program authority, as appropriate, the many programs which enable the TGPC member agencies to protect groundwater quality. This support provides for groundwater protection activities through technology transfer, educational programming, research, quantification monitoring, and regulatory protection.

The TGPC continues to develop white papers to address current groundwater issues. The TGPC white paper recommendations on some of these issues are as follows:

A. On-site Sewage Facilities

- Provide funding to develop a statewide system to collect location, permitting, and design data for all On-site Sewage Facilities in Texas.

B. Protecting Groundwater Resources

- Provide research funding for groundwater monitoring of private water wells for fecal indicator bacteria, long-term quality parameters, and water well disinfection Best Management Practices (BMPs).
- Provide financial assistance funding to private water well owners for laboratory analysis of groundwater on a periodic basis and if their wellheads were submerged in a flood.
- Provide financial assistance to private well owners, groundwater conservation districts, and licensed water well drillers to retrofit older water wells so they are protective of groundwater.

C. Aquifer Storage and Recovery

- Provide funding for demonstration testing of hydrogeology, water quality, and operations to acquire new data and advance the implementation of aquifer storage and recovery (ASR) projects in Texas.
- Require an evaluation of the geochemical interactions between the source water and the receiving aquifer water in ASR projects, including metals mobilization studies and the compatibility of injected and recovered waters with existing water treatment regulations and distribution systems.
- Require the use of monitoring wells to help evaluate the subsurface effects of ASR stored water placement on injection zone water quality and on other nearby water wells.

- Require ASR projects associated with public water systems to coordinate with the TCEQ Water Supply Division during the ASR project design and permit application process.

Activities 2021 and 2022

The TGPC carries out numerous administrative duties required by state law, such as developing this biennial report for the Texas Legislature, holding required quarterly meetings, and ensuring that documents are maintained in a manner that makes them easily accessible to the public. In addition, the TGPC and its subcommittees are subject to the state's open meeting laws.

Periodically, state laws are enacted that require the TGPC to undertake rulemaking. Much of the TGPC's work is performed in quarterly meetings and through the efforts of its subcommittees.

Figure 2. Texas Groundwater Protection Committee Quarterly Hybrid Meeting in Austin, Texas, April 2022

Groundwater Protection Coordination

The TGPC met quarterly during the biennium, as required by TWC, Section 26.404. The Fiscal Year (FY) 2021 second through fourth quarter meetings were conducted via videoconference using the Microsoft Teams platform, and hybrid (in-person and virtual) meetings were held in FY2022. Regularly scheduled items on the TGPC agenda include subcommittee reports, groundwater-related presentations, roundtable discussions, business items, information exchanges, announcements, and public comment. In addition, agencies share and discuss current and ongoing rule development relating to the protection of groundwater. Meeting presentation topics during 2021 and 2022 included:

- Determining ASR project recoverability from a Texas regulatory perspective.
- Understanding and mitigating metals mobilization during ASR.
- Identification of a deep freshwater aquifer in several transboundary counties of Texas.
- A summary of TWDB's assessment of the potential for comingling of brackish water.

With a membership that includes ten statewide agencies and organizations, the TGPC bridges the gap between groundwater programs across the state and works to protect groundwater. Over its 33-year history, the TGPC has produced and delivered 16 (plus this one) reports to the legislature with recommendations; produced and delivered 31 (plus the 2021 report to be published this year) joint reports, tracking 22,193 cases of groundwater contamination; produced numerous brochures, factsheets, and white papers on groundwater-related subjects; participated in the preparation of three PMPs; and, produced three groundwater protection strategies for the state.

The TGPC oversees the GWI, POE, and Legislative Report Subcommittees. Selected Task Forces meet as directed by the TGPC or its subcommittees to address specific issues. The TGPC considers subcommittee findings, recommendations, and materials at its quarterly meetings. During 2021 and 2022, the GWI and POE Subcommittees were the most active.

The TGPC rules define the environmental conditions that constitute groundwater contamination for inclusion of cases in public files of state agencies having groundwater protection responsibilities. The rules describe the contents of the TGPC's *Joint Report* and specify the form and content of notices of groundwater contamination. The TGPC is required to develop and implement a rules-review plan for the periodic review and re-adoption of its rules per Government Code, Section 2001.039. The TGPC adopted its most recent rules review in April 2022. The next quadrennial rules review will be in 2026.

