

The background of the slide is a close-up photograph of water with concentric ripples, creating a textured blue surface. The text is overlaid on this background.

History of the Texas Groundwater Protection Committee

October 23, 2019

House Bill 1458

TGPC Enabling Legislation

1989

CHAPTER 768

H.B. No. 1458

AN ACT

relating to the protection of groundwater in the state and to the creation, powers, and duties of the Texas Groundwater Protection Committee.

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF TEXAS:

SECTION 1. Chapter 26, Water Code, is amended by adding Subchapter J to read as follows:

SUBCHAPTER J. GROUNDWATER PROTECTION

Sec. 26.401. LEGISLATIVE FINDINGS. (a) The legislature finds that:

(1) in order to safeguard present and future groundwater supplies, usable and potentially usable groundwater must be protected and maintained;

(2) protection of the environment and public health and welfare requires that groundwater be kept reasonably free of contaminants that interfere with present and potential uses of groundwater;

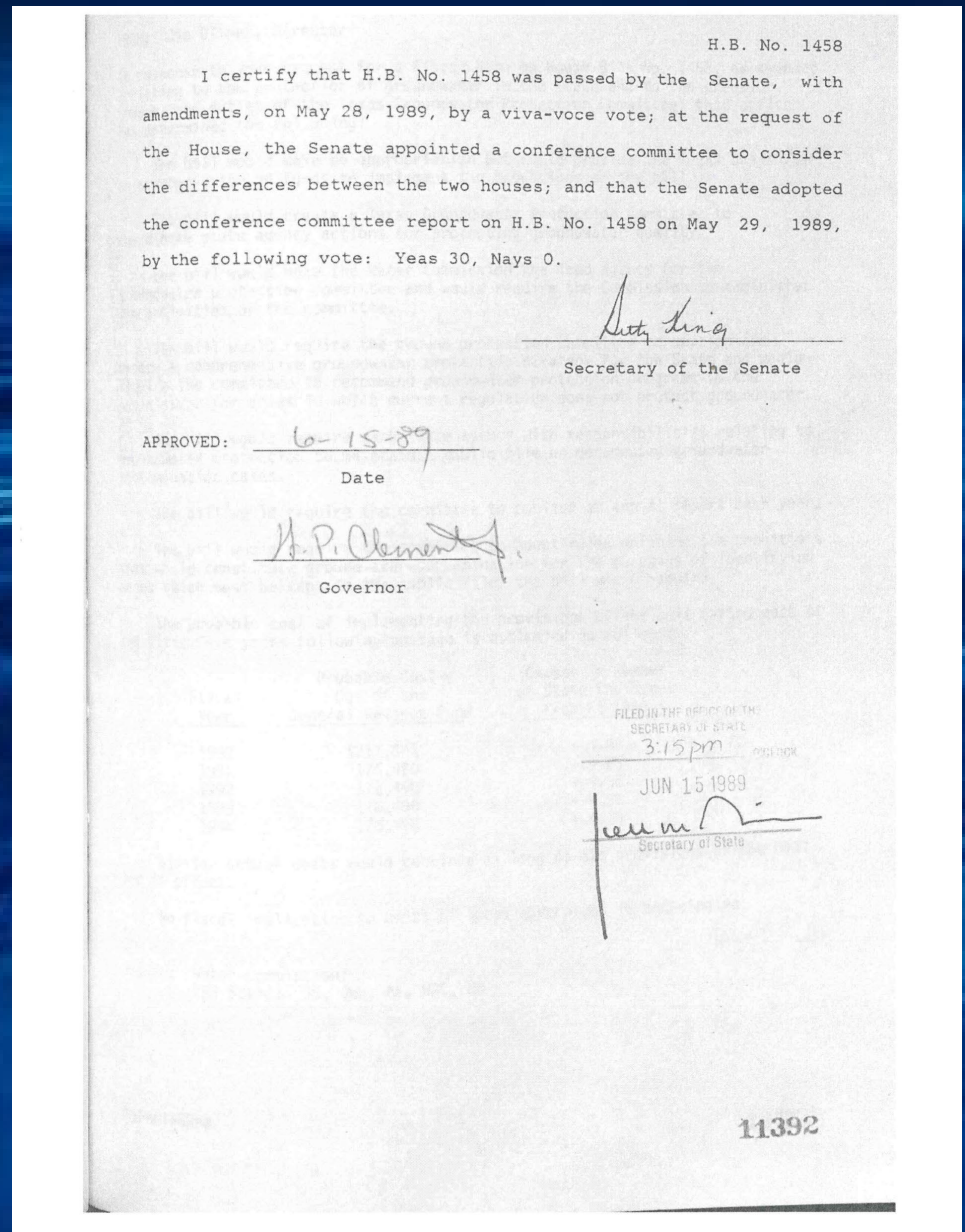
(3) groundwater contamination may result from many sources, including current and past oil and gas production and related practices, agricultural activities, industrial and manufacturing processes, commercial and business endeavors, domestic activities, and natural sources that may be influenced by or may result from human activities;

(4) the various existing and potential groundwater

House Bill 1458

TGPC Enabling Legislation (cont.)

1989




Ground Water Protection Committee

First Agenda

1985

TEXAS DEPARTMENT OF WATER RESOURCES
1700 N. Congress Avenue
Austin, Texas

TEXAS WATER DEVELOPMENT BOARD
Louis A. Beecherl, Jr., Chairman
George W. McCleskey, Vice Chairman
Glen E. Roney
Lonnie A. "Bo" Pilgrim
Louie Welch
Stuart S. Coleman


Charles E. Nemir
Executive Director

TEXAS WATER COMMISSION
Paul Hopkins, Chairman
Lee B. M. Biggart
Ralph Roming

GROUND-WATER PROTECTION COMMITTEE
First Meeting
July 16, 1985, 2:00 P.M.
Stephen F. Austin Building
Room 513-F

AGENDA


INTRODUCTION of COMMITTEE
PURPOSE
Work Product

GROUND-WATER PROTECTION ACTIVITIES
Report from Members
Discussion

SCHEDULE NEXT MEETING
Format of Work Product

STATE GROUND-WATER GRANT PROGRAM FY 1986
Proposed Contracts

P.O. Box 13087 Capitol Station • Austin, Texas 78711 • Area Code 512/463-7847


1836-1986

Ground Water Protection Committee

Texas Groundwater Protection Strategy

1988

TEXAS GROUND WATER PROTECTION STRATEGY



Prepared by the
Ground Water Protection Committee

Participating State Agencies:

- Texas Water Commission
- Texas Water Development Board
- Railroad Commission of Texas
- Texas Department of Health
- Texas Department of Agriculture
- Texas State Soil and Water Conservation Board
- Texas Water Well Drillers Board

January 1988

State's Adopted Groundwater Policy

SUBCHAPTER J. GROUNDWATER PROTECTION

Sec. 26.401. LEGISLATIVE FINDINGS. (a) The legislature finds that:

(1) in order to safeguard present and future groundwater supplies, usable and potentially usable groundwater must be protected and maintained;

(2) protection of the environment and public health and welfare requires that groundwater be kept reasonably free of contaminants that interfere with present and potential uses of groundwater;

(3) groundwater contamination may result from many sources, including current and past oil and gas production and related practices, agricultural activities, industrial and manufacturing processes, commercial and business endeavors, domestic activities, and natural sources that may be influenced by or may result from human activities;

(4) the various existing and potential groundwater uses are important to the state economy; and

(5) aquifers vary both in their potential for beneficial use and in their susceptibility to contamination.

(b) The legislature determines that, consistent with the protection of the public health and welfare, the propagation and protection of

terrestrial and aquatic life, the protection of the environment, the operation of existing industries, and the maintenance and enhancement of the long-term economic health of the state, it is the goal of groundwater policy in this state that the existing quality of groundwater not be degraded. This goal of nondegradation does not mean zero-contaminant discharge.

(c) It is the policy of this state that:

(1) discharges of pollutants, disposal of wastes, or other activities subject to regulation by state agencies be conducted in a manner that will maintain present uses and not impair potential uses of groundwater or pose a public health hazard; and

(2) the quality of groundwater be restored if feasible.

(d) The legislature recognizes the important role of the use of the best professional judgment of the responsible state agencies in attaining the groundwater goal and policy of this state.

Added by Acts 1989, 71st Leg., ch. 768, Sec. 1, eff. Sept. 1, 1989.

State's Groundwater Classification System

Groundwater Classification System

Purpose

The Texas Groundwater Protection Committee and its member agencies recognize that groundwater classification is an important tool to be used in the implementation of the groundwater policy contained in Section 26.401 of the Texas Water Code. Through classification, the groundwaters 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.

Basis

Four classes are defined based on quality as determined by total dissolved solids content (see table below). The names and concentration ranges are based on traditional nomenclature associated with each class. Quality also determines usability, however, it is implicit in this classification that a water-bearing zone must be able to produce sufficient quantities of water to meet its intended use. The examples of use are intended to describe some of the common uses of these classes and are not meant to be exclusive of other uses which might arise due to unusual circumstances or application of new technology such as desalinization.

Application

This groundwater classification system applies to all groundwaters in the state. In assigning a classification, the member agencies shall endeavor to use the natural quality of the groundwater that is unaffected by discharges of pollutants from human activities.

All usable and potentially usable groundwaters are subject to the same protection afforded the nondegradation policy goal of the Texas Water Code in Section 26.401. This section further states that nondegradation does not mean zero-contaminant discharge. Starting with this nondegradation policy goal, protection or restoration measures can be varied according to the response level set by the classification and guidance of this narrative so long as the following conditions are met:

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

In determining protection or restoration measures, the member agencies should consider all beneficial uses to which groundwater of a given quality can currently or potentially be put. Generally, the use of groundwater requiring the highest degree of protection or restoration is human consumption as drinking water. Protection for this use will also be protective of all other current or potential uses in almost all circumstances.

State's Groundwater Classification System (cont.)

The suitability of a zone for use as a human drinking water supply can be based on the quality and quantity of the water it contains as well as its ability to produce enough water to meet its intended use. These considerations facilitate defining two response levels for purposes of assigning protection or restoration measures that are commensurate with the potential to impact human health and the environment.

- Level I response for the fresh, slightly saline and moderately saline classes should be based on the current or potential use as a human drinking water supply.
- Level II response for the very saline to brine class should be based on indirect exposure (i.e., by means other than drinking) or no human consumption.

Evaluations

In specifying a protection or restoration measure, member agencies must apply best professional judgement on a case-by-case basis. Evaluations to be made include, but are not limited to, such factors as:

- yield,
- the availability of alternate sources of water,
- any background concentrations of naturally occurring constituents,
- the effects of constituents on usability,
- traditional and potential beneficial uses of the water,
- economic and technical feasibility of treatment, and
- projected needs for and types of impacts on these groundwaters.

In instances where there is a likelihood of hydrologic interconnection with resultant potential for contaminant movement from a given groundwater zone to a surface water body or other groundwater zones, protection and restoration measures for that zone should be determined by the quality and current and potential use of the receiving waters.

Additional

This classification system is intended to be implemented by member agencies as integral part of their groundwater quality programs. In addition to its response setting function, the classification system can also serve as a common basis among the various programs to foster consistency. It can also be used as a mapping tool to delineate specific areas in need of more detailed groundwater quality management. Towards this end, the committee recognizes the important contributions of all agencies that compile such data and supports the continuing efforts to enhance the statewide database.

State's Groundwater Classification System (cont.)

**Texas Groundwater Protection Committee
Groundwater Classification System**

CLASS	QUALITY	EXAMPLES OF USE	AGENCY RESPONSE
Fresh	Zero to 1,000	Drinking and all other uses.	Level I Response: Protection or restoration measures based on current use as a human drinking water supply.
Slightly Saline	More than 1,000 to 3,000	Drinking if fresh water is unavailable, livestock watering, irrigation, industrial, mineral extraction, oil and gas production.	Level I Response: Same as above.
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 Response: Same as above.
Very Saline to Brine	More than 10,000	Mineral extraction, oil and gas production	Level II Response: Protection or restoration measures based on indirect exposure or no human consumption.

Texas Groundwater Protection Committee

First Agenda

1989

Meeting # 1

TEXAS GROUND WATER PROTECTION COMMITTEE

Thursday, October 26, 1989
Stephen F. Austin Building, Room 1149
1:30 p.m.

