Texas Groundwater Protection Committee

Public Outreach and Education Subcommittee

Groundwater Educational Outreach Plan


















November 13, 2006

TGPC POE Subcommittee
Groundwater Educational Outreach Plan

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ACRONYMS

4-H	Head, Heart, Hands, Health (pledged by members of 4-H Clubs)
BMP	Best Management Practice
CEU	Continuing Education Unit
FAQ	Frequently Asked Question
FFA	Future Farmers of America
GCD	Groundwater Conservation District
GWPC	Ground Water Protection Council
IP	Internet Protocol
IPM	Integrated Pest Management
MCL	Maximum Contaminant Level
NARO	National Association of Royalty Owners
NGWA	National Ground Water Association
OFCUF	Oil Field Clean Up Fund
OSSF	On-Site Sewage Facility
PDW	Public Drinking Water
POE	Public Outreach and Education
PSA	Public Service Announcement
RCT	Railroad Commission of Texas
TAGD	Texas Alliance of Groundwater Districts
TCE	Texas Cooperative Extension
TCEQ	Texas Commission on Environmental Quality
TDA	Texas Department of Agriculture
TDLR	Texas Department of Licensing and Regulation
TGPC	Texas Groundwater Protection Committee
TGWA	Texas Ground Water Association
TIPRO	Texas Independent Producers and Royalty Owners Association
TMDL	Total Maximum Daily Load
TOWTRC	Texas On-site Wastewater Treatment Research Council
TRWA	Texas Rural Water Association
TSSWCB	Texas State Soil and Water Conservation Board
U.S. EPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UWCD	Underground Water Conservation District

INTRODUCTION

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 (TAGD).

The TGPC Public Outreach and Education (POE) Subcommittee encourages the development and coordination of educational outreach programs for landowners concerned with groundwater protection and environmental health issues. In addition, it facilitates interagency communication and coordination to provide support for landowner educational outreach projects.

References to the POE Subcommittee's public outreach goals can be found in the *Texas Groundwater Protection Strategy*[1] and the Charge to the POE Subcommittee[2]. The text of these references is provided below.

Texas Groundwater Protection Strategy – Chapter VII: Public Education

"Groundwater is a valuable component of our water supply, providing roughly one-half of the state's water supply. Approximately 85 percent of the state's public drinking water systems obtain some or all of their drinking water from wells and springs. Since 1965, an estimated 618,390 water wells have been drilled in the state. Because of the importance of groundwater to both humans and the environment, government agencies have designed and implemented efforts to educate the public about groundwater quality and the need to protect and conserve the state's valuable groundwater supply.

Most of the groundwater programs conducted by the members of the TGPC have some educational or outreach component that targets a specific regulated group. This component may be as simple as a brochure or a web site that explains the program, or as complex as detailed technical guidelines for a regulated industry. Because the universe of groundwater educational programs is so broad, this chapter is limited to the programs that are specifically designed to educate the general public."

Texas Groundwater Protection Strategy – Chapter X: Recommendations For Action

Increase Public Outreach

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

Public educational materials and outreach programs are needed to educate domestic/private well owners on drinking water quality and potential health risks. More support needs to be given to educational efforts for targeted geographic areas of concern for high concentrations of naturally occurring groundwater contaminants and on various treatment options available to the domestic/private well owner. Support is also needed for educational efforts to develop and deliver effective educational materials that target potential sources of contamination such as abandoned wells. Special effort should be made to develop programs designed to reach and serve the state's high growth areas. (*Both Short Term and Medium Term Goals, see Chapter VII.*)

An effective on-site system removes wastewater from the home, treats and distributes the wastewater, and protects our water resources. An on-site wastewater system requires maintenance in order to maintain proper operation and environmental protection. Unlike a centralized sewer system maintained by a city or water district, maintenance of an on-site system is the responsibility of the homeowner. A statewide OSSF failure rate of 13 percent and the growing dependence on these systems in the suburban fringe around urban areas continues to create human health and environmental concerns.

Therefore, the TGPC recommends that the state continue to support the efforts of the [Texas] On-Site Wastewater Treatment Research Council, the [Texas Cooperative Extension], the TCEQ's on-site wastewater program, and local governments in their efforts to develop and deliver effective educational material that addresses OSSF maintenance in order to prevent failures. In addition, the government agencies involved in OSSF regulation and outreach may want to consider developing programs specially designed to reach and serve the state's high growth counties. (*Short Term and Medium Term Goals, See Chapter VII.*)

Oftentimes, state agency's web pages are not organized around groundwater as a theme, making it difficult for the general public to find information on the state's groundwater protection efforts. To remedy this, the TGPC should establish, on its web page, links to key groundwater information residing at state agencies and educational institutions. (*Short Term Goal - See Chapter VI.*)"

Public Outreach and Education Subcommittee Charge

Subcommittee Purpose

"The primary goals of the Subcommittee are to develop and implement educational outreach programs for landowners concerned with groundwater protection and environmental health issues; and to facilitate interagency communication and coordination to provide support for landowner educational outreach projects.

Activities include developing educational materials, coordination of outreach programs and special projects. Special effort should be devoted to areas of the state with high levels of naturally occurring constituents of concern such as arsenic and radionuclides

and landowners with on-site wastewater treatment in rapidly growing suburban fringe areas.

The Subcommittee will work in cooperation with the Texas Cooperative Extension, TCEQ, TDLR, and the [Texas] On-Site Wastewater [Treatment] Research Council to develop educational materials and facilitate development of outreach programs to address the following items:

- abandoned well closure,
- private well owner drinking water health impacts,
- OSSF maintenance by the home owner,
- domestic drinking well sampling,
- TEX*A*Syst groundwater quality protection program."

Expected Results

"The Subcommittee will direct and coordinate the following educational efforts, which include, but are not limited to, the following activities and deliverables:

- abandoned well closure,
- continue demonstrating proper plugging procedures,
- private/domestic wells – develop educational materials, as appropriate (brochures/videos/workshop curricula) to address the following: (1) areas where private/domestic wells are potentially impacted by naturally occurring constituents of concern which exceed a MCL; (2) health effects; (3) treatment options,
- on-site sewage facilities – develop educational materials, as appropriate (brochures/videos/workshop curricula) to address the following: (1) operation and maintenance of older systems; (2) operation and maintenance for first time OSSF owners,
- domestic drinking well sampling program including: (1) work with TCE and TAGD members to provide educational materials related to voluntary outreach and well owner sampling efforts; (2) help identify funding sources and facilitate voluntary sampling efforts in areas where naturally occurring constituents of concern are present,
- TEX*A*Syst; including, (1) coordinate outreach and on site demonstration activities utilizing the existing program; (2) provide educational materials developed by the Subcommittee for use by the county agents using TEX*A*Syst materials."

POE Subcommittee Groundwater Educational Outreach Plan

Ten groundwater-related Issues are outlined in this Educational Outreach Plan. POE Subcommittee members who contributed to each Issue are listed, and the lead for each Issue is underlined. Table I lists the anticipated amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete each specific educational outreach. With adequate support, the POE Subcommittee hopes to address each Issue.