State law requires TCEQ to be the TGPC's administrative agent, and like other state agencies, the TGPC is subject to the state's open meeting laws. TCEQ maintains a mailing list of the TGPC members (designated and alternate members), subcommittee members, and agency staff for correspondence. TCEQ also notifies TGPC members, agency staff, and interested parties of upcoming meetings by e-mail. TCEQ provides meeting information through the *Texas Register* for public notification, maintains digital recordings of the TGPC meetings, prepares meeting records, and keeps meeting and correspondence files for the TGPC and its subcommittees. In addition, the TGPC publishes documents that are available through TCEQ's External Relations Division. See Appendix 2 for a list of selected TGPC publications.

Unlike other state agencies, the TGPC is not subject to sunset review since it does not receive direct state appropriations.

Texas Groundwater Protection Strategy

The Texas Legislature charged the TGPC with developing a comprehensive *Strategy* for the state that includes guidelines for the prevention of groundwater contamination and conservation of groundwater and provides for the coordination of the groundwater protection activities of all the entities represented on the TGPC. Simply put, the focus of the *Strategy* is documenting what needs to be done to protect groundwater in the state of Texas.

The most recent edition of the *Strategy* is TCEQ publication AS-188 (TCEQ, 2018).

As required by statute, the TGPC publishes the *Joint Report*, TCEQ publication SFR-056, every year. It explains the status of groundwater protection and monitoring activities that are conducted or required by each member of the TGPC to assure regulatory compliance with groundwater protection, assess ambient groundwater quality, and conduct research activities.

The plan for preserving and conserving groundwater in the state starts with the existing regulatory and non-regulatory groundwater protection, remediation, and conservation programs listed in the *Joint Report*. The most recent edition of the *Strategy* introduced a summary of how information is exchanged, and recommendations are made within and between the TGPC, its subcommittees, and the public to further protect groundwater resources in the state. The comprehensive *Strategy* for protecting groundwater in Texas includes both the TGPC members' internal programs and the TGPC's internal processes outlined in the updated *Strategy.*

Groundwater Classification System

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

TGPC has developed a Groundwater Classification System (Table 1) for use by state agencies. Four groundwater classes are defined based on quality as determined by total dissolved solids (TDS) content. TGPC believes that this method of classification remains valid and has made no changes to the system during this biennium.

Table 1. Groundwater Classification System for Texas Groundwater Protection Committee

CLASS	QUALITY[6] (mg/L)	EXAMPLES OF USE	AGENCY RESPONSE
Fresh	Zero to 1,000	Drinking and all other uses.	**Level I:** Protection or restoration measures basedon current use as a human drinking water supply.
Slightly Saline	More than1,000 to 3,000	Drinking if fresh water is unavailable, livestock watering, irrigation, industrial, mineral extraction, oil and gas production.	**Level I**
Moderately Saline	More than 3,000 to 10,000	Potential/future drinking and limited livestock watering and irrigation if fresh or slightly saline water is unavailable; industrial, mineral extraction, oil and gas production.	**Level I**
Very Saline to Brine	More than 10,000	Mineral extraction, oil and gas production.	**Level II:** Protection or restoration measures based on indirect exposure or no human consumption.

Groundwater Monitoring Strategy

The need for enhanced groundwater data is obvious – there have been high-profile incidents where the presence of comprehensive groundwater quality data could have avoided unnecessary federal involvement, litigation, and associated expenses for the state. TGPC previously identified gaps in groundwater monitoring information and developed two versions of a monitoring plan or *Strategy* for the state. Although the plans that were developed provided valuable suggestions for a representative monitoring program for the state, the documents neither individually nor collectively satisfied the TGPC's desire for a comprehensive monitoring program. Additionally, funding for such an undertaking remains an issue.

Public Outreach and Education

The TGPC's POE activities have two overarching themes: (1) the protection of human health from contaminated groundwater that contains high levels of naturally occurring compounds that could affect human health, and (2) the protection of groundwater from contamination.

The current POE activities are focused specifically on three topic areas:

- Abandoned Water Wells

[6] "Quality" refers to the ranges of total dissolved solids (TDS) concentration in milligrams per liter (mg/L)

- TWON
- Texas ET Networks

For each topic, the *Groundwater Educational Outreach Plan*[7] identified the most important groundwater-related messages, audiences, and actions that would deliver these messages to the public.