A G E N D A

- I. Introduction
- II. Review of Committee Duties as Required by H.B. 1458
- III. EPA Presentation - Pesticides and Agricultural Toxic Substances
- IV. Subcommittee Report on Preparation of Joint Ground Water Monitoring and Contamination Report
- V. Announcement and Information Exchange for Other Ground Water Related Activities
- VI. Adjourn

TGPC Rules



Texas Administrative Code

<u>TITLE 31</u>	NATURAL RESOURCES AND CONSERVATION
<u>PART 18</u>	TEXAS GROUNDWATER PROTECTION COMMITTEE
<u>CHAPTER 601</u>	GROUNDWATER CONTAMINATION REPORT

Subchapters

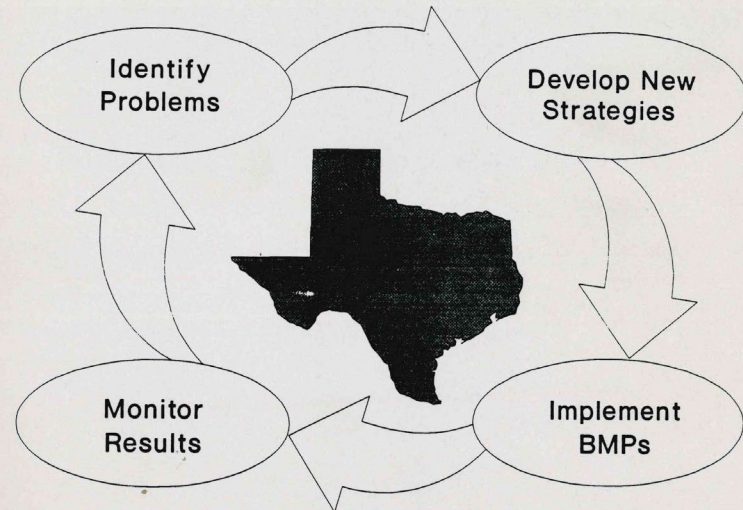
<u>SUBCHAPTER A</u>	<u>GENERAL PROVISIONS RELATING TO PUBLIC FILES AND JOINT REPORT</u>
<u>SUBCHAPTER B</u>	<u>NOTICE OF GROUNDWATER CONTAMINATION</u>

[HOME](#) [TEXAS REGISTER](#) [TEXAS ADMINISTRATIVE CODE](#) [OPEN MEETINGS](#)

Texas State Management Plan for Agricultural Chemicals in Ground Water

1991

TEXAS STATE MANAGEMENT PLAN FOR AGRICULTURAL CHEMICALS IN GROUND WATER



PREPARED BY THE AGRICULTURAL CHEMICALS SUBCOMMITTEE
OF THE TEXAS GROUNDWATER PROTECTION COMMITTEE

JUNE, 1991

Joint Groundwater Monitoring and Contamination Report

1989

Z-94

JOINT GROUNDWATER MONITORING AND CONTAMINATION REPORT



Prepared by the
Texas Groundwater Protection Committee

Contributing State Agencies and Organizations:

- Texas Water Commission
- Texas Water Development Board
- Railroad Commission of Texas
- Texas Department of Health
- Texas Department of Agriculture
- Texas State Soil and Water Conservation Board
- Texas Groundwater Management Districts Association

April 1990

Joint Groundwater Monitoring and Contamination Report

1989

Z-94

JOINT GROUNDWATER MONITORING AND CONTAMINATION REPORT



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- Texas Groundwater Management Districts Association

2,244 unique cases

April 1990

Groundwater Research Subcommittee, 2009



Agricultural Chemicals Subcommittee, 2011



Nonpoint Source Task Force, 2011



Data Management Subcommittee, 2014



Legislative Report Subcommittee, 2018



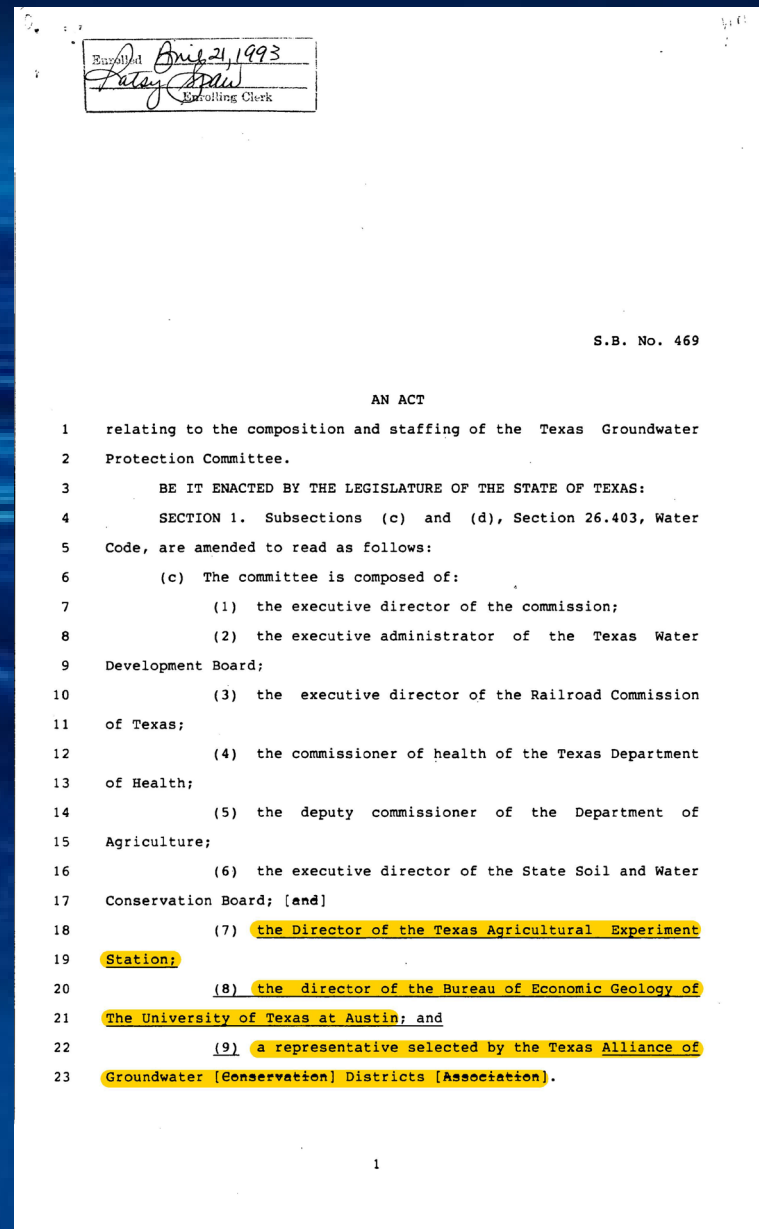
Public Outreach and Education Subcommittee, 2019



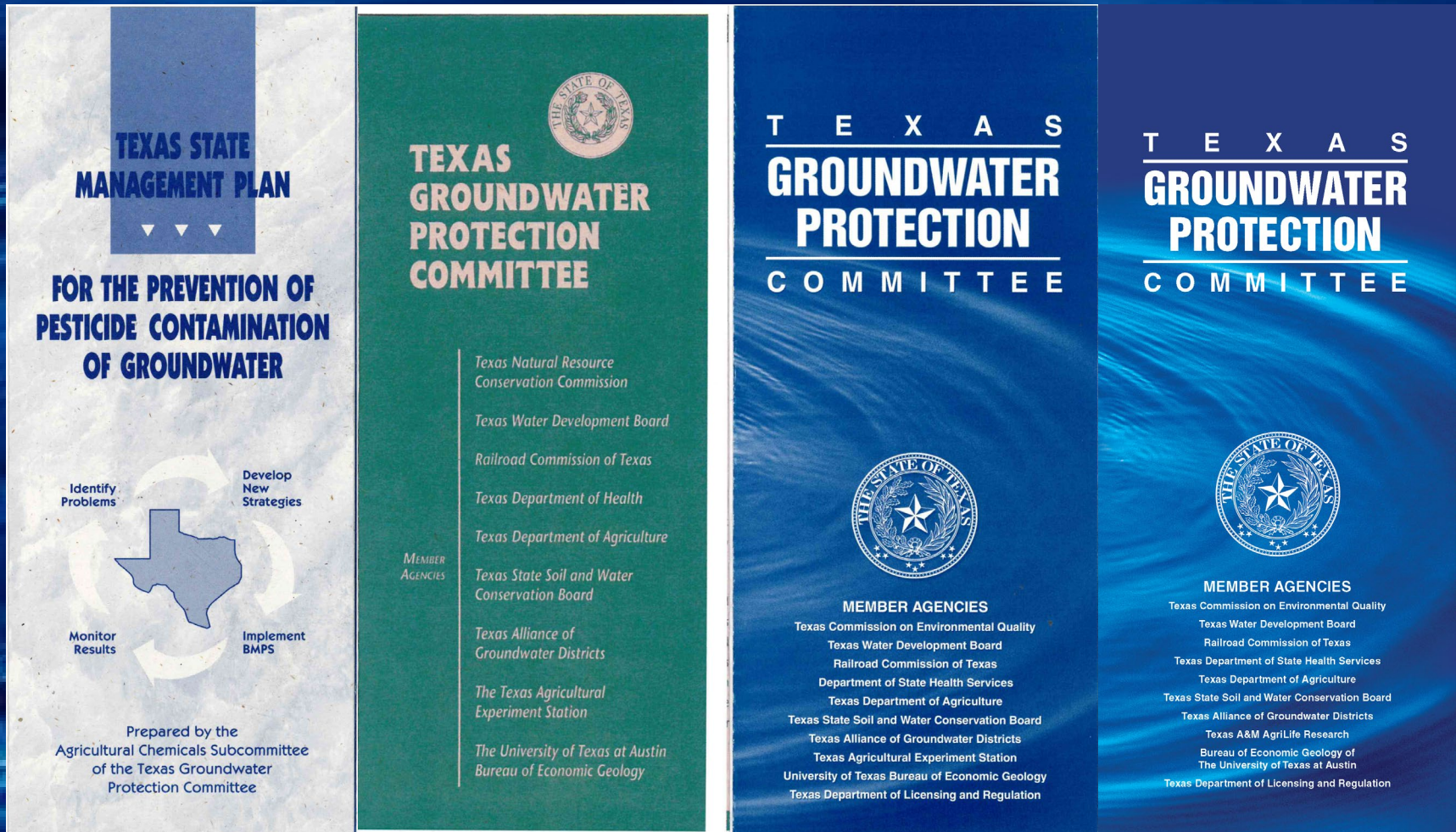
Senate Bill 469

Added AgriLife Research, UTBEG, and TAGD

1993



TGPC Educational Brochures, 1994 – present



TGPC Educational Brochures, 1999 – present

Landowner's Guide to Plugging Abandoned Water Wells

Texas Groundwater Protection Committee
April, 1999, RG-347

Water is one of our state's most precious resources. Groundwater derived from many aquifers supplies over half of the water used in the state. Protecting the quality of this vital resource is the responsibility of all Texans.

For many years groundwater has been pumped through water wells. Over the years, many wells around homes, farms, industrial sites, and urban areas have been abandoned without being properly plugged. Not only are these wells potential groundwater-contamination avenues, many are a safety hazard to children and animals. Although plugging an abandoned well takes time and money, these wells are a threat that cannot be ignored.

Texas law makes the landowner responsible for plugging abandoned wells and, therefore, liable for any water contamination or injury. This publication is provided to help landowners understand how to plug a well properly. It is highly recommended that before you begin the process of plugging an abandoned well that you seek advice from your local groundwater conservation district, a licensed water well driller in your area, or the Water Well Drillers Program with the Texas Department of Licensing and Regulation (TDLR).

Phone numbers for the TDLR and groundwater conservation districts are included on page 6. A map showing the location of the state's groundwater conservation districts is also included.

WHAT ARE THE HAZARDS ASSOCIATED WITH ABANDONED WELLS?