Table I. Anticipated Amount of Effort Required of the TGPC, POE Subcommittee, and/or Their Partners to Complete the Outreach

Low

Issue D – Groundwater Conservation Districts (*GCD Newsletters*)
Issue D – Groundwater Conservation Districts (*Major Rivers Program*)
Issue E – Access to TGPC Agencies'/Organizations' Groundwater Program Information and General Groundwater Information
Issue F – Tex*A*SYST
Issue J – Groundwater and Oil & Gas Wells (*Plugging Abandoned Oil & Gas Wells*)
Issue J – Groundwater and Oil & Gas Wells (*Converting Abandoned Oil & Gas Wells into Water Wells*)

Medium

Issue C – Abandoned Water Well Closure
Issue D – Groundwater Conservation Districts (*Local GCD Symposiums*)
Issue G – On-Site Wastewater Treatment/Disposal Systems Education
Issue I – Education for Domestic Water Well Owners: Quantity
Issue J – Groundwater and Oil & Gas Wells (*Water Wells Supporting Oil & Gas Wells*)

High

Issue A – Urban Landowner Pesticide Application and Groundwater
Issue B – New Rural Landowners and Groundwater Wells
Issue H – Education for Domestic Water Well Owners: Quality

GROUNDWATER EDUCATIONAL OUTREACH – AREAS OF CONCERN

Issue A – Urban Landowner Pesticide Application and Groundwater

Lynne Fahlquist (USGS), Michael Hare (TDA), Al Cherepon (TCEQ)

1. Issue

The issue to be addressed in this specific educational outreach is pesticide application by the urban landowner and its impact on groundwater. Studies indicate that pesticides used in urban areas are found in urban watersheds and in shallow groundwater underlying urban areas.[3,4,5] Urban pesticide sales and use are unregulated; therefore, it is not known how much pesticides are purchased and used by urban (residential and commercial) landowners, nor if they are used according to the labels.

This outreach is needed to educate urban (primarily residential and commercial) landowners about the findings of pesticides in urban surface and groundwater, and the actual and potential effects of such findings. This includes a subset of these urban pesticide users, the so-called "weekend farmers" who have purchased acreage on the urban fringe to farm recreationally. Often they lack the experience and network of traditional farmers, and thus are prone to making mistakes such as the inappropriate use of pesticides. An even greater issue is that contamination can still occur with proper label use.

The primary issues include:

a. Prevention
   - Minimizing pesticide use and runoff because prevention is more effective and less expensive than treatment

b. Management
   - Development of new management approaches for controlling ants and other urban insects
   - Development of a comprehensive program that addresses lawn and landscape decisions to reduce pesticide use and runoff

c. Lack of Treatment
   - Much of the urban pesticides applied will runoff into local streams, rivers, and lakes, and will not be removed by wastewater treatment plants[6]

d. Education
   - A better understanding of the benefits and alternatives available
   - A better understanding of the legacy pesticides versus newer pesticides and their related issues
   - How pesticides in runoff are transported into surface water and groundwater, which ones are more likely to do so, and those that are the most toxic and persistent

2. Background Summary

Urban pesticide use presents numerous concerns related to human and environmental health. Pesticide application in residential, public, commercial, and industrial areas is threatening water quality. Urban pesticide user groups may have little knowledge of pesticides or training in appropriate pesticide disposal practices, safer pesticide alternatives, or Integrated Pest Management (IPM). Additionally, the amount and type of pesticides used by some of these groups is unreported and unknown. More educational and outreach programs directed at these groups are likely to assist in the reduction of pesticide use impacts to human health and water quality; however, appropriate educational approaches for many of these groups have not been well examined.

Evidence is accumulating that there is increasing impact from urban pesticide use due to encroachment of urban areas into traditional rural areas as well as urban development in or near potentially sensitive areas. There is tremendous pressure in several growth corridors within the state that could potentially impact groundwater quality. According to a two-year American Farm Bureau Federation study[7], by 2019 there will be more large farms and more small farms, but the number of mid-sized farms will have decreased drastically.

The increase in urban sprawl has already impacted water resources in many parts of the United States. For instance, United States Geological Survey (USGS) studies in 1997 and 1998 found more pesticide residues in urban streams than in agricultural streams in California. Also, up to nine out of 10 samples from urban streams had concentrations of insecticides exceeding levels deemed harmful to aquatic life. Moreover, recent federal restrictions on certain classes of pesticide usage have led to the proliferation of pesticide detections in urban streams and lakes. These detections are representative of primarily one class of insecticides, the pyrethroids, the use of which has increased in the urban setting in recent years.

The goal of this educational outreach is to expanded program efforts into urban settings where IPM practices reduce pesticide risk to city dwellers. There would be expanded efforts to help urbanites safely and effectively combat agricultural pests. Recent USGS water analyses at Barton Springs (Austin, Texas) have detected various pesticides, emphasizing the importance of implementing IPM education in urban settings. While public education is less effective than regulatory changes, it remains an important piece of the pesticide pollution prevention puzzle. Some studies of pesticide education and outreach show only a 10 – 20 % success rate in changing behavior, but pesticide usage can be reduced by a high degree (over 50 %) when education and outreach are combined with community action.[8,9] Thus, the primary need is for:

- Education on pesticide regulations, appropriate use, and environmental impacts;
- Awareness of urban pesticide studies and monitoring;
- Awareness of pest management choices in order to reduce impacts on human health and the environment;
- An overall change in the way the target audience deals with pests (e.g., IPM).

3. Audience

The audience for this specific educational outreach (i.e., the principal users of pesticides in urban/suburban settings) includes:

a. Urban/suburban landowners, primarily residential and commercial
b. Urban pesticide suppliers (e.g., nurseries, home improvement and hardware stores, and other similar suppliers)
c. Landscape maintenance businesses

4. Partners

Potential partners for developing, delivering, and distributing this specific educational outreach include:

a. Garden clubs and nurseries
b. Home and garden shows or other public gatherings, where appropriate
c. Radio and television garden programs
d. Texas Cooperative Extension (TCE) (e.g., their Texas Master Gardener (http://aggie-horticulture.tamu.edu/mastergd/mg.html and http://www.texasmastergardeners.com/) and Texas Master Naturalist (http://masternaturalist.tamu.edu/) programs)
e. Other colleges and universities
f. Groundwater Conservation Districts (GCDs)
g. River Authorities
h. Watershed groups (e.g., Clean Rivers Program)
i. TWDB
j. Texas Commission on Environmental Quality (TCEQ)
k. Public schools
l. TCE and the City of Austin's Grow Green program (http://www.ci.austin.tx.us/growgreen/)
m. United States Environmental Protection Agency (U.S. EPA) Greenscaping program (http://www.epa.gov/region02/p2/greenscaping/)
n. TCE, North Central Texas Council of Governments, and City of Lubbock's Texas SmartScape program (http://www.txsmartscape.com/)
o. Conservation and environmental groups and organizations
p. Other local businesses, such as architectural firms

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach (depending on the forum) need to be explored in more detail. One idea is to dovetail agriculture or agriculture-type Continuing Education Units (CEUs) with urban misuse issues and incorporate topics such as the Texas Master Gardener concept. Additional materials and methods include:

a. Use of TCE programs (e.g., Master Gardener and Master Naturalist)
b. TEX*A*Syst and Farm*A*Syst materials
c. Current and potential "Fact Sheets"

d. Texas Farm Bureau and public utility newsletters
e. Texas Farm Bureau Small Farm and Ranch Advisory Committee (http://www.txfb.org/index.asp)
f. Local businesses (e.g., local and "big box" nurseries and garden centers)
g. Homeowner and neighborhood associations
h. GCDs
i. Teacher education programs
j. Pre-recorded media (newsletters, newspapers, radio, TV)
k. Presentations (e.g., booths, exhibits) at county fairs
l. Various websites (e.g., the TGPC's website) that can supply educational material
m. Demonstrations for urban, urban/rural mix, and rural town settings of what is possible in the various regions of the state

6. Timeframe

It might take one to two years to develop materials for various forums. Outreach should be ongoing and should reflect the most recent state of knowledge about pesticide use in an area.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be high.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by:

a. Evaluating urban landowner pesticide sales
   - Are there reductions in pesticide sales ?
b. Evaluating urban landowner pesticide products being purchased
   - Have the use of pesticides that have less of an impact on human health and the environment increased ?
c. Conducting surveys of urban landowner pesticide users
   - Has the knowledge of the target audience increased regarding alternative choices to pesticides and appropriate pesticide use ?
   - Has the knowledge of the target audience increased regarding the interaction of pesticides with the environment ?
   - Are pesticides being used less often, or in reduced amounts ?
d. Evaluating urban landowner plant selections that are purchased
   - Are plants that are more resistant to pests being selected ?
e. Evaluating the urban environment
   - Are less pesticides, or lower concentrations, being measured in surface or groundwater ?

