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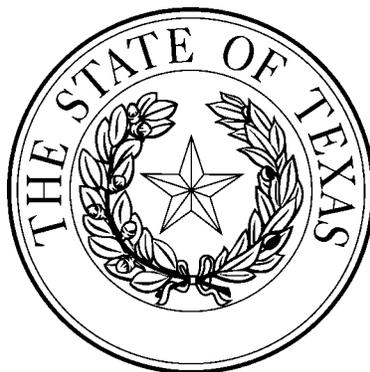
**Bureau of Economic Geology of
The University of Texas at Austin**

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

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Texas Groundwater Protection Committee

<www.tnrcc.state.us/tgpc>

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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 of the University of Texas at Austin

Agricultural Chemicals Subcommittee

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Texas Agricultural Experiment Station
Bureau of Economic Geology of the University of Texas at Austin
Texas Agricultural Extension Service
Structural Pest Control Board

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The Texas State Management Plan for the Prevention of Pesticide Contamination in Groundwater was designed and produced by the Agricultural Chemicals Subcommittee of the Texas Groundwater Protection Committee in fulfillment of the United States Environmental Protection Agency (EPA) grant work plan under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), as amended. The effort was partially funded by the EPA.

Texas Groundwater Protection Committee
Water Quality Planning and Assessment Section, MC-147
Texas Natural Resource Conservation Commission
PO Box 13087
Austin TX 78711-3087

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ACRONYMS

ACS	Agricultural Chemicals Subcommittee
ACRE	Alliance for a Clean Rural Environment
APTRA	Administrative Procedure & Texas Register Act
ARS	Agriculture Research Service
BEG	Bureau of Economic Geology at UT Austin
BMP	Best Management Practices
BMPTF	Best Management Practices Task Force
CAP	Conservation Assistance Program
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
CEU	Continuing Education Unit
CWA	Clean Water Act
DEITF	Data Evaluation & Interpretation Task Force
EPA	Environmental Protection Agency (U.S.)
ETF	Educational Task Force
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act, as Amended
FSA	Farm Service Agency
FTE	Full-Time-Employee
GIS	Geographic Information Systems
GLP	Good Laboratory Practice
HAL	Health Advisory Level
HPUWCD#1	High Plains Underground Water Conservation District #1
ICM	Integrated Crop Management
IPM	Integrated Pest Management
LEPA	Low Energy Precision Application
MCL	Maximum Contaminant Level
NPL	National Priority List
NRCS	Natural Resources Conservation Service of USDA
NRI	Natural Resources Inventory
PMP	Pesticide Management Plan (Previously called a State Management Plan -- SMP)
PMPTF	Pesticide Management Plan Task Force
PRPs	Potentially Responsible Parties
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan

RCRA	Resource Conservation & Recovery Act
RCT	Railroad Commission of Texas
SC	Sierra Club, Lone Star Chapter
SDWA	Safe Drinking Water Act
SMP	State Management Plan (See PMP.)
SMRD	Surface Mining & Reclamation Division of RCT
SPCB	Structural Pest Control Board
SPISP	Soil/Pesticide Interaction Screening Procedure
SSTF	Site Selection Task Force
STATSGO	State Soil Geographic
STORET	STORET Water Quality File database
SWCD	Soil & Water Conservation Districts
TAAC	Texas Association of Agriculture Consultants
TAC	Texas Administrative Code
TAES	Texas Agricultural Experiment Station
TAEX	Texas Agricultural Extension Service
TAGD	Texas Alliance of Groundwater Districts
TAIA	Texas Ag Industry Association
TAN	Texas Association of Nurserymen
TCGA	Texas Cotton Ginners Association
TCGM	Texas Citrus Growers Mutual
TCPB	Texas Corn Producers Board
TCGI	Texas Corn Growers Inc.
TCVA	Texas Citrus & Vegetable Association
TDA	Texas Department of Agriculture
TDH	Texas Department of Health
TDLR	Texas Department of Licensing and Regulation
TFB	Texas Farm Bureau
TGPC	Texas Groundwater Protection Committee
TGSPA	Texas Grain Sorghum Producers Association
TNRCC	Texas Natural Resource Conservation Commission
TPPB	Texas Peanut Producers Board
TSSWCB	Texas State Soil & Water Conservation Board
TSTA	Texas Seed Trade Association
TSWDA	Texas Soil Waste Disposal Act
TTGA	Texas Turf Grass Association
TWC	Texas Water Commission
TWDB	Texas Water Development Board
TWGA	Texas Wheat Growers Association
TWRI	Texas Water Resources Institute
TxDOT	Texas Department of Transportation
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
WWDT	Water Well Drillers Team