During 2021 and 2022, the TGPC continued its sponsorship of exhibitor booths and displays at virtual conferences, seminars, and meetings. From its exhibitor booth, the TGPC distributed its trifold brochure, hydrogeological maps, fact sheets, booklets, and links to downloadable groundwater publications at TGPC and other websites. In March of 2021, a TGPC-sponsored poster for National Groundwater Awareness Week was displayed in the Texas Capitol.

Figure 3. TCEQ geologist Scott Underwood at the TGPC POE exhibit booth

In 2021 and 2022, AgriLife Extension conducted several TGPC-supported educational events targeting domestic water well owners. TGPC-supported drinking water fact sheets were used in conjunction with their water well testing program. As a part of each of these events, participants are encouraged to contact a licensed water well driller or the local GCD to decommission water wells that are not in use or deteriorated. An Outreach Events Status Report, listing both recent and upcoming TGPC booth displays, and water well screening events, is updated on the TGPC POE

[7] https://tgpc.texas.gov/POE/TGPC_POE_GW_EduOutreachPlan10Sep2013.pdf

Subcommittee webpage before each quarterly meeting.

Figure 4. Texas A&M AgriLife Extension Service staff deliver a presentation at a Texas Well Owner Network educational event.

The TGPC website,[8] established in 2002, redesigned in 2013, and upgraded in 2015, is frequently updated with new information on groundwater protection activities. In addition to providing information about TGPC business to its members and the public, the website is a clearinghouse for many groundwater-related topics, supplying links to the websites and publications of TGPC members and other organizations. One existing FAQ was updated, and three new FAQs were added to the TGPC website during the last two years.

There are currently 46 FAQs, which are one- to two-page summaries of topics related to groundwater quality and groundwater quantity (e.g., pesticides, radionuclides, uranium mining, and oil and gas activities). The FAQs covers septic systems, water wells, administrative entities (e.g., GCDs, Regional Water Planning Groups, Municipal Settings Designations), and publications. These popular press articles assist statewide newsletter editors and webmasters in disseminating groundwater-related information to the public.

An email subscription service with over 7,200 recipients is used to notify the public of upcoming meetings and new TGPC website information. Website activity in 2021 and the first half of 2022 averaged 34 new and returning visitors per day, two webpages viewed per visit, and two minutes spent on the website per visit.

[8] https://tgpc.texas.gov/

Joint Groundwater Monitoring and Contamination Reports

TGPC publishes an annual groundwater monitoring and contamination report (Required by TWC, Section 26.406). The report:

- Describes the status of groundwater monitoring activities conducted or required by each agency at regulated facilities or associated with regulated activities.
- Identifies each newly documented case of groundwater contamination during the previous calendar year.
- Lists the cases of contamination documented during previous calendar years for which enforcement action was incomplete when the preceding report was issued.
- Indicates the status of enforcement action for each listed case of contamination.

The TGPC produced and published two monitoring and contamination reports during the previous two years: *Joint Groundwater Monitoring and Contamination Report—2020* (TGPC, 2021) and *Joint Groundwater Monitoring and Contamination Report—2021* (TGPC, 2022).

Each TGPC member agency or organization provides data for the *Joint Report* and a description of its programs that protect groundwater. Each regulatory program with enforcement authority provides a brief description of each case of groundwater contamination as well as the enforcement status for the case. Groundwater contamination cases are listed in the report by regulatory agency, then sorted by county and the specific regulatory program with jurisdiction over the case.

Groundwater Monitoring

The groundwater monitoring programs of the TGPC member agencies fall within one of three categories:

- Regulatory agencies that require or conduct monitoring to assure compliance with guidelines and regulations for the protection of groundwater from discharges of contaminants.
- Agencies or entities that conduct monitoring to assess ambient or existing groundwater quality conditions and to track changes in water quality over time.
- Agencies or entities that conduct 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 varies among the regulatory entities.

TCEQ's Office of Waste and Office of Water regulate approximately 16,000 facilities, 44 percent of which are active public water-supply wells. An estimated 70,000 sites are under the purview of the RRC, with most regulated facilities in RRC's Underground Injection Control program.

More than 45,000 regulatory wells, including nearly 14,000 public drinking water wells, are utilized for groundwater monitoring purposes in the state. Most of these wells are under TCEQ's jurisdiction, and the remainder are regulated by RRC.