Issue B – New Rural Landowners and Groundwater Wells

Lynne Fahlquist (USGS), Mary Ambrose (TCEQ), David Gunn (TDLR),
Kathy McCormack (TCEQ)

1. Issue

The issue to be addressed in this specific educational outreach is new rural landowners and groundwater wells. As population increases in Texas, more people are moving to the semi-rural suburban fringe. Many of the people moving to these areas are first-time domestic water well owners and they need information on many topics associated with these wells:

a. What is the groundwater resource in my area ?
b. Will it yield enough good quality water for its intended use (drinking, irrigation, other) ?
c. How do I select a well driller and pump installer ?
d. How do I maintain my well, pump, plumbing, etc. ?
e. What is wellhead protection ?
f. This refers to the placement of domestic water wells on the homeowner's property related to potential sources of contamination (e.g., burn pits, On-Site Sewage Facilities (OSSFs), well houses used to store chemicals, and barns where chemicals are stored).
g. What are the permits, regulations, and costs that I should know about ?

2. Background Summary

Senate Bill 1323 (Regular session, 76th Legislature, 1999) "provides cities and counties with the authority to withhold approval of subdivision plats until the developer obtains a certificate indicating that sufficient groundwater exists beneath the property being developed to meet anticipated demand for up to 30 years. Although a municipality or county is not required to exercise this authority, if it does, it must follow the requirements outlined in [Texas Administrative Code Title 30] Chapters 230.1 through 230.11."[10] This TWDB study found only 14 counties, and no cities, which required groundwater availability studies involving pump tests. Thus, in many cases, the new rural landowner must research how to obtain and maintain a domestic water well themselves.

A valuable resource for the new rural landowner is the Wellowner.org website (http://www.wellowner.org/). This website provides information on:

a. Water Well Basics
   - Types of Wells
   - Well System Materials
   - Planning For a Water Well
   - Finding a Contractor
b. Tax Payer Advantages
c. Septic Systems
d. Well Maintenance

- Finding a Contractor
- Homeowner Checklist
- Well Logs
- Restoring Flow
- Water Pressure
- Abandoned Water Wells

e. Water Quality
   - Testing
   - Potential Contaminants and their Possible Sources
f. Financing
g. Understanding Groundwater and the Hydrologic Cycle
h. Drought
i. Links to related resources and organizations

3. Audience

The audience for this specific educational outreach is the domestic water well owner, particularly new homeowners and landowners in the rural/suburban fringe.

4. Partners

Potential partners for developing, delivering, and distributing this specific educational outreach include:

a. Better Business Bureau
b. Chambers of Commerce
c. Texas Farm Bureau
d. County Cooperative Extension Offices
e. GCDs
f. TCEQ and Texas Department of Agriculture (TDA) Regional Offices
g. Real Estate Associations
h. Texas Association of Realtors (http://www.texasrealtors.com/)
   - The Texas Association of Realtors' website http://www.texasrealestate.com provides Texas real estate information to the public.
i. Land developers
j. Texas Ground Water Association (TGWA, http://www.tgwa.org/)
   - Professional organization of water well drillers
k. National Ground Water Association (NGWA, http://www.ngwa.org/)
l. Association of Rural Communities in Texas (http://www.arcit.org/)
m. U.S. EPA
n. Texas Association of Counties (http://www.county.org/)
o. Texas Department of Licensing and Regulation (TDLR, http://www.license.state.tx.us/wwd/wwd.htm)
p. TWDB
q. TCEQ
r. Schools and after school activities such as 4-H (http://www.4husa.org/) and Future Farmers of America (FFA, http://www.ffa.org/)

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach include:

a. County fairs, farm or home and garden shows
b. Public Service Announcements (PSAs) on television and radio
c. Workshops for new rural homeowners
d. Homeowner Associations

6. Timeframe

This specific educational outreach could be implemented in one to two years, and should continue indefinitely.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be high.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by:

a. Surveying the knowledge and practices of rural landowners.
b. Evaluating data, especially temporal, collected from groundwater quality monitoring programs that collect data from domestic water wells.
c. Identifying land use changes, particularly at the fringes of urban areas, for potential sources of contamination.

Issue C – Abandoned Water Well Closure

David Gunn (TDLR), TAGD representative, Bruce Lesikar (TCE)

1. Issue

The issue to be addressed in this specific educational outreach is the thousands of abandoned and deteriorated domestic water wells throughout the State. The problem is that the majority of landowners and the public do not know the hazards of an abandoned or deteriorated well. Abandoned and deteriorated wells are hazards to the public's health and safety as well as to wildlife. Wells serve as conduits for contamination to pollute the groundwater of the State.

Domestic water well owners need to be educated on the hazards of abandoned and deteriorated wells and trained in the ways to properly plug an abandoned well or upgrade and cap a deteriorated well.

The public needs to be educated about abandoned wells and what to do when one is discovered. Until recently, there was no procedure in place that would allow anyone to report an abandoned or deteriorated well (see http://www.license.state.tx.us/abwells/default.aspx for the current procedure).

2. Background Summary

Since the early days, domestic water wells have been drilled or dug and have been left abandoned after the user no longer had any use for the well. The general attitude of landowners and the public is, if they cover the well so that no one falls into the well it is no longer a hazard. They are incorrect because when a domestic water well is not properly plugged it is still a continuing hazard to the groundwater aquifers and zones. In 1988, the legislature enacted legislation that required abandoned domestic water wells to be plugged within 180 days of notification that the well has been deemed abandoned. Two weeks after the legislation passed, a young girl named Jessica fell into an abandoned well in the Midland/Odessa area. This drew a lot of media attention to the problem of abandoned and deteriorated domestic water wells. What occurred next is the wells were being located but no one could afford the expense of plugging the abandoned wells or upgrading and capping the deteriorated wells. During recent legislative sessions, bills were introduced to create a fund for plugging these abandoned domestic water wells properly. As of yet, the proposed legislation has not passed.

3. Audience

The audience for this specific educational outreach includes:
a. The public
b. Landowners
c. School and agriculture programs such as 4-H and FFA

Knowledge of the hazards is the key to compliance. By informing as many people as possible of the hazards of abandoned and deteriorated domestic water wells, and their effects on groundwater contamination, this will promote compliance.

4. Partners

Potential partners for developing, delivering, and distributing this specific educational outreach include:

a. TWDB
b. TCEQ
c. USGS
d. TCE
e. Texas Farm Bureau
f. Texas State Soil and Water Conservation Board (TSSWCB)
g. Railroad Commission of Texas (RCT)
h. TAGD
i. Individual GCDs
j. TDLR

5. Materials/Methods

Brochures should be written up to show the audience how to identify an abandoned or deteriorated domestic water well and what to do when one is located. Guidelines for properly plugging an abandoned domestic water well already exist.[11] Guidelines for upgrading a deteriorated domestic water well, and then properly capping it for potential future use, should be documented.