DEFINITIONS

Pesticide

FIFRA (Section 2 [136] Definitions) - *The term “pesticide” means (1) any substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest, and (2) any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant, except that the term “pesticide” shall not include any article that is a “new animal drug” within the meaning of Section 201(w) of the Federal Food, Drug, and Cosmetic Act (21 U.S.C. 321(w)), that has been determined by the Secretary of Health and Human Services not to be a new animal drug by a regulation establishing conditions of use for the article, or that is an animal feed within the meaning of section 201(x) of such Act (21 U.S.C. 321(x)) bearing or containing a new animal drug.*

Texas Pesticide Laws (1989) (Chapter 76.001 DEFINITIONS, (18)) - *Pesticide means a substance or mixture of substances intended to prevent, destroy, repel, or mitigate any pest, or any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant.*

Pesticide in this PMP refers to those pesticides that have been designated by EPA in the PMP Proposed Rules.

Groundwater

In this document the word *groundwater* is spelled as one word both as an adjective and noun. This is in accordance with common usage. The only exception is in the titles of laws or documents and in the names of entities, where, if the original usage was as two words, it is retained.

PREFACE

This document, the Texas State Management Plan for Prevention of Pesticide Contamination of Groundwater, is based on the draft and final *Guidance for Pesticides and Ground Water State Management Plans* prepared by EPA, and EPA's *Pesticides and Ground Water Strategy*. It is an update of the document, Texas State Management Plan for Agricultural Chemicals in Ground Water, published in 1991. [EPA has previously referred to these documents as State Management Plans (SMPs) but more recently has designated them as Pesticide Management Plans (PMPs)]. Each of the State agencies having responsibilities in the protection and conservation of groundwater resources or the regulation of pesticides has contributed to this PMP.

EPA has determined that, due to their groundwater contamination potential, some pesticides commonly used nationwide may pose an unreasonable adverse effect on the environment, unless effective local management measures are developed and implemented through state pesticide-specific management plans. Under its authority granted by the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), EPA is planning to release proposed rules for the development and implementation of management plans as a condition for the legal sale and use of identified pesticides. When the rules go into effect, these pesticides will be prohibited for sale and use within a state that does not have an EPA-approved pesticide-specific Pesticide Management Plan (PMP), potentially affecting a large segment of a state's agricultural community who are dependent upon these pesticides.

To preserve the continued use of the EPA-listed pesticides, a state will need to develop pesticide-specific PMPs that address groundwater contamination for each pesticide. EPA is asking states to develop two different kinds of PMPs: generic and pesticide-specific. Both types must contain twelve components defined by EPA. Even though the development of a generic PMP is voluntary, it serves an important function since it is to contain the basic underlying framework for managing pesticide use in the state and will serve as a basis for the development of the pesticide-specific PMPs. The pesticide-specific PMPs will be required by regulation as a condition of sale and use of an EPA listed pesticide. In addition to the basic program components that it will share with the generic PMP, the pesticide-specific PMPs will contain any specific actions necessary to prevent groundwater contamination by the subject pesticide. The State of Texas, through the Texas Natural Resource Conservation Commission, with the guidance of the Texas Groundwater Protection Committee, has initiated the process for developing the necessary PMPs. This document is the generic PMP for the State and will serve to guide the development of pesticide-specific PMPs as needed.

The information contained in this document represents the contribution of each individual participating agency and group. The document as a whole is the work of the Agricultural Chemical Subcommittee and reflects the commitment of each participating organization.

EXECUTIVE SUMMARY

The development of this generic Pesticide Management Plan (PMP) was guided by U.S. Environmental Protection Agency's (EPA) *Pesticide and Ground Water Protection Strategy and Guidance for Pesticides and Ground Water State Management Plans*. The management plan guidance document outlines the components to be addressed in the development of management plans. This plan was developed consistent with those components.