Personal Safety

This hazard is obvious to anyone who has encountered an unmarked and uncovered large diameter well. Accidents involving humans and animals falling into abandoned wells have happened and continue to occur. Even when a well is covered,

the soil around the well may be unstable and can cave in. The liability associated with abandoned wells has not really been tested in Texas. A good question for a landowner with an abandoned well to ask is, "Do I want to be the first legal test case in Texas?"

Groundwater Contamination

An abandoned well is a d surface to the aquifer belt the well are introduced di no opportunity for natural geologic materials. If a cc with a concentrated chem health-threatening levels high. This puts other wells particularly those wells that are close to the aban of 2,4-D herbicide can co million gallons of water. I approximately that much upper 3 feet of an aquifer

Co-mingling of Groundwater

A well open to more than water to migrate out of a head and enter a zone wit many areas of Texas, deep pressures and are extreme from a high pressure well abandoned without proper upward flow of salty water will cause contamination aquifer. Also, any pollutants can migrate to another zone

Loss of Aquifer Pressure

Pressure head in artesian depleted as water discharges to less pressurized aquifer wells contribute to the regional

TCEQ
RG-347
2005
C.2

Landowner's Guide to Plugging Abandoned Water Wells

Texas Groundwater Protection Committee
February, 2005; RG-347



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Abandoned wells are regulated by the TDLR and local Groundwater Conservation Districts through Texas Occupations Code, Sections 1901.255 and 1901.256.

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Austin, Texas

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Groundwater Contamination

An abandoned well is a direct conduit from the surface to the aquifer below. Contaminants that enter the well are introduced directly into the aquifer with no opportunity for natural filtration by soils or geologic materials. If a contamination incident occurs with a concentrated chemical, the potential for health-threatening levels in the underlying aquifer is high. This puts other wells in the aquifer at risk, particularly those wells on the same property or those that are close to the abandoned well. Just one gallon of 2,4-D herbicide can contaminate about three to four million gallons of water. In terms of groundwater, approximately that much water would be held in the upper three feet of an aquifer over a 20-acre area.

Co-mingling of Groundwater

A well open to more than one aquifer will allow water to migrate out of a zone with higher pressure head and enter a zone with lower pressure head. In many areas of Texas, deep aquifers are under high pressure and are extremely salty. When the casing from a high pressure well deteriorates and the well is

Landowner's Guide to Plugging Abandoned Water Wells

Texas Groundwater Protection Committee
March, 2006; RG-347

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TCEQ REGULATORY GUIDANCE
Texas Groundwater Protection Committee
RG-347 • Revised March 2010

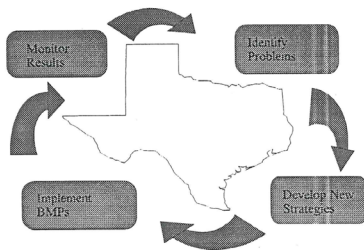
Landowner's Guide to Plugging Abandoned Water Wells

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1996 TGPC Publications

TEXAS STATE MANAGEMENT PLAN FOR PREVENTION OF PESTICIDE CONTAMINATION OF GROUND WATER



PREPARED BY THE
AGRICULTURAL CHEMICALS SUBCOMMITTEE
OF THE
TEXAS GROUNDWATER PROTECTION
COMMITTEE

MARCH 1996



August 1996
GI-272 (formerly AS-109)

Texas Ground-Water Data Dictionary

printed on
recycled paper
Data Management Subcommittee/Texas Groundwater Protection Committee
TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

TEXAS GROUNDWATER PROGRAM DIRECTORY

Prepared by the
Texas Groundwater Protection Committee



Texas Natural Resource Conservation Commission

GI-226

10/96

TGPC Homepage

<http://www.tgpc.state.tx.us>

Established
1998,
Screenshot
2004




Texas Groundwater Protection Committee


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Systems](#)

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Contamination](#)

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Prevention](#)

 [Water
Conservation](#)

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 [Oil, Gas and
Mining](#)

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The Texas Groundwater Protection Committee (TGPC) is a consortium of nine state agencies and the Texas Alliance of Groundwater Districts. The committee works to effectively manage Texas groundwater and protect this state's vital resource.

 [Joint Groundwater Monitoring and Contamination Report-2004](#)

[TGPC Member Organizations](#)

Click on member organizations for information on their role in the TGPC.

More than half
the water used in
Texas comes from
groundwater

- [Texas Commission on Environmental Quality \(Chair\)](#)
- [Texas Water Development Board \(Vice Chair\)](#)
- [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 & Regulation](#)

[TGPC Subcommittees](#)

The TGPC works on special issues through subcommittees composed of agency personnel and the general public. The subcommittees are:

- [Agricultural Chemicals Subcommittee](#)
- [Data Management Subcommittee](#)
- [Groundwater Research Subcommittee](#)
- [Legislative Report Subcommittee](#)
- [Nonpoint Source Task Force](#)
- [Public Outreach and Education Subcommittee](#)

[How to Get Involved](#)

[Attend a meeting](#)

The public is welcome to attend and give comment at all Committee and Subcommittee meetings. Click [here for meeting times and agendas](#). To get on the TGPC's mailing list and receive mailed notices of meetings, [contact the TGPC](#).

House Bill 1848

Added TDLR

1999

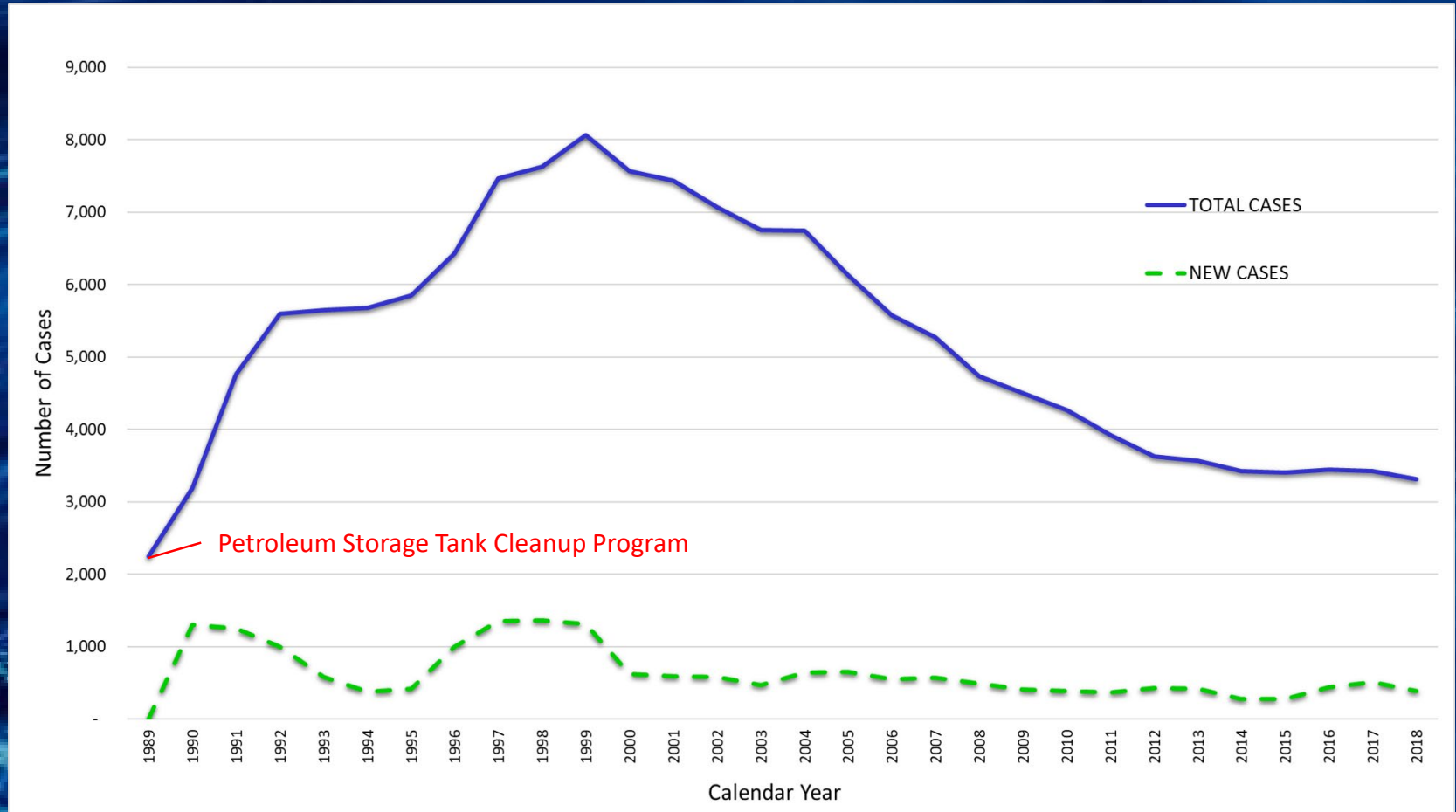
H.B. No. 1848

1 (10) a representative of the Water Well Drillers and
2 Water Well Pump Installers Program of the Texas Department of
3 Licensing and Regulation selected by the executive director of the
4 department.

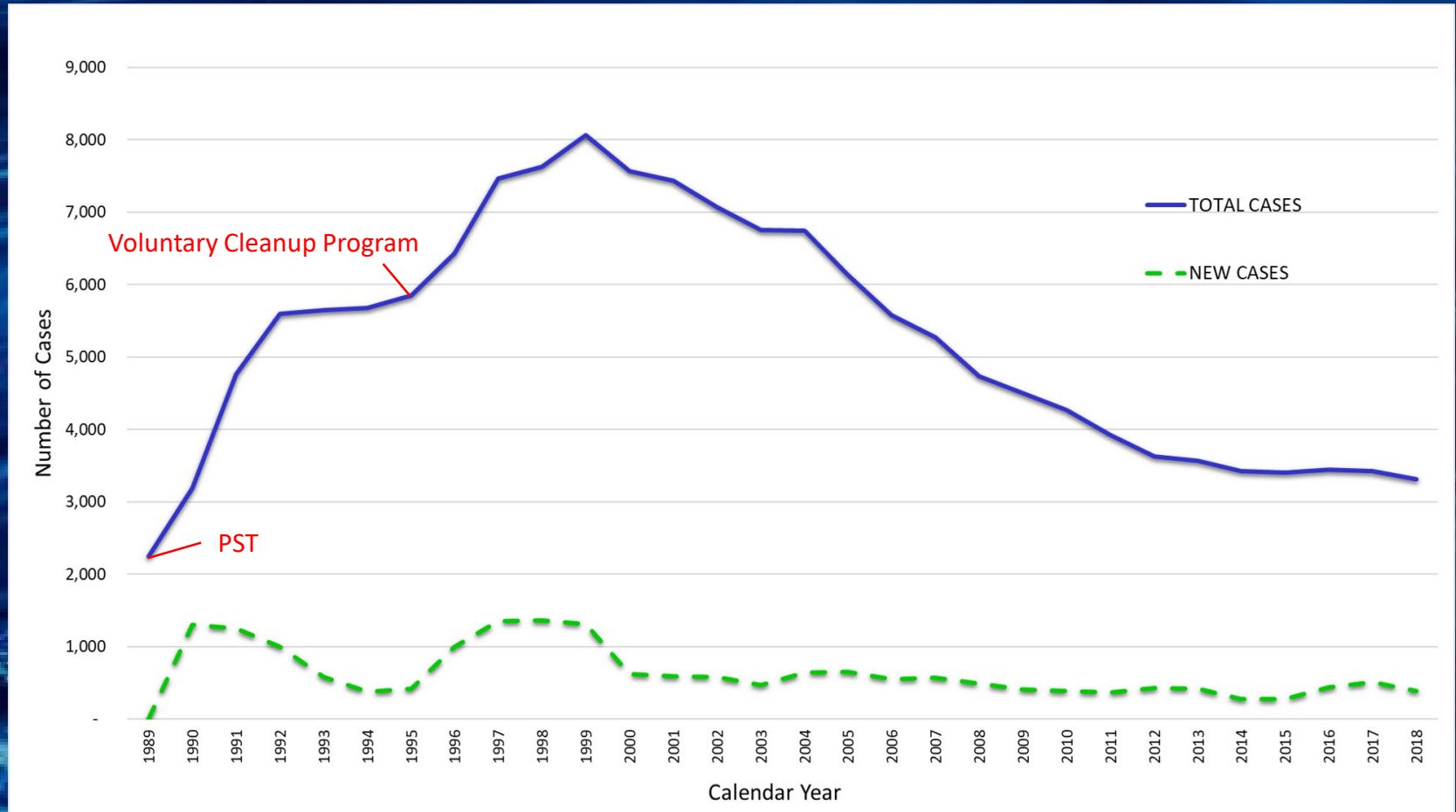
5 SECTION 2. As soon as possible on or after the effective
6 date of this Act the executive director of the Texas Department of
7 Licensing and Regulation shall appoint to the Texas Groundwater
8 Protection Committee a representative of the Water Well Drillers
9 and Water Well Pump Installers Program of the department.