6. Timeframe

The outreach program should be continued until articles on all identified topics are completed with the goal of at least one per year.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be medium.

7. Evaluation

The effectiveness will be measured by the increase in reported abandoned, plugged, and capped domestic water wells.

Issue D – Groundwater Conservation Districts

GCD Newsletters

Chris Ramser (Clearwater Underground Water Conservation District (UWCD))

1. Issue

The issue to be addressed in this specific educational outreach is providing newsletter articles to GCD newsletters or other newsletters designed to inform the public about groundwater quality issues, conservation, basic hydrogeology, new domestic water well owner information, or other issues that TGPC member agencies may wish to provide to the public.

2. Background Summary

While the TGPC's POE Subcommittee does not have the funds to distribute information directly to landowners or groundwater stakeholders, many GCDs and other local entities publish newsletters that are mailed to the public. GCD newsletters are typically provided to registered domestic water well owners. These entities may also have websites that could be used to publish or archive the information. Information in the form of Frequently Asked Questions (FAQs) or newsletter articles may be submitted to the TAGD representative to request publication in the GCD newsletters or websites. Other representatives of other entities could also be asked to send the article out for publication at the local office or district level. Topics that should be covered include general information on the TGPC, wellhead protection, a checklist for landowners that want to drill new domestic water wells, water quality issues, abandoned domestic water wells, and rainwater harvesting, among others. This method, if successful, would reach the public at a publication cost that the TGPC will not have to bear. It also provides an asset to GCDs because the groundwater professionals that write the stories may have knowledge that local districts do not have.

3. Audience

The audience for this specific educational outreach is landowners and domestic water well owners.

4. Partners

Potential partners for developing, delivering, and distributing this specific educational outreach include:

a. TWDB
b. TCEQ
c. USGS
d. TCE
e. Texas Farm Bureau

f. TSSWCB
g. RCT
h. TAGD
i. Individual GCDs
j. Any other member agencies

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach include:

a. Newsletter articles which would be written by the staff of the agency identified. They would be completed at least one per year, or as frequently as staff resources allow, keeping in mind that some GCDs only provide newsletters annually or bi-annually:
    - Summary of the TGPC (TCEQ)
    - Summary of the available Drinking Water Problems Fact Sheets and how to obtain them (TCE)
    - Water Quality 101 – What Domestic Water Well Owners Should Know (USGS)
    - Abandoned Domestic Water Wells (TDLR)
    - Wellhead Management – Tips for Domestic Water Well Owners (TCE)
    - Septic System 101 – Tips for On-Site Sewage Facilities (i.e., septic systems) Owners (TCE)
    - Other topics as deemed appropriate by the TGPC

6. Timeframe

The outreach program would be continued until articles on all of the identified topics are completed, with the goal of at least one per year.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be low.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by:

a. The GCD or local entity could be requested to provide a copy of the page of the newsletter in which the article appears as well as the estimated circulation.

Local GCD Symposiums

Chris Ramser (Clearwater UWCD)

1. Issue

The issue to be addressed in this specific educational outreach is to provide GCDs with a guide that could be used to answer questions pertaining to groundwater and to plan local symposium or workshops on groundwater targeted at landowners and groundwater stakeholders.

2. Background Summary

There are many professionals within the various state agencies who have knowledge and expertise on a variety of issues related to groundwater. However, it is often difficult for groundwater districts to find information, advice, or presenters without knowing what is available. It would be of benefit to create a guide or listing of groundwater professionals and topics that are available to assist GCDs. The guide would be used by GCDs when they require additional information on a topic, perhaps in response to a question that a constituent has asked. Also, some GCDs or TAGD may want to ask a professional from one of the agencies to give a presentation on a topic or to participate in a local water symposium. The guide could also provide topic suggestions or sample agendas of water symposiums that the GCD could sponsor or fund. The symposiums would be designed to provide outreach to landowners and stakeholders on topics that include groundwater protection.

3. Audience

The audience for this specific educational outreach is primarily GCD employees and directors, but it could also be a resource used by the other state agencies.

4. Partners

Potential partners for developing, delivering, and distributing this specific educational outreach include:

a. TWDB
b. TCEQ
c. USGS
d. TCE
e. Texas Farm Bureau
f. RCT
g. TSSWCB
h. TAGD
i. Individual GCDs
j. Any other member agencies

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach include:

a. Development of surveys to be sent to the various agencies that would be used to create the guide.
    - The surveys would be compiled into the guide once all information is received. The guide should be indexed by topic and name to provide ease of use.
    - Distribution could be done by electronic form or by print depending on the availability of resources.
    - Updates should be done on an as-needed basis or at least bi-annually.

6. Timeframe

There is no timeframe for the completion of the guide. However once completed, updates to the guide should be made as-needed with at least one update being done every two years.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be medium.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by requesting that GCDs complete a survey one year after distribution of the guide.

Major Rivers Program

Chris Ramser (Clearwater UWCD), Al Cherepon (TCEQ)

1. Issue

The issue to be addressed in this specific educational outreach is to assist in disseminating the Major Rivers Program or other groundwater educational material to 5th grade students within the boundaries of GCDs.

2. Background Summary

Education of the state's water resources should begin at an early age because water quality issues and water availability problems can only be solved if young people are engaged. The best and easiest way to reach the most kids is through cooperation with the teachers and administration of independent school districts and private schools. Many GCDs are doing this by sponsoring outreach programs such as providing the Major Rivers Programs to those schools that wish to participate. The Major Rivers Program was developed by the TWDB and includes a teacher's guide, video, and student activity books for seven water-related lessons that provide knowledge on the state's water resources, water cycle, planning, watersheds, the effects of human activity, water treatment, and efficient water use. The cost of the program varies but is approximately $1.30 per student. However, the budgets of GCDs are often not able to provide the program for all schools and some GCDs do not generate enough revenue to pursue such a program. Assistance could be provided by seeking contributions from the private industry that has a stake in water management and protection. Donations from the private sector could allow the GCD to help reach more children. The TGPC could assist GCDs by creating a mechanism to endorse GCD programs that sponsor the Major Rivers Program in schools. Endorsement may lead to greater success in receiving contributions from the private sector. The GCD would submit the details of the program to the TGPC, including the proposed cost and number of students the GCD would fund, as well as the percentage match or dollar amount being sought from the private sector. A letter of support would be written by the TGPC and sent to the GCD to include with the request for donation. To encourage participation from GCDs, the TGPC could suggest to the TWDB (a member of the TGPC) that a discounted rate for educational materials be given to those GCD programs that receive endorsement from the TGPC. This discounted rate may result in more activity books provided to students. After distribution of the educational material, the GCD would submit an activity report to the TGPC detailing the number of students and schools reached.

3. Audience

The audience for this specific educational outreach is students at the 5th grade level.

4. Partners

Potential partners for developing, delivering, and distributing this specific educational outreach include:

a. GCDs
b. TWDB
c. Independent School Districts and private schools
d. The private sector (including hydrogeology (engineering) consultants, law firms, and water supply corporations)

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach include:

a. The Major Rivers Program
    - The GCD would be responsible for identifying schools that wish to participate and requesting the private sector match fund. The TGPC would be responsible for endorsement of the GCD's outreach program.
b. Other groundwater educational programs

6. Timeframe

The educational outreach program would occur on an annual reoccurring basis.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be low.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by requiring the submittal of an activity report to the TGPC once the information is distributed.