The TWDB, GCDs, and USGS conduct non-regulatory groundwater monitoring to assess ambient groundwater quality conditions and to track changes over time. Some monitoring programs are developed for the assessment of water quality that target specific geographic areas, contaminants, constituents, or activities. Contamination cases discovered by these agencies or entities through groundwater studies or groundwater sampling programs are referred to the regulatory agency with the appropriate jurisdiction.

The TWDB and participating organizations reported sampling 322 water wells and monitoring sites (including springs) in 2021 and 177 in 2022. The TWDB's collection of these samples and analyses of additional samples from cooperative entities comprise the state's ambient groundwater quality sampling program. The TWDB enters groundwater quality data collected under this program into its groundwater database.

Groundwater Contamination

The TGPC defines "groundwater contamination" in its rules as 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. (Title 31, Texas Administrative Code, Chapter 601) The TGPC recognizes that groundwater contamination may result from many sources, including: agricultural activities; commercial and business endeavors; current and past oil and gas exploration and production and related practices; domestic activities; industrial and manufacturing processes; and, natural sources that may be influenced by, or may be the result of, human activities.

The contamination cases identified in the *Joint Report* are primarily those where contaminants have been discharged to the surface, to the shallow subsurface, or directly to groundwater from activities such as the storage, processing, transport, or disposal of products or waste materials. The most common contaminants reported in both 2020 and 2021 were gasoline, diesel fuel, and other petroleum products due to the large number of cases related to petroleum storage tank systems. Less commonly reported contaminants include inorganic pollutants such as arsenic, nitrate, and heavy metals; and organic compounds such as phenols, trichloroethylene, carbon tetrachloride, dichloroethylene, naphthalene, creosote constituents, and solvents.

There were 3,035 active groundwater contamination cases in the *Joint Report* for 2020 and 2,929 cases in 2021. Approximately 81 percent of the documented cases were under TCEQ jurisdiction, with the rest under RRC jurisdiction (about 19 percent).

Table 2 lists the documented groundwater contamination cases reported by each agency with enforcement jurisdiction and is further broken down by program within the agency. Table 2 also illustrates the total percentage of documented cases attributable to each agency and program and the net change and percentage change from 2020 to 2021.

Table 2. Groundwater Contamination Cases by Jurisdictional Agency, 2020-2021

Agency, Division, Program	**2020 Number of Cases**	**2021 Number of Cases**	% of total cases (2020)	% of total cases (2021)	Net Change (# of cases)	Percentage change (#of cases)
TCEQ, Radioactive Materials Division (RMD), Radioactive Materials Licensing	**1**	**1**	<0.1%	<0.1%	0	n/a
TCEQ, RMD, Uranium & Technical Assessments	**3**	**3**	0.1%	0.1%	0	n/a
TCEQ, Remediation Division (REM), Brownfield Site Assessment	**2**	**2**	<0.1%	0.1%	0	n/a
TCEQ, REM, Corrective Action	**543**	**509**	17.9%	17.4%	-34	-6.7%
TCEQ, REM, Dry Cleaner Remediation	**238**	**241**	7.8%	8.2%	+3	0.1%
TCEQ, REM, Innocent Owner/Operator	**61**	**65**	2.0%	2.2%	+4	6.6%
TCEQ, REM, Preliminary Assessment and Site Inspection	**1**	**2**	<0.1%	0.1%	+1	n/a
TCEQ, REM, Petroleum Storage Tank	**1,040**	**1,030**	34.3%	35.2%	-10	<0.1%
TCEQ, REM, Superfund Cleanup	**83**	**84**	2.7%	2.9%	+1	<0.1%
TCEQ, REM, Superfund Site Discovery and Assessment	**5**	**3**	0.2%	0.1%	-2	n/a
TCEQ, REM, Voluntary Cleanup	**412**	**355**	13.6%	12.1%	-57	-13.8%
TCEQ, Waste Permits Division (WPD), Municipal Solid Waste	**52**	**52**	1.7%	1.8%	0	n/a
TCEQ, WPD, Industrial and Hazardous Waste	**1**	**0**	<0.1%	0%	-1	0%
TCEQ, Water Quality Division, Water Quality Assessment	**17**	**18**	0.6%	0.6%	+1	0.1%
TCEQ, Water Supply Division, Public Drinking Water	**7**	**2**	0.2%	0.1%	-5	-71%
TCEQ, Water Availability Division, Groundwater Planning and Assessment	**0**	**0**	0%	0%	0	n/a
TCEQ, Enforcement Division	**2**	**2**	<0.1%	0.1%	0	n/a
TCEQ - Subtotal:	**2,468**	**2,369**	81.3%	80.9%	-99	-4.2%
Railroad Commission of Texas (RRC), Oil and Gas Division	**567**	**560**	18.7	19.1%	-7	<0.1%
Total:	***3,035***	***2,929***			*-106*	