10 SECTION 3. The importance of this legislation and the
11 crowded condition of the calendars in both houses create an
12 emergency and an imperative public necessity that the
13 constitutional rule requiring bills to be read on three several
14 days in each house be suspended, and this rule is hereby suspended,
15 and that this Act take effect and be in force from and after its
16 passage, and it is so enacted.

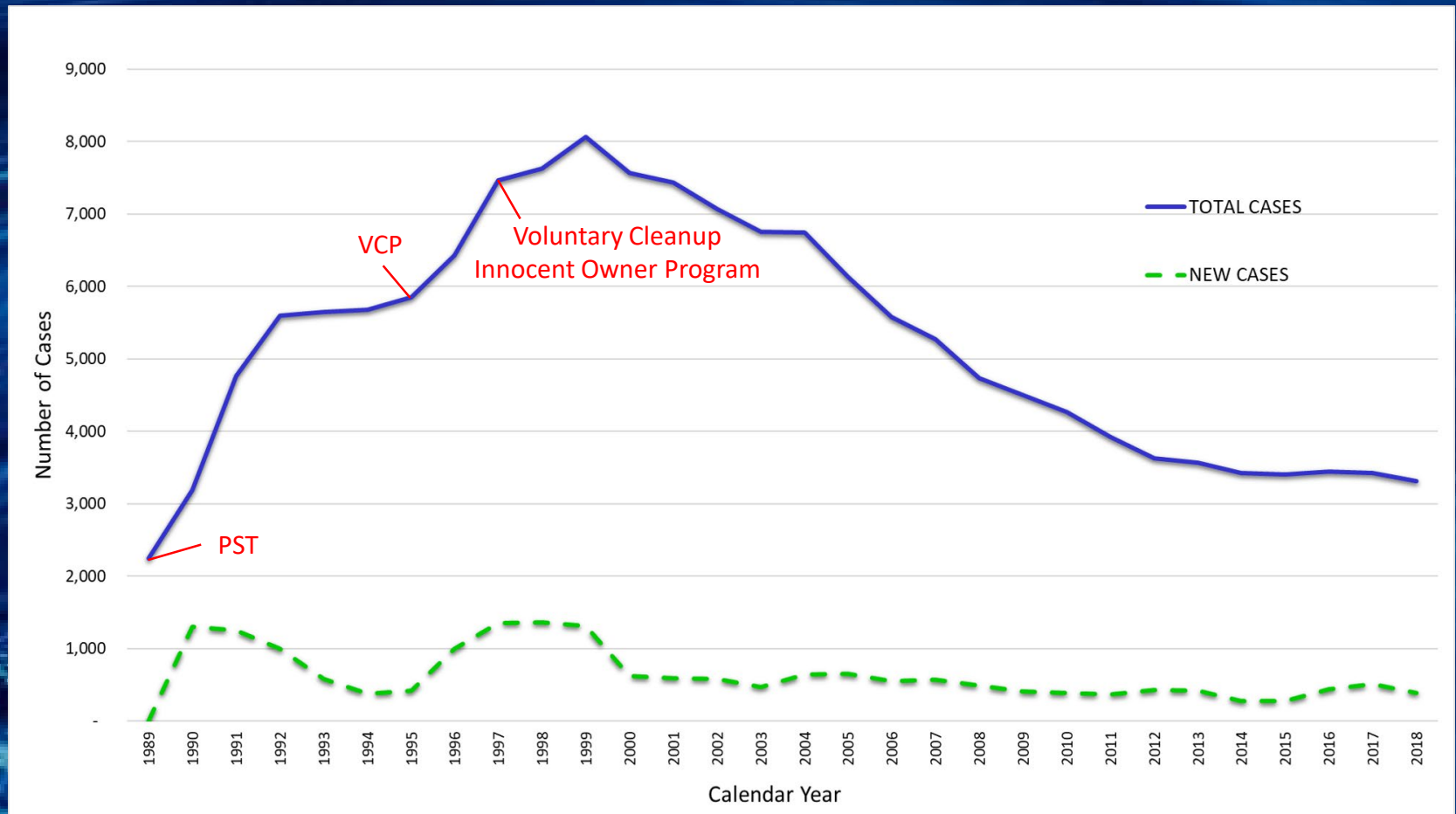
TGPC Groundwater Contamination Cases



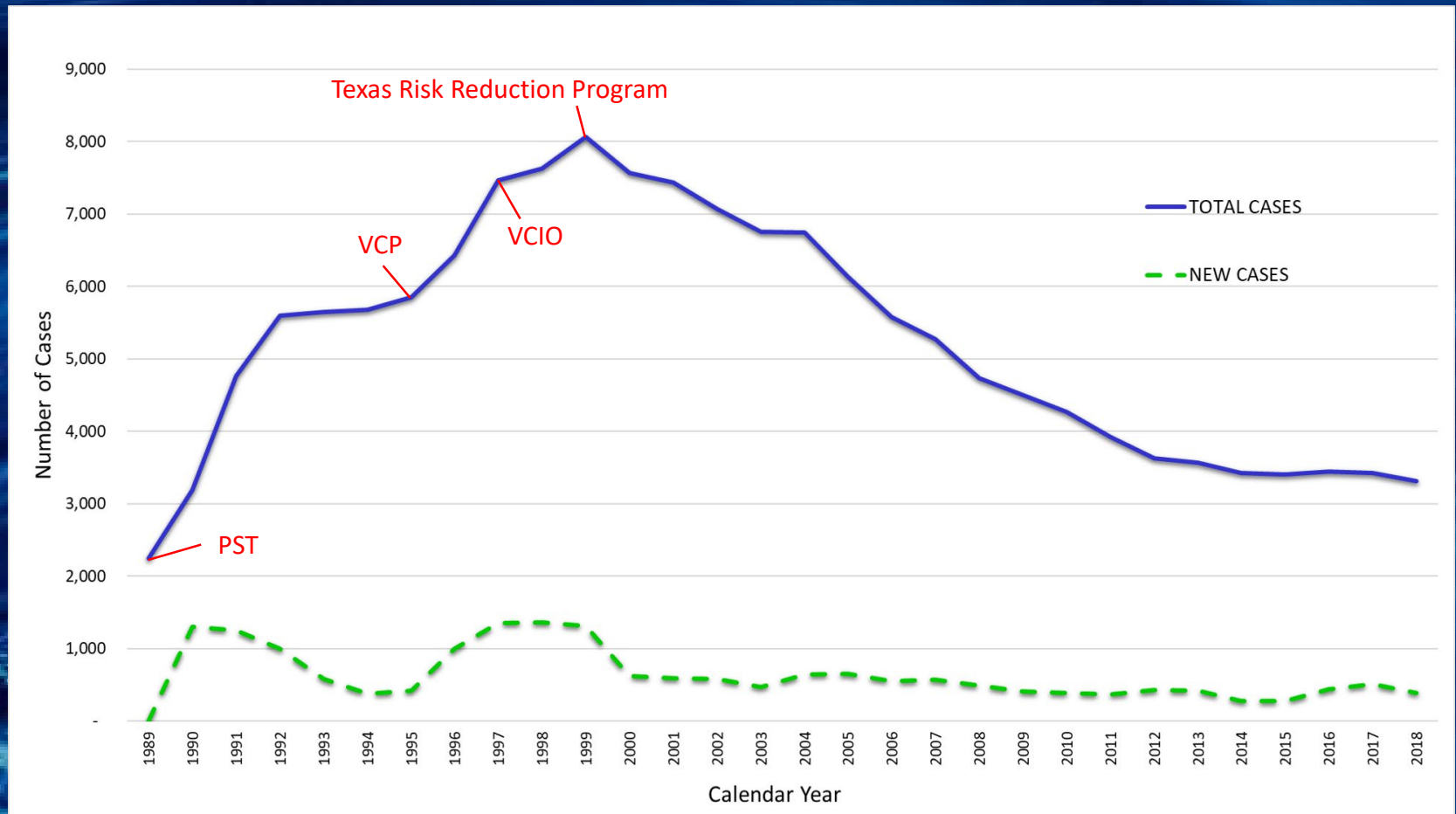
TGPC Groundwater Contamination Cases



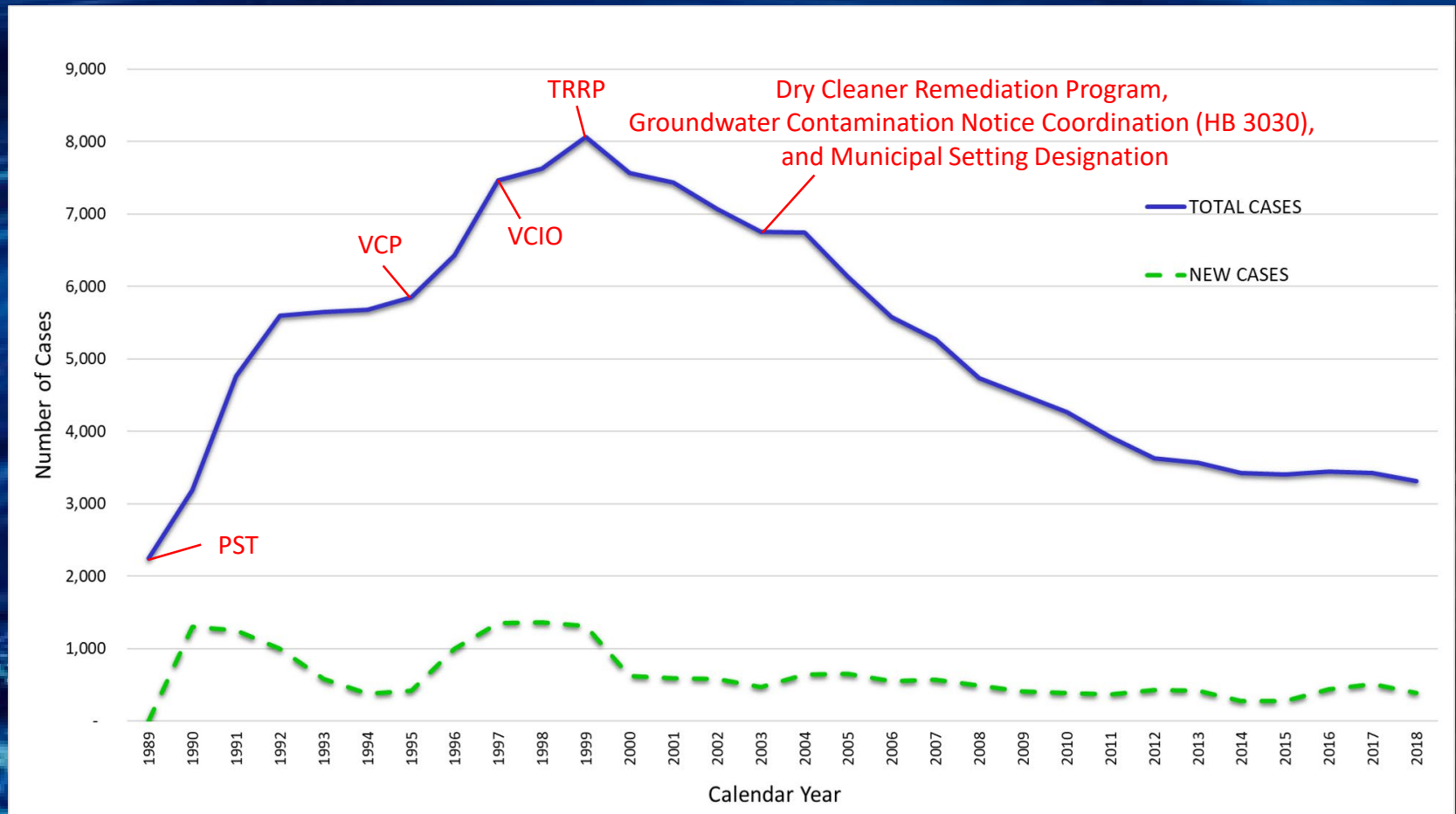
TGPC Groundwater Contamination Cases



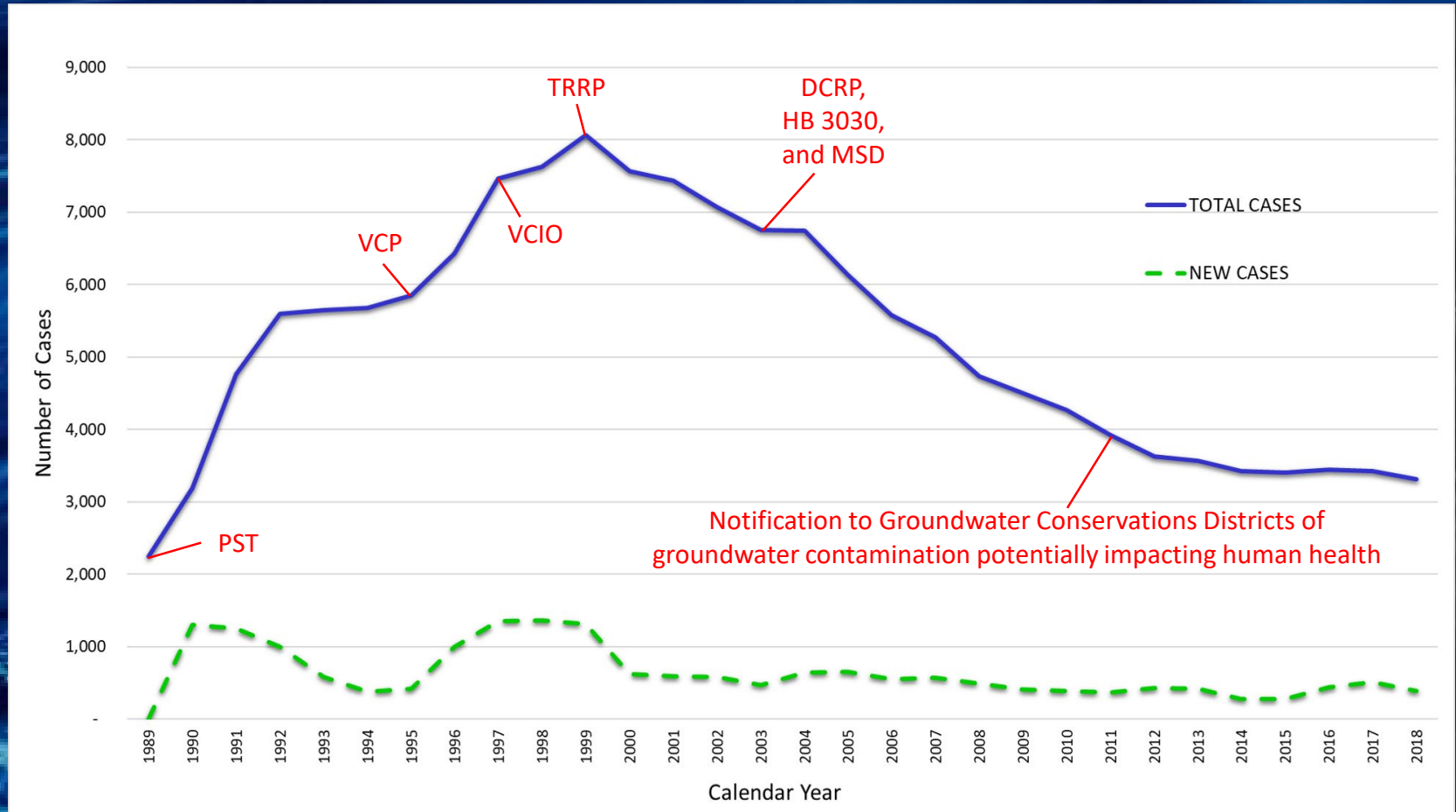
TGPC Groundwater Contamination Cases



TGPC Groundwater Contamination Cases



TGPC Groundwater Contamination Cases



Texas Groundwater Protection Strategy

2003

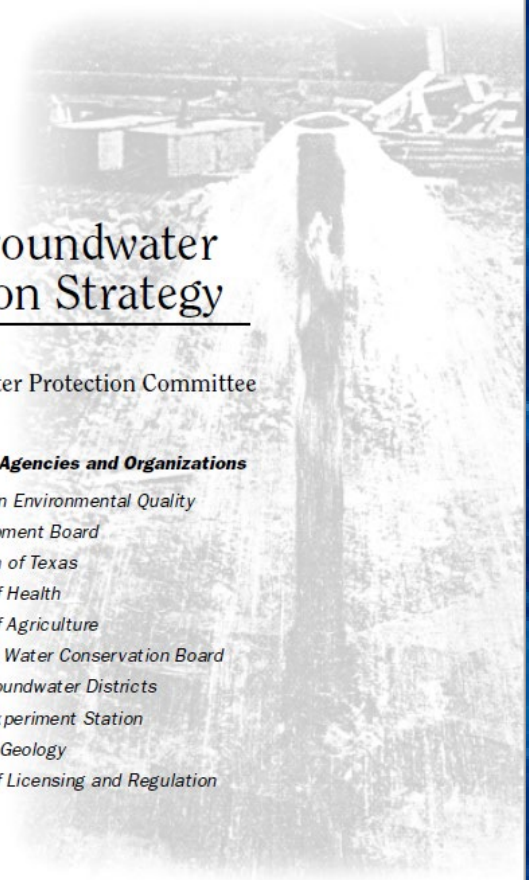
February 2003
AS-188

Texas Groundwater Protection Strategy

Prepared by the
Texas Groundwater Protection Committee

Contributing State Agencies and Organizations

*Texas Commission on Environmental Quality
Texas Water Development Board
Railroad Commission of Texas
Texas Department of Health
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*