Issue E – Access to TGPC Agencies'/Organizations' Groundwater Program Information and General Groundwater Information

Kathy McCormack (TCEQ), Mary Ambrose (TCEQ)

1. Issue

The issue to be addressed in this specific educational outreach is disseminating the huge volume of groundwater-related information and resources available from the 10 TGPC member agencies/organizations, as well as similar information from other agencies/organizations.

2. Background Summary

Direct delivery of groundwater-related information to Texans is not an efficient use of the TGPC's resources (members/staff, funding, or time). But with an increasing population in the state, groundwater quality and quantity are diminishing, and educational outreach on these issues has become critical. The Internet is one of the most effective means of not only directly reaching homeowners and landowners, via the TGPC website, but also indirectly reaching them through other media that reference the TGPC website.

3. Audience

The audience for this specific educational outreach is anyone in Texas with Internet access.

4. Partners

Potential partners for developing and delivering this specific educational outreach include:

a. The 10 TGPC Member Agencies/Organizations
b. The Wilkins Group, Inc. (http://www.wilkins.com/index.htm)
   - The Wilkins Group, Inc. is the TGPC website host supplier.
c. TCEQ Small Business and Environmental Assistance Division
d. Ground Water Protection Council (GWPC, http://www.gwpc.org/)
e. The Groundwater Foundation (http://www.groundwater.org/)
   - An education and social marketing company that focuses on behavior change related to environmental protection
f. An experienced environmental communicator could create strategies for reaching specific audiences, develop suitable groundwater-related messages, and then select the appropriate media to reach these audiences.
   - One example is the Academy for Educational Development Center for Environmental Strategies (http://www.aed.org).

Potential partners for distributing this specific educational outreach to potentially more than 50 % of the rural landowners in Texas through their websites, newsletters, and publications include:

a. The 10 TGPC Member Agencies/Organizations
b. Texas Farm Bureau (http://www.txfb.org/)
    - The Texas Farm Bureau's newly formed Small Farm and Ranch Management Advisory Committee may be the most appropriate contact within this organization.
c. Texas and Southwestern Cattle Raisers Association (http://www.thecattlemanmagazine.com/)
d. Texas Wildlife Association (http://texas-wildlife.org/)
e. TAGD (http://www.texasgroundwater.org/)
f. Texas Electric Cooperatives (http://www.texas-ec.org/)
    - Texas Electric Cooperatives also serve suburban homeowners.
g. TCE County Agents
    - TCE County Agents could pull groundwater information from the TGPC website to include in the columns that they write for rural/suburban newspapers.
h. Texas Nursery & Landscape Association (http://www.txnla.org)
i. Texas Association of Realtors (http://www.texasrealtors.com/)
    - The Texas Association of Realtors' website http://www.texasrealestate.com provides Texas real estate information to the public.
j. Texas Association of Regional Councils (http://www.txregionalcouncil.org/)
k. Texas FFA Association (http://www.texasffa.org/)

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach include:

a. A variety of resources made available through the TGPC website
    - Some examples are phone numbers and links to relevant publications, maps, and other websites.
b. FAQ webpage(s) providing an easier and quicker means of disseminating information compared to formal publications
    - With various topic areas, newsletter editors can find specific information to use in their articles.
c. Video clips of three minutes or less on specific topics to accompany the FAQ text that do not require extensive scripts, production effort, or costs
d. Items a., b., and c. in Spanish
e. Assistance to GCDs in establishing their own websites
    - TAGD should first be surveyed to determine the level of interest and need for this assistance.
    - The TWDB might also be able to provide assistance.

6. Timeframe

This specific educational outreach has already been implemented, but it can be expanded, and support should be continued indefinitely.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be low.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by:

a. Tracking TGPC Website Activity
   - Visitors
     - Average Visitors Per Day
     - Average Time Spent by Each Visitor
   - Unique Internet Protocol (IP) Addresses
     - Visitors Who Visited Once
     - Visitors Who Visited More Than Once
     - Percentage of Repeat Visitors
   - PageViews and Downloads
     - Average PageViews Per Day
     - Average File Downloads Per Day
     - Number of Visitors that Bookmarked Website
     - Percentage of Visitors that Bookmarked Website

b. Comparing TGPC website activity to similar websites
   - Texas On-site Wastewater Treatment Research Council (TOWTRC, http://www.towtrc.state.tx.us/)
   - Clean Texas (http://www.cleantexas.org/)

Issue F – Tex*A*SYST

Steve Musick (TCEQ), Joe Peters (TCEQ), Monty Dozier (TCE),
Dennis Hoffman (Texas Agricultural Experiment Station)

1. Issue

The issue to be addressed in this specific educational outreach is the prevention of groundwater contamination for rural residents who rely on groundwater to supply their water requirements. Educational efforts towards rural residents in how to assess and mitigate the vulnerabilities of their water supply via farm pollutant inventory and management can go a long way toward preventing contamination problems.

2. Background Summary

TEX*A*Syst is a valuable tool for rural residents who rely on groundwater to supply their water requirements. This program addresses a wide range of potential contaminants and provides remedies in a comprehensive, easy-to-understand way. TEX*A*Syst incorporates current regulations and the latest technologies into an applied decision-making format. This program provides rural residents with the means to assess how their home site activities are affecting their environmental risks. More importantly, TEX*A*Syst helps rural residents take decisive actions to preserve the quality of their drinking water, prevent water pollution, and protect health.

3. Audience

The audience for this specific educational outreach is all rural residents who rely on groundwater to supply their water requirements. This specific audience is important because groundwater sources of water supply have some specific risks associated with agricultural activities.

4. Partners

Potential partners for funding this specific educational outreach include:

a. United States Department of Agriculture
b. Natural Resources Conservation Service
c. U.S. EPA
d. TCEQ
e. TCE

Potential partners for developing this specific educational outreach include:

a. TSSWCB
b. TWDB
c. TDA
d. USGS
e. TCEQ

Potential partners for delivering and distributing this specific educational outreach include:

a. TCE
b. GCDs
c. Private contractor

5. Materials/Methods

The TEX*A*Syst website (http://waterhome.brc.tamus.edu/texasyst/index.html) provides general information on the program and the availability of the various education materials. A series of publications are available to help rural residents assess the risk of groundwater pollution, and they describe Best Management Practices (BMPs) that can help protect groundwater. These TEX*A*Syst bulletins and related materials were developed from the national Farm*A*Syst groundwater protection program. The TEX*A*Syst system is designed to help the user learn more about the environment, existing environmental policies and regulations, and recommended management practices for household and agricultural activities. With this knowledge, the user can voluntarily reduce the pollution risks associated with domestic water wells.

The TEX*A*Syst Video tape series was released in 1999 as a set of five tapes for use at County Extension meetings. Now these videos are available for use on the Internet (http://waterhome.brc.tamus.edu/texasyst/video/). These tapes address a wide range of potential contaminants and provide remedies in a comprehensive, easy-to-understand way.