The joint reports for both 2020 and 2021 document the number of groundwater contamination cases attributed to leaking petroleum storage tanks (LPSTs). As reported by TCEQ, the number of documented groundwater contamination cases resulting from the failure of petroleum storage tank systems remained relatively steady in 2020 (1,040 cases) and 2021 (1,030 cases). These numbers are consistent with the number of LPST cases in the previous two-year period, 2018 (1,140 cases) and 2019 (1,050 cases).

While the number of documented contamination cases from LPST sites is high compared to other programs, it can be directly linked to the number of regulated facilities. Although contamination from LPSTs remains the largest category in the *Joint Report*, the number of cases has declined about 84 percent from the 6,504 contamination cases attributed to LPSTs listed in the 1999 *Joint Report*.

This declining trend does not necessarily indicate that a smaller percentage of regulated petroleum storage tanks are leaking. It does, however, show the effectiveness of new regulations implemented during the 1990s that helped detect leaks and address them before affecting groundwater.

Table 2 also illustrates the number of active cases reported by the RRC, which has remained relatively steady over the previous biennium. Active RRC cases are under the jurisdiction of the Oil and Gas Division.

The TCEQ programs with a decrease in the number of active cases from 2020 to 2021 are: Corrective Action (34 fewer cases), PST (10 fewer cases), Voluntary Cleanup (57 fewer cases), and Industrial Hazardous Waste (one fewer case). The following TCEQ programs had an increase of fewer than five cases: Dry Cleaner Remediation (three more cases), Innocent Owner/Operator (four more cases), Preliminary Assessment / Site Inspection (four more cases), and Water Quality Assessment (one more case).

The *Joint Report* also shows the status of enforcement action for each instance of groundwater contamination. For purposes of the *Joint Report*, enforcement action includes any agency action that carries out or needs 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, although the status of a contamination case may remain at an agency action level for a long period, 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 correlation between an agency's response (enforcement status) and the completion of the discrete phases in the progression of contamination investigation (activity status).

Once groundwater contamination has been confirmed, either the regulated entity or the agency will address the groundwater contamination incident following a general sequence of actions until the investigation concludes that no further action is necessary. Each of the 3,307 cases listed in the 2020 report have documented groundwater contamination and the activity status for these cases can be summarized as follows:

- No activity has occurred in 161 reported cases.
- Contamination is confirmed (validated) in 245 cases.
- Investigations are ongoing for the largest number of cases: 1,051.
- Corrective action planning is complete in 177 cases.
- Action was implemented in 380 cases.
- Monitoring action is ongoing in 603 cases.
- No further action is necessary for 312 cases designated as "action completed."
- For three cases, no activity status information was provided.

Historically, the number of new groundwater contamination cases documented each year has been greater than the number of cases in which action was completed. This was evident in the first publication of the report in 1989 and continued through the 1999 calendar year. Starting in 2000, the trend generally changed, and since 2012 the number of new cases and completed cases has been similar.

The 2021 *Joint Report* includes a summary of the changes in the previous 20 years, which for this report is from 2002. In the past 20 years, the average number of new cases each year is approximately 440, which is significantly lower than the average number of new cases each year before 2000. The number of new cases reported in 2021 is about 15 percent lower than 2020 and is generally consistent with the past 20 years. The number of completed cases has also varied over the years but has remained relatively steady since 2000 and through 2020.

Notification of Groundwater Contamination

TWC, Section 26.408 requires TCEQ to inform private drinking water well owners of groundwater contamination that has the potential to affect their water wells. TCEQ has 30 days from the date notice of groundwater contamination is received to notify well owners of the potential contamination and any possible adverse health effects associated with the contaminant of concern. GCDs located in the county where the contamination is occurring are also notified. In November 2003, and in accordance with the statute, the TGPC developed by rule the form and content of the TCEQ notice.

During fiscal 2021 and fiscal 2022, 789 notices were mailed for 93 cases of potential groundwater contamination to the owners of private drinking water wells.