Sampling Groundwater



Sampling Groundwater



Sampling Groundwater



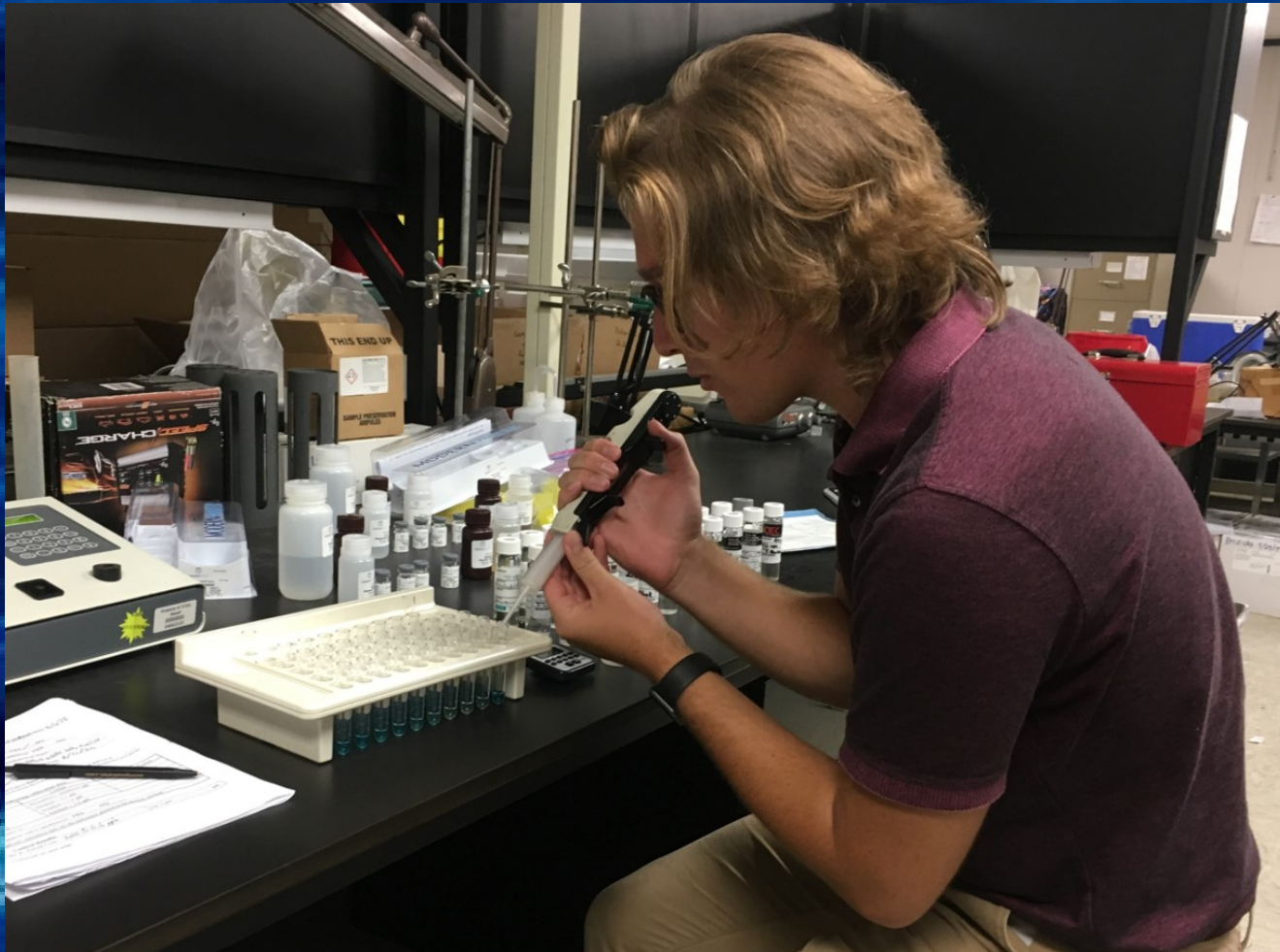
Sampling Groundwater



Analyzing Groundwater Samples



Analyzing Groundwater Samples



Texas Groundwater Protection Strategy

2018

Texas Groundwater Protection Strategy



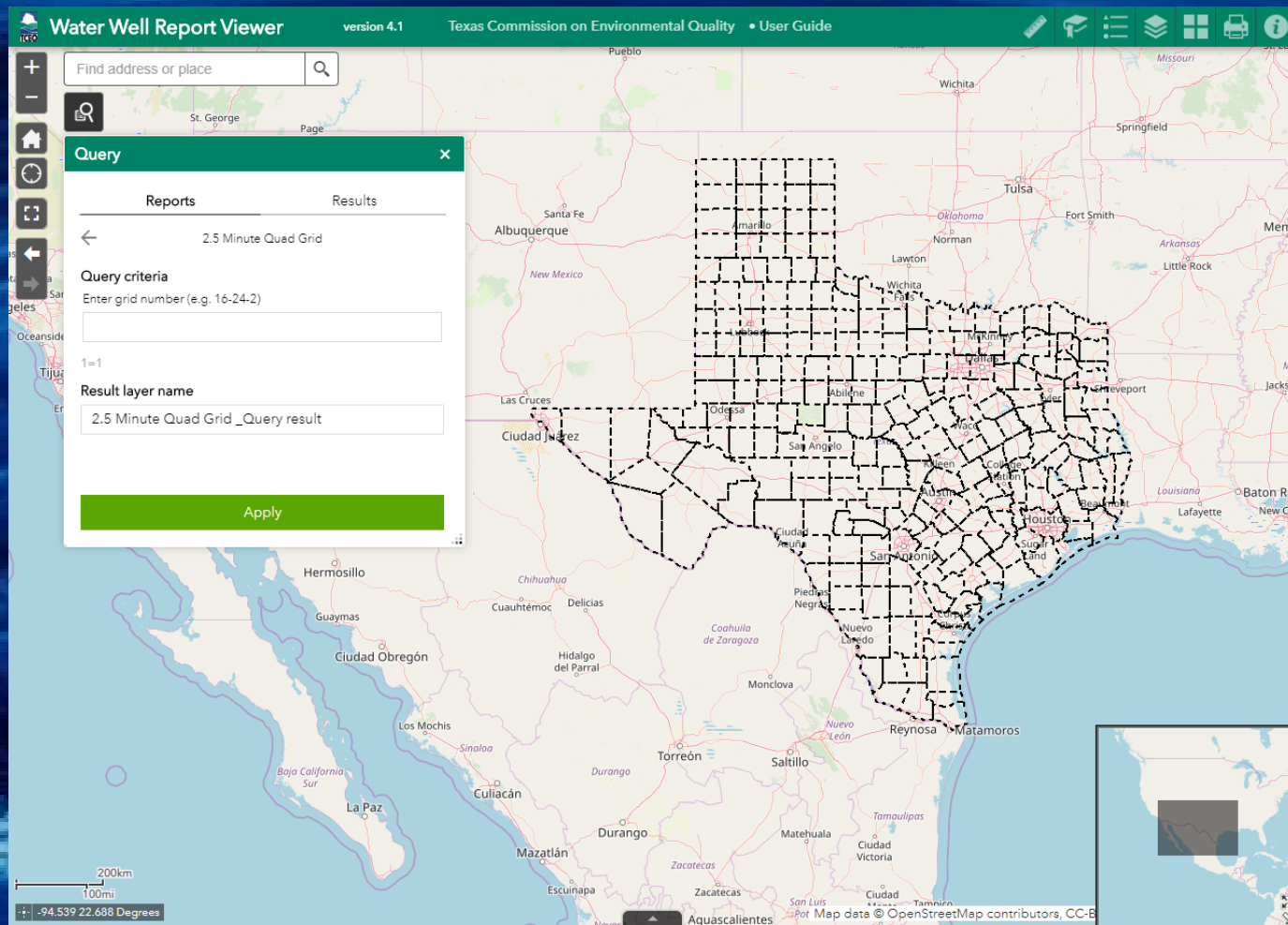
Created by the 71st Legislature in 1989, the Texas Groundwater Protection Committee (TGPC)¹ strives to identify areas where new or existing Texas groundwater programs² could be enhanced, as well as improve coordination among the state agencies and statewide organizations involved in groundwater-related activities. The TGPC also provides a means for the public to interact with groundwater experts.

One of the TGPC's legislative mandates is to develop and update a comprehensive groundwater protection strategy for the state that provides guidelines for groundwater conservation and the prevention of groundwater contamination. Groundwater is water that occurs beneath the land surface in porous or fractured rock and sediments.

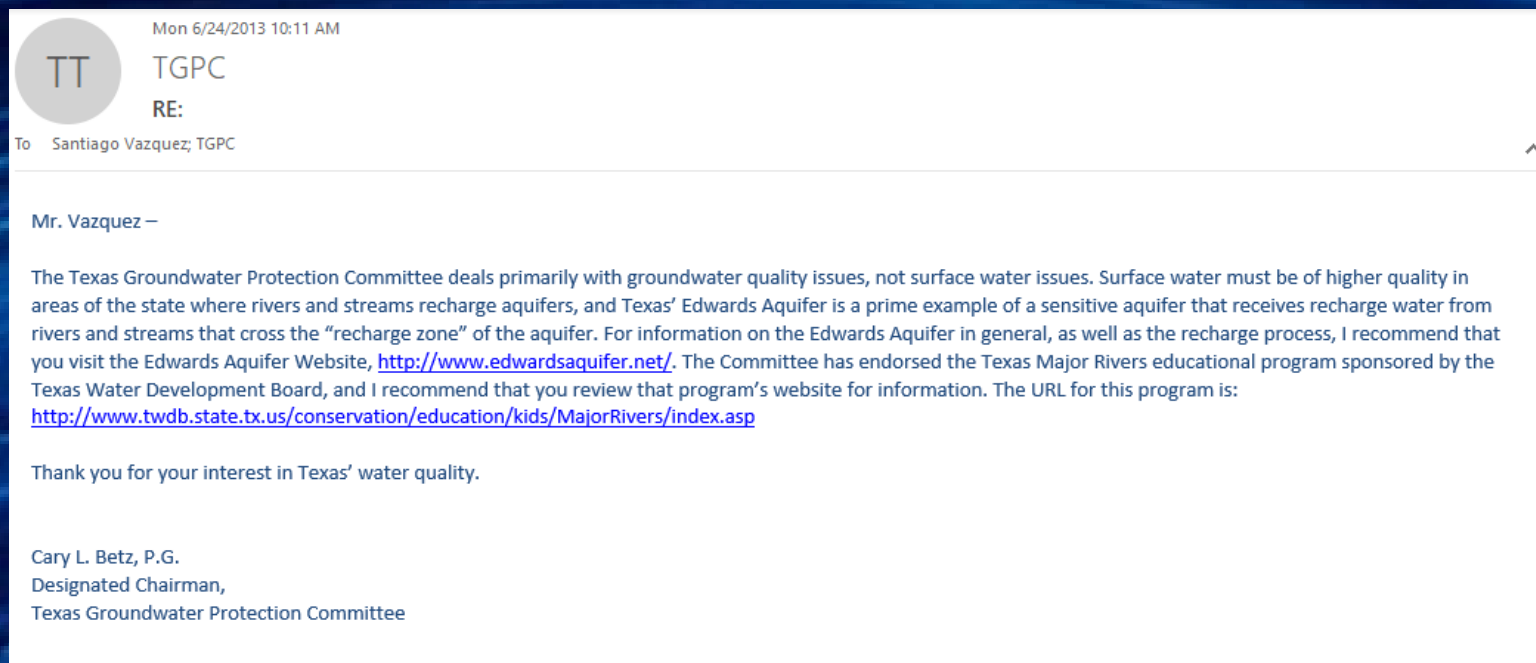
Prepared by the Texas Groundwater Protection Committee

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

Water Well Report Viewer, Established 2009, Screenshot 2019



TGPC Email Address, Established 2012, tgpc@tceq.texas.gov



TGPC Homepage, Redesigned 2013, Screenshot 2019

<https://www.tgpc.texas.gov>

 **T E X A S
GROUNDWATER
PROTECTION
COMMITTEE**

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[ABOUT TGPC](#) [MEETINGS](#) [SUBCOMMITTEES](#) [PUBLICATIONS](#) [CONTACT US](#)

62%
IN TEXAS, GROUNDWATER PROVIDES
62% OF ALL FRESHWATER WITHDRAWALS.

TGPC Links

- > [Home Page](#)
- > [Groundwater Information](#)