The TEX*A*Syst table-top display includes photos and information on the following sections of the TEX*A*Syst material:

a. Wellhead Management and Condition
b. Pesticide Storage and Handling
c. Fertilizer Storage and Handling
d. Hazardous Waste Management
e. Household Wastewater Treatment
f. Livestock Manure Storage and Treatment Facilities
g. Livestock Holding Pen Management
h. Milking Center Wastewater Treatment

Two different delivery methods have been used:

a. A presentation to a group of landowners about potential domestic water well problems. This provides some good exposure for the TEX*A*Syst program, disseminates information and documentation to a large number of people, and often leads to questions and continued dialogue.
b. One-on-one delivery to specific landowners. This is a more effective delivery method, especially with domestic water well owners who are concerned about problems. One issue that is always surprising during site visits is the lack of wellhead protection. It is very common for landowners to store chemicals in their well house (especially pesticides) because it is dry and secure. This then becomes

a good site to mix chemicals (because a water supply and the chemicals are there) and stack empty containers. In these situations, a group site visit could embarrass the landowner. The drawback of the one-on-one delivery method is the large amount of time involved and the limited number of experienced people to perform the evaluations.

6. Timeframe

Materials have already been developed, but bulletins will need to be updated in the next two to three years. Currently, the outreach portion of this program is inactive due to lack of funding.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be low.

7. Evaluation

If implemented, the effectiveness of this specific educational outreach could be measured by the number of BMPs that are adopted by the program participant.

Issue G – On-Site Wastewater Treatment/Disposal Systems Education

Bruce Lesikar (TCE)

1. Issue

On-site wastewater treatment systems ("systems") are an important component of our wastewater infrastructure. These systems must be properly maintained to make sure that they are removing potential contaminants from the wastewater as it is being returned to our water resources. Therefore, homeowners must be aware of the operation and maintenance requirements associated with their on-site wastewater treatment system.

2. Background Summary

On-site wastewater treatment systems provide wastewater infrastructure for approximately 25 % of the residences in Texas. These systems must remove the contaminants from the wastewater prior to the water returning to groundwater, lakes, rivers, and streams. The pathogens and fecal coliforms in this wastewater have the potential to contaminate our water resources.

The TOWTRC conducted a survey of the local authorized agents in Texas to estimate the number of failing systems in the State. The estimate for Texas placed the number of failing systems at between 10 and 13 %. Assuming 25 % of the population is served by on-site wastewater treatment systems, approximately 1.3 million systems are located in the State. With the assumed failure rate, approximately 130,000 systems would be in a failure condition. The challenge arises from the definition of failure. The definition that was probably used to describe the failure condition would have been a system discharging to the ground surface which is classified as an illicit discharge.

On-site wastewater treatment systems are designed and installed to collect, treat, and disperse the effluent into the soil thus removing contaminants before they reach the surface and groundwater resources. Many of these failing systems were installed prior to the 1997 OSSF rules revisions. These OSSF rule revisions implemented the requirement that constituents needed to be removed from the effluent before it returned to the water resources of the State. Therefore, many of these failing systems are legacy systems that may consist only of a septic tank and straight pipe to the ditch, or septic tank, short drainfield trench, and relief line to the ditch. The emphasis with regard to the short drainfield trench was to make the effluent go away and therefore, in some areas, highly permeable material such as fractured rock or gravel was desirable for making the effluent go away, but this does not meet the goal of protecting the groundwater resources.

These legacy systems are an illicit discharge of partially treated wastewater to drainage ways and a threat to surface and groundwater resources. One method to identify these failing systems is through the "point of sale" property inspection. The "point of sale" property inspection identifies the location and condition of the on-site wastewater

treatment system on the property, and the goal is to determine if the system is operational and not malfunctioning. Limited regulatory guidance is provided for the definition of operational and thus not malfunctioning. Another method to identify and locate these illicit discharges is through implementation of the Total Maximum Daily Load (TMDL) program. Protection of the water resources is critical to the success of the TMDL process and therefore the systems can be required to be operational and not malfunctioning.

The homeowner is the first line of defense with regard to keeping on-site wastewater treatment systems operational. Homeowners need additional information about what is considered an operational system and the practices that are needed to keep their system operational.

3. Audience

The intended audience for this educational program is homeowners. The homeowners are ultimately responsible for the function of their on-site wastewater treatment system. The homeowner must be aware of the components of the system and how to maintain the components.

4. Partners

Potential partners for developing, delivering, and distributing this specific educational outreach include:

a. TCE
b. TOWTRC
c. TCEQ
d. GCDs
e. Local Authorized Agents and Designated Representatives
f. Local Health Departments

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach include:

a. Print – homeowner-directed fact sheets, brochures, flyers
b. News media – radio, newspaper/magazine/newsletter articles
c. Electronic media – List servers, Web sites (these can reach even larger audiences, and they are more adaptable/changeable), CD-ROMs

6. Timeframe

The educational activities associated with the on-site wastewater treatment systems will be an on-going program.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be medium.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by:

a. Distribution of Fact Sheets, brochures, and flyers
    - The number distributed in person
    - The number distributed via download from websites
b. Improvement of water quality in target watersheds monitored through the TMDL process

Issue H – Education for Domestic Water Well Owners: Quality

Steve Musick (TCEQ), Al Cherepon (TCEQ), Kathy McCormack (TCEQ)

1. Issue

The issue to be addressed in this specific educational outreach is improving domestic water well owners' awareness and understanding of the quality of water produced by their wells.

2. Background Summary

Since 1999, all public drinking water systems in the country have been required to provide their customers with an annual water quality report identifying the regulated contaminants and naturally occurring materials detected in the water produced by their system and the likely sources of those contaminants/materials. This new "right-to-know" requirement gives consumers much more information about the water they drink and empowers them to make more informed choices – for example, the choice between a utility's drinking water, in-home treatment systems, and bottled water. However, virtually all of the water used by rural homes not connected to a public drinking water system comes from domestic water wells. We do not know the number of domestic water wells that exist in the state (those that are in use, capped, or abandoned) – water wells have been dug and drilled in Texas since the early 1800s, and more than 800,000 water well reports have been submitted since 1966. There are no specific federal or state programs which routinely monitor the quality of groundwater being consumed by Texans utilizing these wells, and records are not available for the minimal amount of voluntary monitoring currently taking place in the state. There are also no specific federal or state health criteria requirements for this groundwater. Currently, the domestic water well owner in Texas is solely responsible for understanding their groundwater quality and its impact on human health.

The latest issue of the TGPC's *Joint Groundwater Monitoring and Contamination Report*[12] lists 6,132 cases of groundwater contamination in Texas (including hydrocarbons and brine). Public educational materials and outreach programs are needed to educate domestic water well owners on their drinking water quality and potential health risks. Lists of primary, secondary, and unregulated drinking water contaminants and their Maximum Contaminant Levels (MCLs) can be found at http://www.epa.gov/safewater/mcl.html, but more support should be given to educational efforts targeting geographic areas of concern for high concentrations of naturally occurring groundwater contaminants (e.g., nitrate, arsenic, perchlorate, and radionuclides) and on various treatment options available to the domestic water well owner. Special effort is also needed in developing programs designed to reach and serve the state's high growth areas.