Prevention of Pollution from Agricultural Chemicals

TWC, Section 26.407 requires TCEQ to develop any necessary management plans for agricultural chemicals, with the advice of the TGPC. TCEQ with participation from the TGPC, in 2001, developed the Texas State Management Plan for Prevention of Pesticide Contamination of Groundwater.[9] This plan, as a generic PMP for the state, serves as a

[9] https://wayback.archive-it.org/414/20210904135754/https:/www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/070_01.pdf

guide for the prevention of pesticide contamination of groundwater. The plan was developed as a joint effort of the former TGPC Agricultural Chemicals Subcommittee, now a task force within the GWI Subcommittee. Agricultural Chemicals Task Force (ACTF) status reports are provided at the quarterly subcommittee meetings.

The PMP explains the general policies and regulatory and non-regulatory approaches the state will use to protect groundwater resources from pesticide contamination. The plan describes how the responsible agencies will coordinate while executing the PMP. It also provides specific responses and actions needed to protect groundwater. The PMP reflects the state's philosophy toward groundwater protection and recognizes the importance of agriculture to the state's economy. Much of the TGPC's work on agricultural chemicals follows the PMP and is performed by the ACTF.

Currently, the ACTF's focus is on two areas of the PMP: (1) continued cooperative monitoring; and (2) identifying and providing outreach on Best Management Practices in problem areas. Monitoring efforts have been achieved through TCEQ and TWDB cooperative sampling.

The 2021 cooperative monitoring effort succeeded in collecting a total of 143 well and spring samples and 62 Quality Assurance (QA) samples for 205 atrazine and 2,4-D analyses. There were no significant atrazine or 2,4-D detections in the cooperative monitoring immunoassay samples. These results are consistent with the historical trend of no detections with an occasional low-level detection of atrazine or 2,4-D.

Results of the pesticide sampling of groundwater by the USGS for 2020 and 2021 and the 2021 cooperative monitoring results were entered into the Interagency Pesticide Database (IPD) in 2021 and early 2022. Some of this work included conducting QA/QC tasks. New totals for the IPD include 6,892 wells/springs, 15,547 samples, and 388,345 analytes. Also, TCEQ updated the U.S. EPA's online Pesticides of Interest Tracking System through 2021. The most recent update was initiated in December 2022.

The TGPC-sponsored educational outreach activities included the TCEQ Public Drinking Water Conference in August 2021, the Texas Plant Protection Conference in December 2021, and the TCEQ Environmental Trade Fair in May 2022. During these conferences, the PMP program was explained through the distribution of brochures and the display of various pesticide monitoring graphics, including maps of water wells monitored for pesticides in Texas.

Appendices

Appendix 1. Texas Groundwater ProtectionCommittee Membership

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Appendix 2. Selected Publications of the TGPC

Texas Groundwater Protection Strategy. TCEQ publication AS-188 (November 2018).

www.tceq.texas.gov/downloads/groundwater/publications/as-188-texas-groundwater-protection-strategy.pdf

Joint Groundwater Monitoring and Contamination Report – 2021. TCEQ publication SFR- 056/21 (July 2022); and *Joint Groundwater Monitoring and Contamination Report – 2020*. TCEQ publication SFR-056/20 (July 2021).

www.tceq.texas.gov/groundwater/groundwater-planning-assessment/sfr-056-joint-groundwater-monitoring-contamination-report

*Texas State Management Plan for Prevention of Pesticide Contamination of Groundwater.*TCEQ publication SFR-070 (January 2001).

https://wayback.archive-it.org/414/20210904135754/https://www.tceq.texas.gov/assets/public/comm_exec/pubs/sfr/070_01.pdf

Texas Groundwater Protection Committee. TCEQ publication GI-088 (December 2015).

www.tceq.texas.gov/downloads/groundwater/publications/gi-088-texas-groundwater-protection-committee.pdf

Landowner's Guide to Plugging Abandoned Water Wells. TCEQ publication RG-347 (April 2021).

www.tceq.texas.gov/downloads/groundwater/publications/landowners-guide-to-plugging-abandoned-water-wells-rg-347.pdf

Landowner's Guide to Plugging Abandoned Water Wells (Spanish). TCEQ publication RG-347/esp (April 2021).

www.tceq.texas.gov/downloads/groundwater/publications/guia-del-terrateniente-para-tapar-pozos-de-agua-abandonados-rg-347esp.pdf

Drinking Water Problems Fact Sheets

Arsenic. AgriLife Extension publication (English) EL-5467 (December 2005) and (Spanish) EL-5467S (June 2006).