- > [Pesticides](#)
- > [Water Wells](#)
- > [Septic Systems](#)
- > [Groundwater Contamination](#)
- > [Pollution Prevention](#)
- > [Water Conservation](#)
- > [Classroom Resources](#)
- > [Oil, Gas & Mining](#)

Texas Groundwater Protection Committee

The Texas Groundwater Protection Committee (TGPC) strives to identify areas where new or existing groundwater programs could be enhanced, as well as improve coordination among agencies involved in groundwater activities. Its membership is made up of nine state agencies and the Texas Alliance of Groundwater Districts.

TGPC Updates

- > [NEW Joint Groundwater Monitoring and Contamination Report - 2018 \(July 2019\)](#)
- > [Activities and Recommendations of the Texas Groundwater Protection Committee - Report to the 86th Legislature \(January 2019\)](#)
- > [Priority Groundwater Management Areas and Groundwater Conservation Districts - Report to the 86th Legislature \(January 2019\)](#)
- > [Texas Groundwater Protection Strategy \(Revised November 2018\)](#)
- > [Landowner's Guide to Plugging Abandoned Water Wells \(Revised March 2010\)](#)
- > [Groundwater Frequently Asked Questions \(FAQs\)](#)

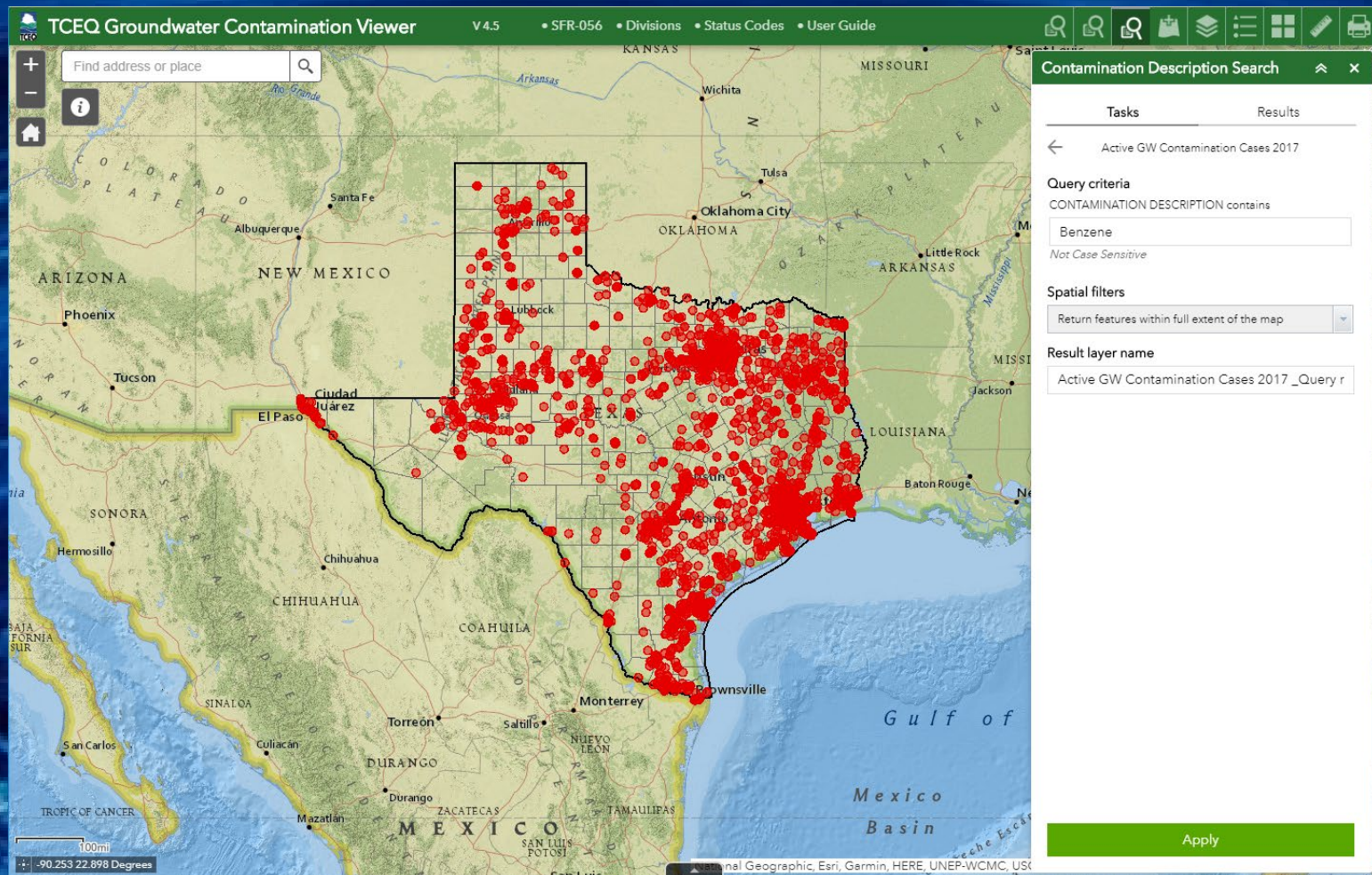
TGPC Member Organizations

- > [Texas Commission on Environmental Quality \(Chair\)](#)
- > [Texas State Soil and Water Conservation Board](#)
- > [Texas Water Development Board \(Vice Chair\)](#)
- > [Texas Alliance of Groundwater Districts](#)
- > [Railroad Commission of Texas](#)
- > [Texas A&M AgriLife Research](#)
- > [Texas Department of State Health Services](#)
- > [University of Texas Bureau of Economic Geology](#)
- > [Texas Department of Agriculture](#)
- > [Texas Department of Licensing & Regulation](#)