3. Audience

The audience for this specific educational outreach includes:

a. All domestic water well owners in Texas
b. Domestic water well owners living in geographic areas of concern for high concentrations of naturally occurring groundwater contaminants (e.g., nitrate, arsenic, perchlorate, and radionuclides)
c. Domestic water well owners living in the rapidly developing suburban fringe

4. Partners

Potential partners for developing and delivering this specific educational outreach include:

a. TCEQ
b. TWDB
c. TDLR
d. TDA
e. RCT
f. TAGD
g. USGS
h. U.S. EPA
i. NGWA
j. TGWA

Potential partners for distributing this specific educational outreach include:

a. TCE
b. GCDs
c. County Health Officials

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach include:

a. TGPC website
    - Links to resources and educational materials regarding domestic water wells, including the *Landowner's Guide to Plugging Abandoned Water Wells*[7] and Drinking Water Problems Fact Sheets
b. Tex*A*SYST program
    - An on-farm inventory of domestic water well pollution sources
c. Water well screening outreach program (e.g., at county fairs)
    - Landowner water well sample analysis with a presentation on interpreting the results and Drinking Water Problems Fact Sheets on constituents of concern
d. Presentations at other community events
e. A television weather forecaster giving a live broadcast from a water well screening event
f. TCE's Drinking Water Fact Sheets

g. County Agricultural Agents' weekly radio broadcasts (the next water well screening event in the area could be announced and the issue could be discussed)
h. Any material developed by RCT related to domestic water well owner outreach

6. Timeframe

This specific educational outreach may require:

a. One year to develop all of the material
b. An additional year to publish all of the material in English and Spanish
c. Monthly outreach events to distribute the material

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be high.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by:

a. Email/website/phone surveys during and after the water well screening events
    - How did you hear about this event ?
    - Based on the information that you've received today, what actions do you think you might take next ?
    - One month after the event – what actions did you take ?

Issue I – Education for Domestic Water Well Owners: Quantity

Al Cherepon (TCEQ), Radu Boghici (TWDB)

1. Issue

The larger issue to be addressed in this specific educational outreach is groundwater conservation, especially in areas of the state with little aquifer recharge. Education is critical to understanding the importance of using groundwater wisely.

2. Background Summary

Many Texans rely on groundwater to a great extent both for drinking water and for industry and agriculture. Of the 16.4 million acre-feet of water Texas expended in 2000, groundwater provided 10.0 million acre-feet, or about 61 %, with surface water supplying the rest. Almost 95 % of the groundwater came from nine major aquifers; the remaining five percent was extracted from 20 minor aquifers.[13] Water levels in wells are direct indicators of the amount of groundwater stored by the aquifers.

From 1990 to 2000, well water levels declined in most major and minor aquifers of Texas. Several aquifers showed an overall recovery. The median water-level change statewide was -3.0 feet.

Water resources management is critical in Texas because of diminishing water supplies and projected rapid increases in population growth (19 million in 1997 to 36 million in 2050). Based on these population projections, if a drought were to occur in 2050, almost half (43 %) of the municipal demand would not be satisfied by current water sources. Since conventional freshwater supplies in Texas are already 75 – 80 % developed, water conservation is a very critical element in meeting the state's long-term water needs.

3. Audience

Audiences for this specific educational outreach include:

a. Large urban centers
b. Panhandle
c. Agriculture
d. Golf courses
e. Large businesses that irrigate their lawns
f. Private domestic water well owners

4. Partners

Potential partners for developing, delivering, and distributing this specific educational outreach include:

a. Better Business Bureaus
b. Chambers of Commerce

c. Texas Farm Bureau
d. Texas Rural Water Association (TRWA)
e. County Agricultural Extension Offices
f. GCDs
g. TCEQ/TDA Regional Offices
h. Public Drinking Water (PDW) Systems

5. Materials/Methods

Materials and methods that could be used by these partners for this specific educational outreach to large urban centers and the panhandle include:

a. County Fairs
b. School volunteer groundwater level monitoring programs
c. PSAs on television and radio
d. Groundwater conservation reminders and current groundwater levels included in local television weather segments

Materials and methods that could be used by these partners for this specific educational outreach to agriculture, golf courses, and large businesses that irrigate their lawns would need to be more focused, perhaps through industry associations.

6. Timeframe

This specific educational outreach could be implemented within a couple of years, but it should continue indefinitely.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be medium.

7. Evaluation

The effectiveness of this specific educational outreach could be measured by:

a. Monitoring and comparing groundwater level reduction rates on an annual basis
b. Installing flow meters on domestic water wells
    - PDW Systems, TWDB, other state agencies, or GCDs can purchase flow meters in bulk and offer them to home/landowners at a 50 % match.

Issue J – Groundwater and Oil & Gas Wells

Plugging Abandoned Oil & Gas Wells

Leslie Savage (RCT), Mary Ambrose (TCEQ)

1. Issue

The issue to be addressed in this specific educational outreach effort is the plugging of abandoned oil and gas wells. This outreach effort is needed in order to enhance public awareness of an RCT oil and gas well plugging assistance program.

2. Background Summary

Although the RCT has had a small well plugging program since 1983, the Texas Legislature created the Oil Field Cleanup Dedicated Account (the Account) in 1991 to increase the revenue to this program and to expand the program to include remediation of abandoned oilfield surface sites. Revenue for the Account comes from the oil and gas industry in the form of permit fees, oil and gas production regulatory fees, financial assurance collections, sales of salvageable equipment, reimbursement for plugging and remediation costs, administrative penalties, and civil penalties.

House Bill 2161 (HB 2161), enacted by the 79th Texas Legislature (2005), established an Orphaned Well Reduction Program (Section 89.047, Texas Natural Resources Code). This new program, which became effective on January 1, 2006, includes procedures, requirements, and incentives for a person to assume operatorship and regulatory responsibility for orphaned oil or gas wells. An "orphaned well" is a well for which the RCT has issued a permit, for which production of oil or gas or another activity under RCT jurisdiction has not been reported to the RCT for the preceding 12 months, and whose operator's RCT-approved Organizational Report has lapsed. An operator adopting such wells from January 1, 2006 to December 31, 2007 may be eligible to receive certain benefits, such as a payment from the Oil Field Clean Up Fund (OFCUF) and/or an exemption from severance taxes and Oil Field Cleanup Regulatory fees on future production from the wells.

HB 2161 also established a new program in which the RCT is authorized to make payments to surface estate owners who plug orphaned oil or gas wells on their property. The orphaned or abandoned oil or gas wells on the RCT's list are generally plugged according to risk to surface and subsurface water. If a surface estate owner with an abandoned well on his or her property contracts to have the well plugged sooner, HB 2161 provides for reimbursement from the RCT to that surface owner of one-half of the cost of plugging the oil or gas well.

Under the new law, a surface estate owner is defined as the owner of interest in the surface estate of a tract of land on which an orphaned oil or gas well is located. The surface estate owner must contract with a RCT-approved well cementer to plug an

orphaned well on his or her property. The list of approved cementers can be found on the RCT's web site at http://www.rrc.state.tx.us/divisions/og/environmental_protect.html. The well cementer under contract with the surface owner must: (1) not later than the 30th day before the date the well is plugged, mail notice of its intent to plug the well to the operator of the well at the operator's address as shown by RCT records; (2) assume responsibility for the physical operation and control of the well as shown by a form the person files with the RCT and the RCT approves (file a one-signature Form P-4); (3) file a bond, letter of credit, or cash deposit covering the well as required by RCT rules; and (4) plug the well in accordance with RCT rules.

Upon successful plugging of the oil or gas well by the well cementer, the surface estate owner may submit to the RCT FORM OW-3, Application for Payment for Reactivating or Plugging an Orphaned Oil or Gas Well (http://www.rrc.state.tx.us/divisions/og/form-library/FORM-OW-3.pdf), and documentation of the plugging costs. The RCT will reimburse the surface estate owner from the state's OFCUF in an amount not to exceed 50 % of the lesser of the (1) documented well-plugging costs or (2) the average RCT costs for plugging a similar oil or gas well in the same general area within the preceding 24 months.

3. Audience

The target audience for this outreach effort is mineral owners, surface owners, local government, land developers, and the general pubic. These are the groups that are the most likely to have problems with unplugged oil and gas wells.