Perchlorate. Texas AgriLife Extension Service publication (English) EL-5468 (November 2005) and (Spanish) EL-5468S (February 2006).

Nitrates. AgriLife Extension publication (English) EB-6184 (May 2006) and (Spanish) EB-6184S (May 2006).

Radionuclides. AgriLife Extension publication (English) EB-6192 (July 2006) and (Spanish) EB- 6192S (November 2006).

MTBE. AgriLife Extension publication (English) L-5502 / EL-5502 (June 2008).

Benzene. AgriLife Extension publication (English) L-5513 / EL-5513 (April 2009).

Note: Find these publications at https://agrilifelearn.tamu.edu/s/.

On-site Wastewater Treatment Systems Fact Sheets

Homeowner's Guide to Evaluating Service Contracts. AgriLife Extension publication (in English) B-6171 / EB-6171 (July 2005).

Graywater. AgriLife Extension publication (English) EB-6176 (October 2005).

Understanding and Maintaining Your Septic System. AgriLife Extension publication (English) L-5491 / EL-5491 (March 2008).

Note: Find these publications at https://agrilifelearn.tamu.edu/s/.

Water Wells Fact Sheets

Capping of Water Wells for Future Use. AgriLife Extension publication (English) EL-5490 (August 2007).

Plugging Abandoned Water Wells. AgriLife Extension publication (English) B-6238 / EB-6238 (April 2010).

Note: Find these publications at https://agrilifelearn.tamu.edu/s/.

Pesticides Best Management Practices Trifold Brochure

Keep Pesticides Out of Texas Water Supplies – Best Management Practices to Prevent Pesticide Contamination. AgriLife Extension publication (English) L-5500 / EL-5500 (July 2008).

Note: Find this publication at https://agrilifelearn.tamu.edu/s/.

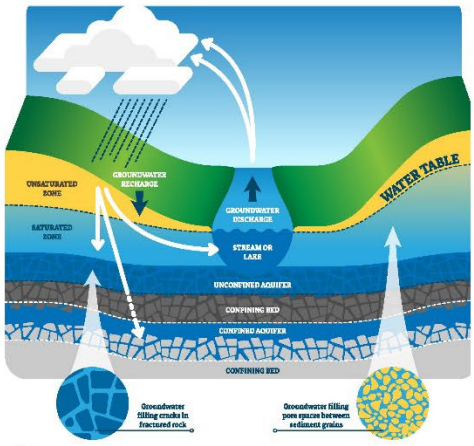
Figure 5. Mickey Leland Intern Claudia Guillot-Wallace and TCEQ geologist Al Cherepon analyze groundwater samples for pesticides on June 10, 2022.

National Groundwater Awareness Week

MARCH 5–11, 2023

Groundwater is a precious resource in Texas that needs to be protected and preserved

Groundwater



- 95% of Texans depend on public drinking water supplies. 17% of that supply, 991 million gallons per day, is from groundwater, serving over 4,965,160 Texans.
- There are 13,851 active public water supply wells in Texas ranging in depth from 12 to 5,400 feet.
- 9 major aquifers and 22 minor aquifers supply 55% of all the water used in the state
- 1,320,000 Texans rely on groundwater from their own wells for their drinking water and use 137 million gallons per day.
- The quality of Texas' groundwater is generally good, and after the required disinfection, meets the U.S. Environmental Protection Agency's safe drinking water standards without additional treatment.

NATIONWIDE, GROUNDWATER PROVIDES AN ESTIMATED:	IN TEXAS, GROUNDWATER PROVIDES AN ESTIMATED:
■ 29% of all freshwater withdrawals	■ 56% of all freshwater withdrawals
■ 48% of agricultural use (mostly for irrigation)	■ 73% of agricultural use (mostly for irrigation)
■ 39% of the public water supply withdrawals	■ 17% of the public water supply withdrawals
■ 98% of drinking water for the rural population	■ >99% of drinking water for the rural population

From the United States Geological Survey, the National Groundwater Association, the Texas Water Development Board, and the Texas Commission on Environmental Quality

FOR MORE INFORMATION ON GROUNDWATER ISSUES IN TEXAS, visit the Texas Groundwater Protection Committee's website at www.tgpc.texas.gov