Groundwater Issues Subcommittee, 2019



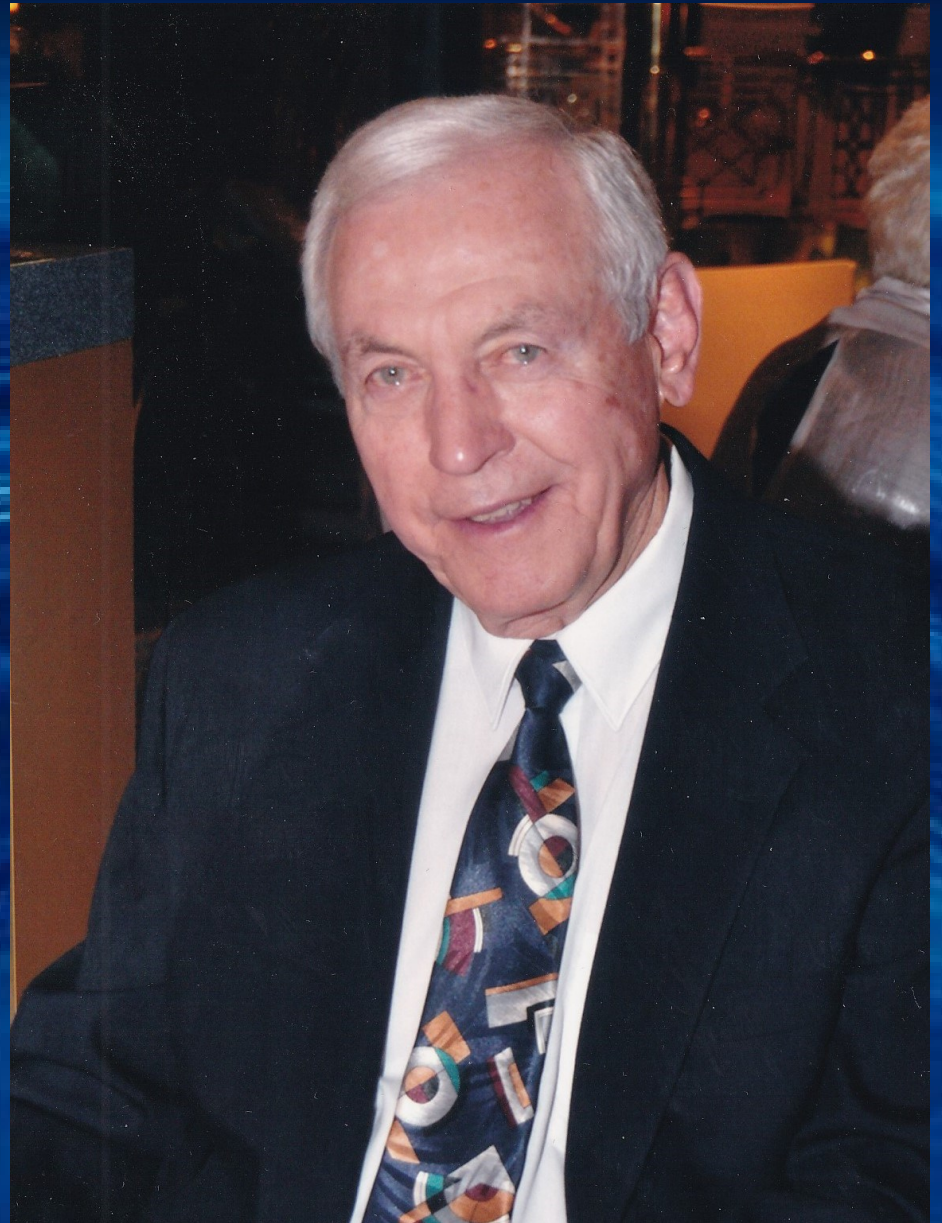
Groundwater Contamination Viewer, Established 2017, Screenshot 2019



Bruce Fink

TGPC
Designated
Chair

1989 – 1991



Mary
(Ambrose)
Musick

TGPC
Designated
Chair

1991 – 2007



Cary Betz

TGPC
Designated
Chair

2007 – 2019



Kelly Mills

TGPC
Designated
Chair

2019 - present

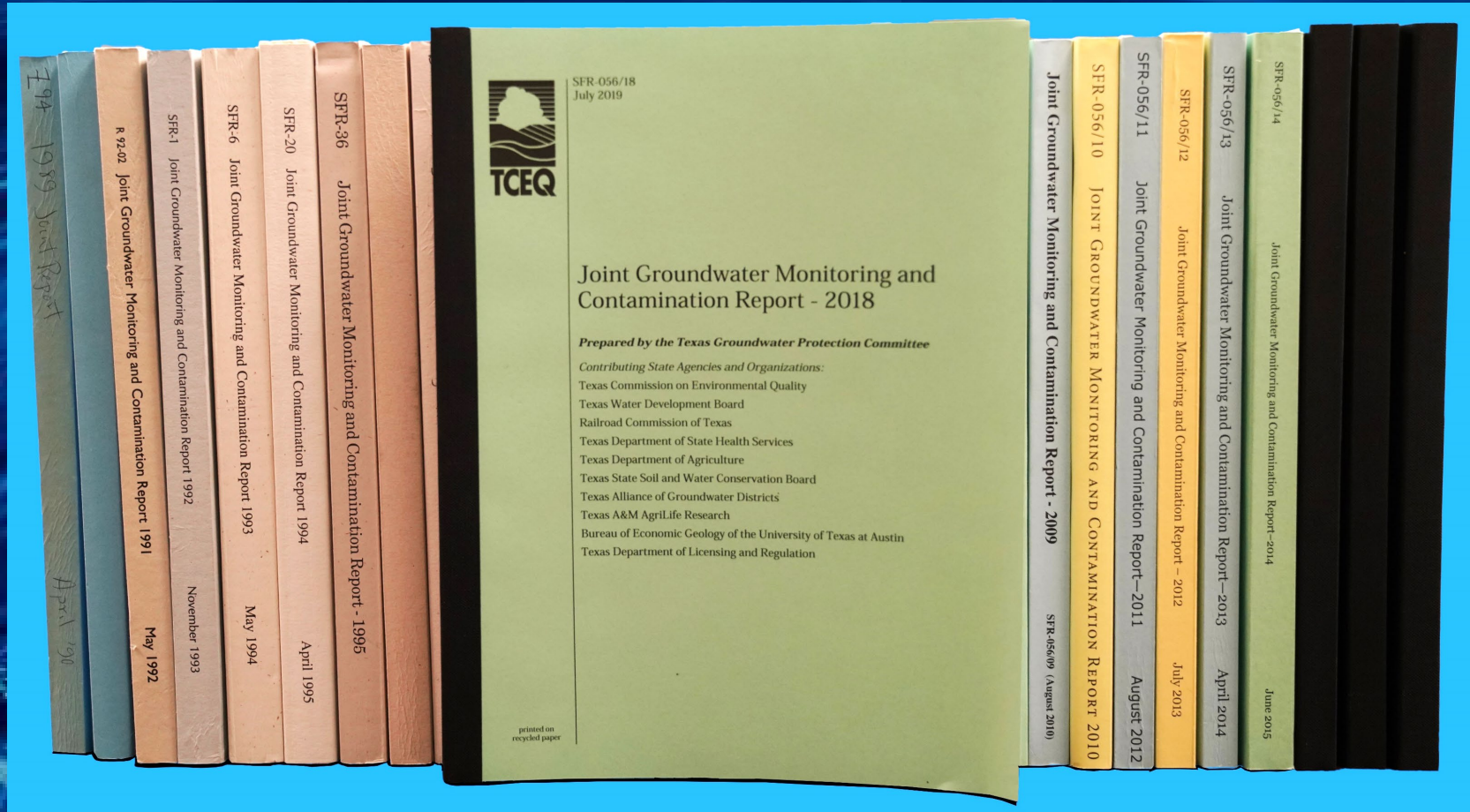


15 Legislative Reports

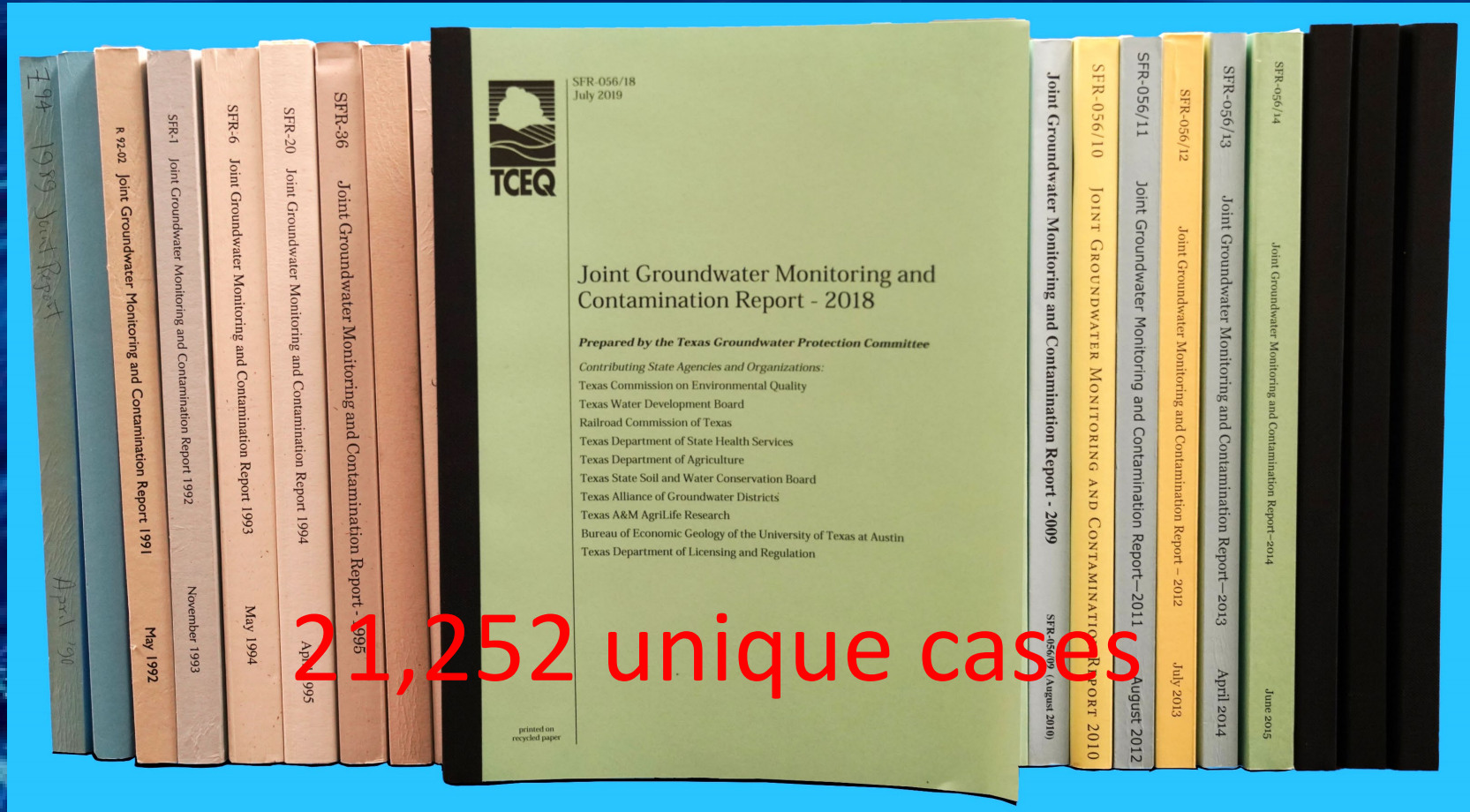


1991 - 2019

30 Joint Groundwater Monitoring and Contamination Reports, 1989 - 2018



30 Joint Groundwater Monitoring and Contamination Reports, 1989 - 2018



40+ Frequently Asked Questions (FAQs)

How Is Uranium Mined in Texas ?

The two uranium mining techniques that have been used in Texas are open pit mining and *in situ* mining. Shallow uranium deposits that occurred above groundwater at depths typically no deeper than 300 feet in Karnes County were mined simply by digging open pits. Most of the open pit mining for uranium occurred in Karnes County, although some occurred in Gonzales, Atascosa, Live Oak, and McMullen counties. Deeper deposits in Brooks, Kleberg, Jim Hogg, Duval, Webb, Bee, Live Oak, and Karnes counties have been mined using *in situ* mining techniques.