4. Partners

Other entities with whom a partnership might be beneficial during the development of the outreach include:

a. GCDs
b. TWDB
c. TCEQ
d. TCE
e. National Association of Royalty Owners (NARO, http://www.naro-tx.org/)
f. Texas Independent Producers and Royalty Owners Association (TIPRO, http://www.tipro.org/)
g. TDLR

A partnership with these entities, as well as industry associations, might be beneficial during the distribution of this information.

5. Materials/Methods

The following materials and methods could be used by these partners for this educational outreach:

a. Print – Fact sheets and brochures
b. Events – Conferences, board meetings, fairs, and seminars
c. Newspaper and newsletter articles
d. Electronic media – List servers and websites

6. Timeframe

Development of the materials, and an implementation and distribution plan in coordination with partners, is estimated to take around six months.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be low.

7. Evaluation

The effectiveness of this educational outreach effort, as far as influencing changes in behavior, could be measured by:

a. The number of brochures distributed
b. The number of articles and the distribution of the newspaper or newsletter
c. The number of events attended
d. The number of webpage hits
e. The number of inquiries into the oil and gas well plugging program
f. The number of oil or gas wells plugged as a result of the outreach effort

Converting Abandoned Oil & Gas Wells into Water Wells

Leslie Savage (RCT), Mary Ambrose (TCEQ), Chris Ramser (Clearwater UWCD)

1. Issue

The issue to be addressed in this specific educational outreach effort is the regulations and responsibilities associated with the conversion of an oil or gas well into a water well. This effort is needed in order to make surface owners aware of the program and the requirements of both the oil or gas company and the surface owner.

2. Background Summary

The Texas Statutes and RCT regulations allow a surface owner and the operator to file an application to condition an abandoned oil or gas well located on the surface owner's tract for usable quality water production operations. The application must be made on Form P-13, Application of Landowner to Condition an Abandoned Well for Fresh Water Production (http://www.rrc.state.tx.us/divisions/og/form-library/finalp-13-92104.pdf).

Before the RCT will consider approval of an application, the surface owner must assume responsibility for plugging the oil or gas well and obligate himself, his heirs, successors, and assignees to complete the plugging operations. In addition, the operator responsible for plugging the oil or gas well must place all cement plugs required by this rule up to the base of the usable quality water strata. The surface owner further must submit a copy of the permit from the GCD for the area where the oil or gas well is located or must attest to the fact that (1) there is no GCD for the area in which the well is located; or (2) there is a GCD for the area where the well is located, but the GCD does not require that the well be permitted or registered; or (3) the surface owner has registered the well with the GCD for the area where the well is located.

The duty of the operator to properly plug ends only when the operator has properly plugged the oil or gas well in accordance with RCT requirements up to the base of the usable quality water stratum, the surface owner has registered the well with, or has obtained a permit for the well from the GCD, if applicable, and the RCT has approved the application of the surface owner to condition an abandoned oil or gas well for fresh water production. Information concerning the various GCDs can be found at the TAGD home page (http://www.texasgroundwater.org).

3. Audience

The target audience for this outreach effort is mineral owners, surface owners, and the general pubic. These are the groups that are the most likely to be interested in conversion of an oil or gas well into a water well for their own use.

4. Partners

Other entities with whom a partnership might be beneficial during the development of the outreach include:

a. Royalty owner associations
b. GCDs
c. TDLR
d. TWDB
e. TCEQ
f. TCE
g. NARO
h. TIPRO

A partnership with these entities, as well as industry associations, might be beneficial during the distribution of this information.

5. Materials/Methods

The following materials and methods could be used by these partners for this educational outreach:

a. Print – Fact sheets and brochures
b. Events – Conferences, board meetings, fairs, and seminars
c. Newspaper and newsletter articles
d. Electronic media – List servers and websites

6. Timeframe

Development of the materials, and an implementation and distribution plan in coordination with partners, is estimated to take around six months.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be low.

7. Evaluation

The effectiveness of this educational outreach effort, as far as influencing changes in behavior, could be measured by:

a. The number of brochures distributed
b. The number of articles and the distribution of the newspaper or newsletter
c. The number of events attended
d. The number of webpage hits
e. The number of inquiries into the oil and gas well plugging program
f. The number of oil or gas wells plugged as a result of the outreach effort

Water Wells Supporting Oil & Gas Wells

Leslie Savage (RCT), Mary Ambrose (TCEQ), Chris Ramser (Clearwater UWCD)

1. Issue

The issue to be addressed in this specific educational outreach effort is the current Texas law and regulation concerning water wells associated with oil and gas activity. Inquiries during this current period of drought have indicated that the state laws relating to the drilling and use of water wells in association with oil and gas activity is extremely unclear. This educational outreach effort is needed because the public is confused and frustrated with the information that is currently available with respect to water rights.

2. Background Summary

Generally, under Texas Natural Resources Code, Title 3, and Texas Water Code, Chapters 26 and 27, the RCT has jurisdiction activities associated with the exploration, development, or production of oil or gas or geothermal resources, including transportation of crude oil or natural gas by pipeline. The RCT also has jurisdiction over surface mining for coal, uranium, and iron ore gravel.

Water is used in association with many oil and gas activities, including use (in general order of relative volume) as a supplemental fluid in enhanced recovery of petroleum resources; during drilling and completion of an oil or gas well; during workover of an oil or gas well; during solution of underground salt in brine mining or hydrocarbon storage cavern creation; as gas plant cooling and boiler water; as hydrostatic test water for pipelines and tanks; as rig wash water; as coolant for internal combustion engines for rigs, compressors, and other equipment; for sanitary purposes; and for laboratory purposes.

Much of the water used in association with oil and gas activities, particularly the water used in enhanced recovery, is saline or brackish water. Saline or brackish water is drawn from underground reservoirs that are below the base of usable quality water. The RCT requires a permit for wells associated with oil and gas activities that draw such water from formations below the base of usable quality water. When a fresh water well is drilled above the base of usable quality water and fresh water or surface water is used regulations other than those of the RCT apply.

Numerous inquiries received by Texas state agencies indicate much confusion and frustration over regulation of water in Texas, particularly of groundwater during drought periods. This educational effort would provide general information concerning water rights and regulation in Texas.

3. Audience

The target audience for this outreach effort is:

a. Mineral owners
b. Surface owners
c. Local government
d. Land developers
e. Property owners associations
f. The general pubic

These are the groups that are the most likely to have questions about the issue.

4. Partners

Other entities with whom a partnership might be beneficial during the development of the outreach include:

a. GCDs
b. TWDB
c. TCEQ
d. TDLR
e. Local government associations (such as the Association of Texas Counties)
f. TCE
g. NARO
h. TIPRO

A partnership with these entities, as well as industry associations, might be beneficial during the distribution of this information.

5. Materials/Methods

The following materials and methods could be used by these partners for this educational outreach:

a. Print – Fact sheets and brochures
b. Events – Conferences, board meetings, fairs, and seminars
c. Newspaper and newsletter articles
d. Electronic media – List servers and websites

6. Timeframe

Development of the materials, and an implementation and distribution plan in coordination with partners, is estimated to take around six months.

The relative amount of effort required of the TGPC, POE Subcommittee, and/or their Partners to complete this specific educational outreach is estimated to be medium.

7. Evaluation

The effectiveness of this educational outreach effort, as far as influencing changes in behavior, could be measured by:

a. The number of brochures distributed
b. The number of articles and the distribution of the newspaper or newsletter
c. The number of events attended
d. The number of webpage hits
e. The number of inquiries into the oil and gas well plugging program
f. The number of oil or gas wells plugged as a result of the outreach effort

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