The need for a Pesticide Management Plan specifically to address potential and actual groundwater contamination from pesticides arises from evidence nationwide that use of these pesticides can, in some instances, lead to the contamination of groundwater. Groundwater is a vital natural resource in Texas, providing a large amount of the total state water requirements. While only a few incidents of groundwater contamination by pesticides have been reported in Texas, there is significant potential for impact to vulnerable groundwater resources.

The goal of this plan is to protect the existing quality of groundwater and to prevent the degradation of state groundwater resources. This goal does not mean zero-contaminant discharge, but that normal use of pesticides be conducted in a manner that will maintain present groundwater uses and not impair potential uses of groundwater or pose a public health hazard. All usable and potentially usable groundwaters are subject to the same protection afforded by the nondegradation policy goal. This level of groundwater protection should assure equivalent protection to surface water influenced or hydrologically connected to groundwater.

State law authorizes the Texas Natural Resource Conservation Commission with the advice of the Texas Groundwater Protection Committee to develop management plans for the protection of water quality under labeled use of agricultural pesticides. The Texas Legislature created the interagency Texas Groundwater Protection Committee (TGPC) in 1989, to coordinate actions for the protection of groundwater quality in the State. Certain State agencies were identified by the Texas Legislature as standing members of the TGPC. The Texas Natural Resource Conservation Commission (TNRCC) was designated as the lead agency for the Committee and is the designated State/EPA liaison for FIFRA groundwater issues. An Agricultural Chemicals Subcommittee (ACS) was formed in November 1989, to develop a Statewide management plan for pesticides. TNRCC, in its capacity as the liaison agency, will be responsible for maintaining the channels of communication between TGPC, ACS, EPA, and the cooperating agencies and entities concerning activities associated with the development and implementation of the PMP. TGPC and ACS meet once each quarter and as needed.

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

The seven major principles that govern the development of this plan are:

- Agricultural pesticides are beneficial and important to the production of food, fiber supply, and the economy of the State;
- State and local government should be the first line of groundwater protection, with this effort being complemented by federal expertise and information;
- The use of pesticides, while important for protection of public safety and health, should not impair any use of groundwater or cause a public health hazard;
- Drinking water supplies, including groundwater resources used to supply private wells, should be protected;
- Groundwater quality monitoring by state agencies, local government, and other interested parties can be directed to areas determined by the State to be vulnerable to nonpoint source contamination;
- Pesticide use and best management practices (BMPs) should be tailored to prevent contamination of groundwater from pesticides; and
- Education and voluntary implementation of BMPs should be the primary emphasis of this plan.

SECTION I STATEMENT OF PHILOSOPHY

Groundwater Protection Policy

Chapter 26 of the Texas Water Code provides that the goal of this Pesticide Management Plan (PMP) be consistent with the protection of public health and welfare, the propagation and protection of terrestrial and aquatic life, the protection of the environment, and the maintenance and enhancement of long-term economic health of the State. The State's responsibility is to protect the existing quality of groundwater. This goal of non-degradation does not mean zero-contaminant discharge. Wastewater discharges containing pesticides, disposal of wastes, or other activities subject to regulation by State agencies are to be conducted in a manner that will maintain present groundwater uses and not impair potential uses of groundwater or pose a public health hazard.

Groundwater classification is an important tool in the implementation of the PMP's components. Through classification, the groundwaters of the State can be identified and protected, according to their water quality and present or potential use. The Texas Groundwater Protection Committee has adopted the Groundwater Classification System and recommends that the member agencies implement this system as an integral part of their groundwater quality programs. This classification system will serve as a common basis among the various programs to foster consistency. It also serves as a response setting mechanism, and a mapping tool to delineate specific areas in need of more detailed groundwater quality management. The State's classification applies to all aquifers with water of usable quality which includes the mapped major and minor aquifers (Figures 1 and 2), including any aquifers that may be mapped subsequent to the adoption of this plan.

Four classes of groundwater are defined based on quality as determined by total dissolved solids content (Table 1). The names and concentration ranges are based on traditional nomenclature associated with each class. In determining usability, it is implicit in this classification that a water-bearing zone 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. 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.

It is the goal of this PMP to protect these waters from contamination resulting from the use of pesticides and to require cleanup of waters on a case-by-case basis. The determination of the appropriate level of remediation will consider: (1) yield; (2) the availability of alternative sources of water; (3) possible hydrogeologic interconnections between aquifers and between aquifers and surface waters; (4) any naturally occurring concentrations of background constituents; and (5) traditional and potential beneficial uses of the water.