In situ mining involves injecting fluids into the ground to dissolve minerals, then pumping the fluids to the surface where they are processed to recover the minerals. *In situ* mining for uranium generally reverses the process by which nature formed the uranium deposits. A leaching solution is injected into the uranium-bearing zone through injection wells arranged in a pattern designed to efficiently recover the uranium. The leaching solution circulates through the uranium-bearing zone and dissolves the uranium. The uranium-bearing solution is then recovered through production wells (see Figure 1). In the past, the leaching solution was an acid solution. More recently, the leaching solution typically consists of groundwater supplemented with oxygen and bicarbonate ions, which is safer and better for the environment. At the surface, this solution is processed to remove the uranium. The water is then recharged with oxygen and bicarbonate ions and reused for additional *in situ* mining.

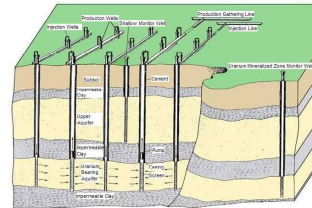


Figure 1. *In Situ* Uranium Mining Operation

1

1.7

municipal Setting Designation (MSD) statute is addressing the groundwater contamination as for persons who "volunteer" to address

rem to property within a municipality or its designated groundwater at the property is defined as water that is used for drinking, crops intended for human consumption, or success of the applicable potable-water subsists its future use as potable water. Through this action against using the designated groundwater or as a restrictive covenant that is property records. This law also limits for contaminated groundwater on MSD address the problem of contaminated water, persons may be more inclined to ipal areas that have contaminated groundwater.

figure is a three-dimensional cross-section of se cross-section on, three different groundwater Property" depicts the lateral and vertical

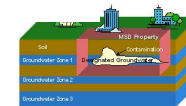


Figure 1. Three-dimensional cross-section of an MSD property and the designated groundwater zone

In this example, only Groundwater Zone 1 is contaminated. An MSD can only be applied to existing contaminated groundwater zones, not to clean or uncontaminated groundwater zones. Therefore, as indicated by the vertical boundary of the box, only Groundwater Zone 1 is included in the MSD. The portion of Groundwater Zone 1 within the MSD boundary is deemed the "designated groundwater" for the MSD and as such is prohibited from current and future use as potable water.

tion (ET) Networks ?

it of the total amount of water needed to grow he words *evaporation* (i.e., evaporation of water, transpiration of water by plants). Different so they have different ET rates. rks in Texas. ET Networks are different from ssors and tools used to provide irrigation and An ET Network typically:

se Figure 1) designed specifically to measure ion of reference evapotranspiration (ET₀), slant water requirements and irrigation

users through on-line access, on-line tools,



Figure 1. ET Weather Station

4 White Papers

The Process for Independent Data Sources to Submit Information to the TGPC for Consideration in PGMA Studies

White Paper Prepared by the Texas Groundwater Protection Committee (TGPC)
Groundwater Issues (GWI) Subcommittee

Date: January 18, 2017

Executive Summary

Priority Groundwater Management Areas (PGMAs) are those designated areas of the state where, within the next 50 years, groundwater is deemed to be at risk due to shortages or contamination, or where land is subsiding due to groundwater withdrawals. The Texas Groundwater Protection Committee (TGPC) is particularly concerned with changes in groundwater quality. Each of its Subcommittees could receive information on potentially critical problems from an independent data source. After review, discussion and additional research, the TGPC could approve the submitted data as part of PGMA studies and present it to the Texas Commission on Environment and Natural Resources (TCEQ) Executive Director and the Texas Water Development Board Administrator for consideration during the annual PGMA meeting. This white paper outlines five potential scenarios describing the process of independent data sources submitting information to the TGPC for PGMA study consideration.

1

How is Groundwater Quality Affected by Per- and Polyfluoroalkyl Substances (PFAS)?

White Paper Prepared by the Texas Groundwater Protection Committee (TGPC)
Groundwater Issues (GWI) Subcommittee

Date: June 12, 2019

Executive Summary

There are thousands of per- and polyfluoroalkyl substances (PFAS) in the environment. PFAS have been used for decades in industrial applications and consumer products, such as non-stick surfaces for cooking implements and food packaging. They may impact groundwater quality as they leach into the ground. This occurs not only at former PFAS production facilities and landfills, but also at military and firefighter training sites.

The presence of PFAS in groundwater can lead to bioaccumulation in humans and animals. PFAS can also impact the health of adults and children, including reproductive health. Studies suggest that sufficiently high exposure to PFAS can lead to liver damage, thyroid disease, and other health issues. The health of individuals and communities is impacted by PFAS in groundwater. This white paper provides an overview of PFAS in groundwater and the health impacts of PFAS. It also discusses the current regulatory framework for PFAS in groundwater and the need for additional research and regulation.

How is Groundwater Quality Affected by Failing On-Site Sewage Facilities (OSSFs)?

White Paper Prepared by the Texas Groundwater Protection Committee (TGPC)
Groundwater Issues (GWI) Subcommittee

Date: January 16, 2019

Executive Summary

Approximately one out of five homes (20%) in Texas uses an On-Site Sewage Facility (OSSF) for wastewater treatment and disposal. The most common type of OSSF has a conventional septic tank and drain field; however, since early 2000, the use of an aerobic treatment and surface spray disposal system has become more common in Texas. Use of OSSFs (aka, septic systems) is regulated by the Texas Commission on Environmental Quality (TCEQ) Title 30, Texas Administrative Code (30 TAC), §285 and by local contract orders that are implemented and enforced by more than 350 Authorized Agents (AAs).

The number of OSSFs in Texas has increased from about 1.3 million in 1990 to about 2.2 million in 2016 (Bonatti, et al., 2017-a). Prior to 1995, aerobic systems accounted for less than 10% of the new installations; however, in 2016 they accounted for 55% of the new installations. The Texas A&M AgriLife Extension Service (AgriLife Extension) OSSF program maintains a state map showing the approximate number and type of OSSFs in each of the 254 counties in Texas. Approximately 20,000 to 30,000 permits are issued per year to install new OSSFs in the state, thus it is safe to assume the number of OSSFs in the state will continue to increase. Currently there is no state-wide mechanism to determine the number of old, private OSSFs replaced by new, public sewer connections. The fact remains that approximately 20% of the dwellings in Texas will be served by OSSFs in the future.

A properly designed, permitted, installed, and maintained OSSF does not adversely impact groundwater quality because wastewater is adequately treated before entering groundwater. However, an OSSF that is not properly designed, permitted, installed, or maintained has the potential to cause an adverse impact on groundwater quality by allowing inadequately treated wastewater to enter groundwater. A failing OSSF may create a "nuisance", which is defined in TAC Chapter §285.2(43)(B) as "...an overflow from a septic tank or similar device, including surface discharge from or groundwater contamination by a component of an on-site sewage facility..." Typically, groundwater contamination is due to coliform bacteria, nitrate, or other bio-chemical pollutants present in untreated wastewater that are not removed before they mix with groundwater. This white paper gives an overview of how groundwater quality could be adversely affected by failing OSSFs with examples from Texas and other states, and it presents concepts for ensuring groundwater quality protection from OSSFs operating in Texas.

1

Transboundary Groundwater Resources along the Texas-Mexico Border

White Paper Prepared by the Texas Groundwater Protection Committee (TGPC)
Groundwater Issues (GWI) Subcommittee

Date: June 12, 2019

Executive Summary

Fifteen transboundary aquifers have been identified between Mexico and Texas (Sanchez et al. 2016), though the mechanisms for hydrogeologic connection across the international boundary, which will be referred to subsequently as transboundary groundwater linkages, are known only for five (Sanchez et al. 2016). The transboundary groundwater resources shared by the two countries are largely uncharacterized due to lack of data, differences in aquifer boundary delineations and methodologies, and the limited cooperation and coordination among federal, state, and local agencies within and between these countries to address groundwater issues from a binational perspective.

From a general perspective, the region of the bolsons (aquifers located southeast of the Conejos-Medanos/Mesilla Bolson, Valle de Juarez/Huaco-Tularosa Bolson Aquifer in northern Chihuahua, in southern New Mexico and western Texas, and between the Serrania del Burro and Allende-Piedras Negras Aquifers in south Texas and northern Coahuila), where Quaternary alluvial deposits are concentrated, appear to be the most important areas for transboundary aquifer development.

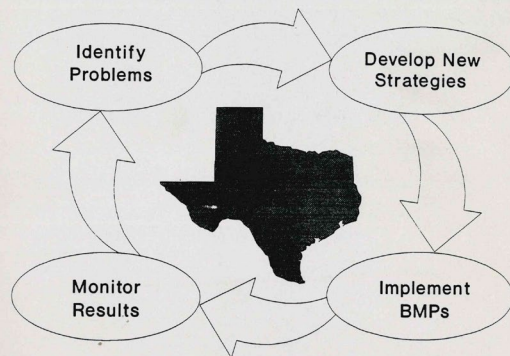
Overall, the hydrogeological units along the Texas-Mexico border cover around 182,000 km² (approximately 110,000 km² on the Texas side and 72,000 km² on the Mexico side) (Sanchez et al. 2018). The total area considered to have good aquifer potential (defined as the favorable lithological properties that allow sustained and significant rates of pumpage) as well as good water quality ranges between 50% and 60% (60% of this in Texas). Some 20 to 25% of the hydrogeological units that cross the border area ("border area") are considered to have poor aquifer potential and poor water quality, with the proportion of land being approximately equal on both sides of the border.

In terms of water quality data, some reports are rather general and do not specify the location of the water being tested. If such formations cover a significant area, their water quality parameters might be over- or under-estimated. Also, some reports contradict

1

3 Pesticide Management Plans

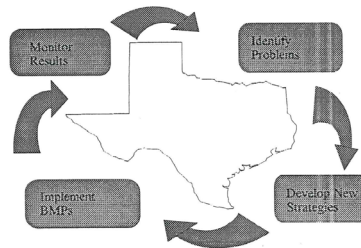
TEXAS STATE MANAGEMENT PLAN FOR AGRICULTURAL CHEMICALS IN GROUND WATER



PREPARED BY THE AGRICULTURAL CHEMICALS SUBCOMMITTEE
OF THE TEXAS GROUNDWATER PROTECTION COMMITTEE

JUNE, 1991

TEXAS STATE MANAGEMENT PLAN FOR PREVENTION OF PESTICIDE CONTAMINATION OF GROUND WATER



PREPARED BY THE
AGRICULTURAL CHEMICALS SUBCOMMITTEE
OF THE
TEXAS GROUNDWATER PROTECTION
COMMITTEE

MARCH 1996

Texas Natural Resource
Conservation Commission
Chairman

Texas Water
Development Board
Vice-Chairman

Transportation Commission
of Texas

Texas Department
of Health

Texas Department
of Agriculture

Texas State Soil and
Conservation Board

Texas Alliance of
Groundwater Districts

Texas Agricultural
Experiment Station

Texas Economic Geology of
Texas at Austin

January 2001
SFR-070/01

TEXAS STATE MANAGEMENT PLAN FOR PREVENTION OF PESTICIDE CONTAMINATION OF GROUNDWATER

Prepared by the Agricultural Chemicals Subcommittee
of the Texas Groundwater Protection Committee

3 Groundwater Protection Strategies

TEXAS GROUND WATER PROTECTION STRATEGY



Prepared by the
Ground Water Protection Committee

Participating State Agencies:

- Texas Water Commission
- Texas Water Development Board
- Railroad Commission of Texas
- Texas Department of Health
- Texas Department of Agriculture
- Texas State Soil and Water Conservation Board
- Texas Water Well Drillers Board

January 1988

February 2003
AS-188

Texas Groundwater Protection Strategy

Prepared by the
Texas Groundwater Protection Committee

Contributing State Agencies and Organizations

Texas Commission on Environmental Quality
Texas Water Development Board
Railroad Commission of Texas
Texas Department of Health
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

Texas Groundwater Protection Strategy



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Prepared by the Texas Groundwater Protection Committee

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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

Texas Groundwater Protection Committee, 2019



Protecting the state's groundwater since 1989