The first priority is to protect groundwaters that are or can be used as drinking water sources and other groundwaters used for other beneficial purposes. These other waters include slightly saline waters that are not presently used as drinking water sources, but that are potential sources of drinking water. Also included are moderately saline waters, when they are used for livestock and irrigation. These waters will receive the same priority of protection in order to ensure their current and potential future uses.

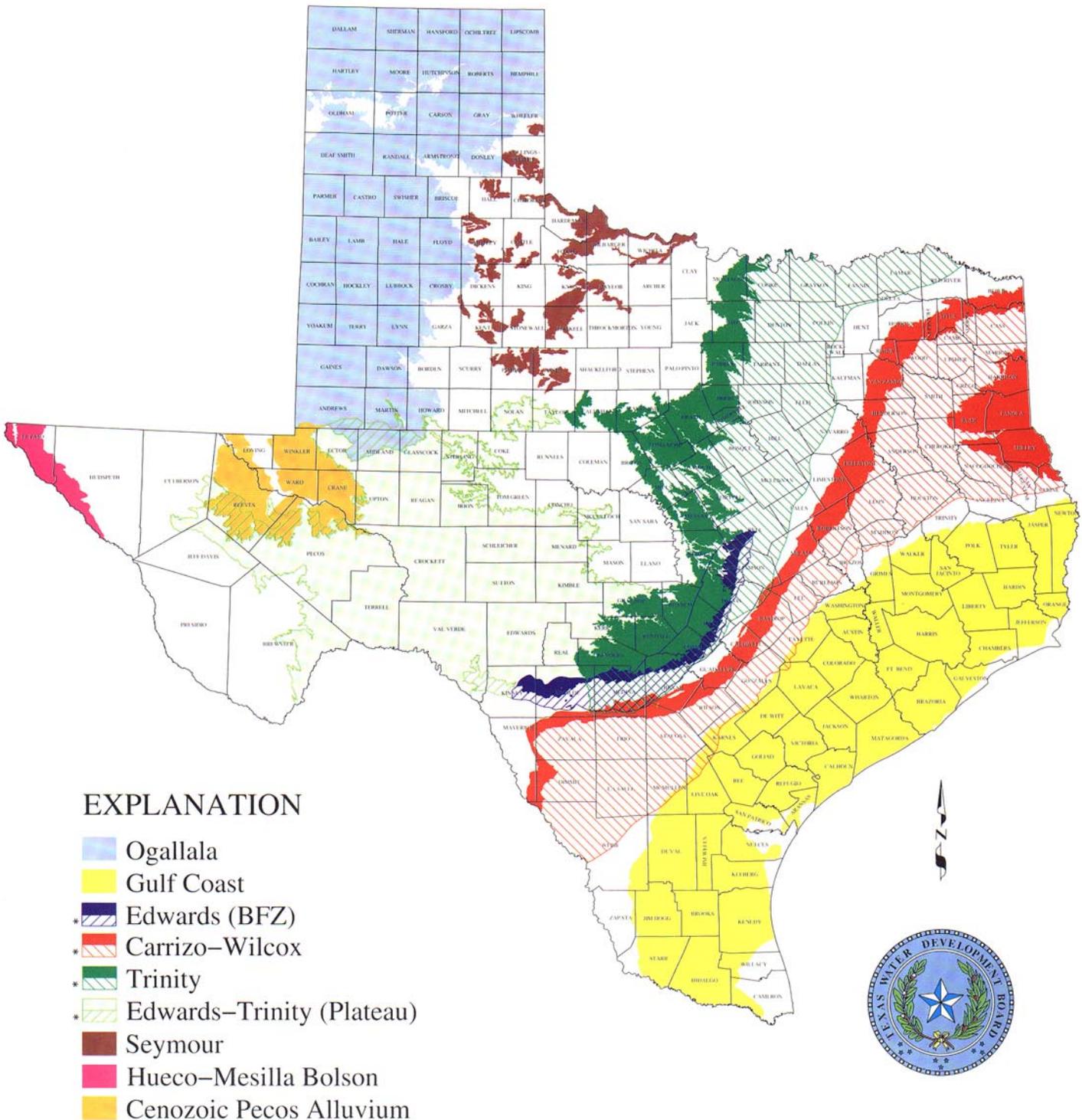
The second priority is to protect moderately saline groundwaters which could potentially be used or may be interconnected with better quality waters. This potential use should be resolved on a case-by-case basis taking into account such factors as the economic and technical feasibility of treatment, the projected needs for, and the type of impacts on these groundwaters.

The PMP relies on the State's non-degradation policy for protecting groundwater, used in combination with the Groundwater Classification System. This high level of groundwater protection and the recognition of the interconnection of ground and surface waters also provides for the protection of many of the State's surface waters. Protection of groundwater in vulnerable areas will also protect surface waters that are hydrogeologically connected to groundwater.

Importance of Agriculture

Although less than two percent of the population is involved directly in farming and ranching, agriculture remains a powerful economic force in the State. Agriculture is the state's second largest industry, employing one in five Texans and generating almost \$40 billion in economic activity from the farm to the family dinner table. Texas also ranks as the nation's top producer of cattle, sheep, Angora goats, horses, cotton, grain sorghum, wool and mohair. Advances in improving crop varieties and enhancing the medicinal properties of vegetables also are occurring at Texas research centers. As the industry makes a transition into the computer and bio-tech age, it will continue to offer first-class food, clothing, shelter and health to Texas, the nation, and the world.

MAJOR AQUIFERS OF TEXAS

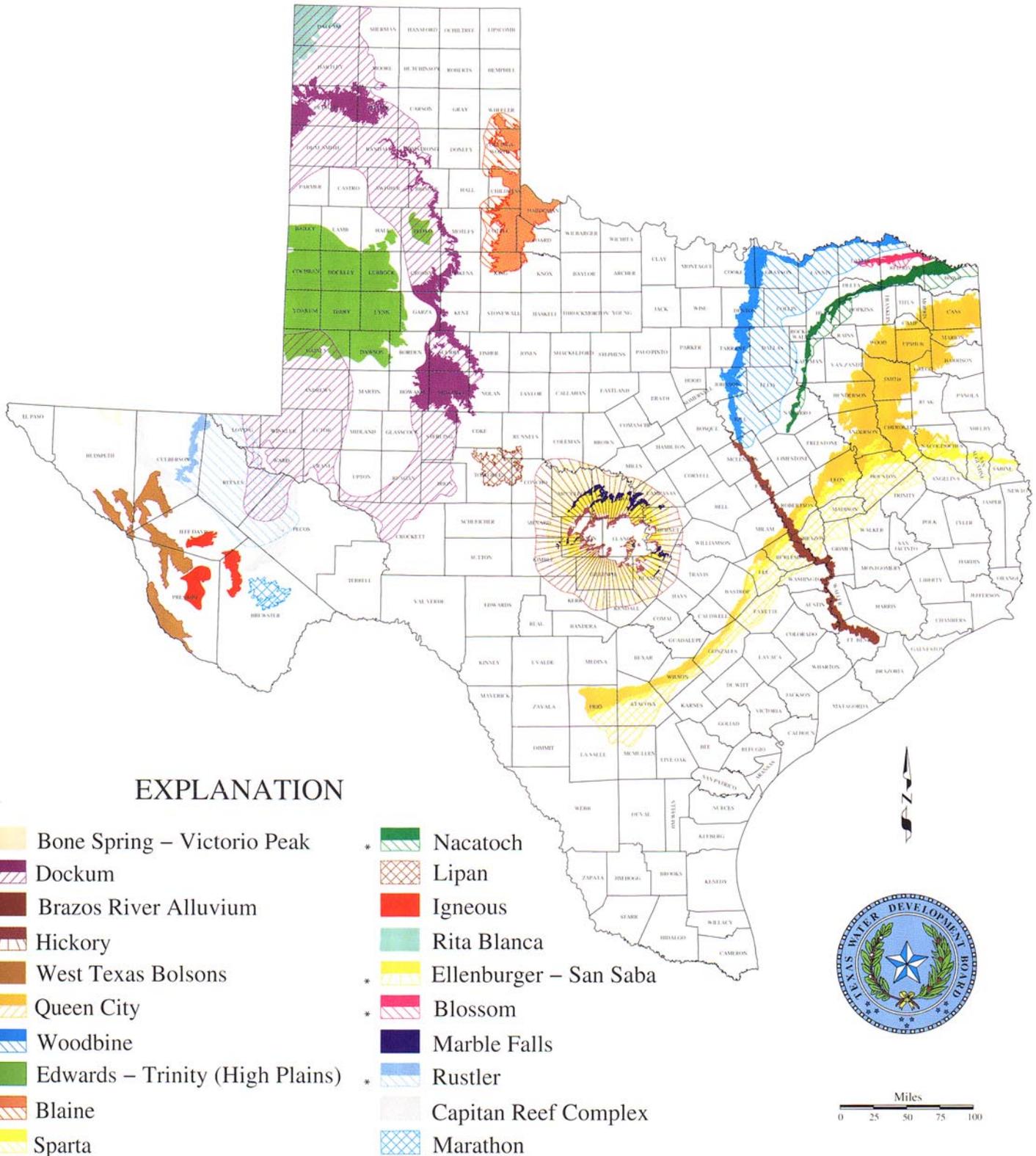


OUTCROP (That part of a water-bearing rock layer which appears at the land surface.)

*** DOWNDIP** (That part of a water-bearing rock layer which dips below other rock layers.)



MINOR AQUIFERS OF TEXAS



January 1994

OUTCROP (That part of a water-bearing rock layer which appears at the land surface.)
 * DOWNDIP (That part of a water-bearing rock layer which dips below other rock layers.)

TABLE 1
TEXAS GROUNDWATER PROTECTION COMMITTEE GROUNDWATER CLASSIFICATION SYSTEM

Class	Quality*	Examples of Use	Agency Response
Fresh	Zero to 1000	Drinking and all other uses	Level I Response: Protection or restoration measures based on current or potential use as a human drinking water supply.
Slightly Saline	More than 1000 to 3000	Drinking if fresh water is unavailable, livestock watering, irrigation, industrial, mineral extraction, oil and gas production	
Moderately Saline	More than 3000 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	
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

* Concentration range of Total Dissolved Solids in milligrams per liter

SECTIONS II & III ROLES AND RESPONSIBILITIES OF PARTICIPATING AGENCIES AND ENTITIES AND CORRESPONDING LEGAL AUTHORITY

This section identifies and describes the roles and responsibilities of state agencies and other entities in the development and implementation of the Pesticide Management Plan (PMP) as well as specific agency roles and technical and administrative tasks to be performed under this plan. In addition, the roles and available resources of federal entities and manufacturers are described. See Table 2 for a list of agencies and entities.

Chapter 26 of the Water Code designates the Texas Natural Resource Conservation Commission (TNRCC) as the responsible agency for the development of management plans for the prevention of water pollution by pesticides. TNRCC is required to solicit the advice of the TGPC in the development of such plans. TGPC was created as an interagency committee to coordinate state agency actions for the protection of groundwater quality in Texas. As the lead agency and Chair of TGPC, TNRCC is responsible for administering the activities of the Committee. Therefore, TGPC will serve as the primary coordinating mechanism for all activities associated with the development, maintenance and implementation of the PMP.

TGPC is composed of *the executive director* of TNRCC, *the executive administrator* of the Texas Water Development Board (TWDB), *the executive director* of the Railroad Commission of Texas (RCT), *the commissioner of health* of the Texas Department of Health (TDH), *the deputy commissioner* of the Texas Department of Agriculture (TDA), *the executive director* of the Texas State Soil and Water Conservation Board (TSSWCB), *a representative* selected by the Texas Alliance of Groundwater Districts (TAGD), *the director* of the Texas Agricultural Experiment Station (TAES) and *the director* of the Bureau of Economic Geology (BEG) at The University of Texas at Austin. Each member of TGPC may designate a personal voting representative from the member's agency to serve TGPC, however, this does not relieve the responsibility of the member in decisions of the TGPC.

Coordinating Mechanism

Texas Groundwater Protection Committee

Specifically, the Texas Water Code directs the TNRCC with the advice of the TGPC to develop management plans for the prevention of groundwater pollution by agricultural chemicals and other agents. The exception is those plans that are required by other codes (Agriculture Code Section 201.026) for the protection and enhancement of water quality pursuant to federal statute, regulation or policy. TGPC was created as an interagency committee to coordinate state agency actions for the protection of groundwater quality in Texas. TGPC will serve as the primary *coordinating mechanism* for all activities associated with the development, maintenance, and implementation of the PMP (See Figure 3).

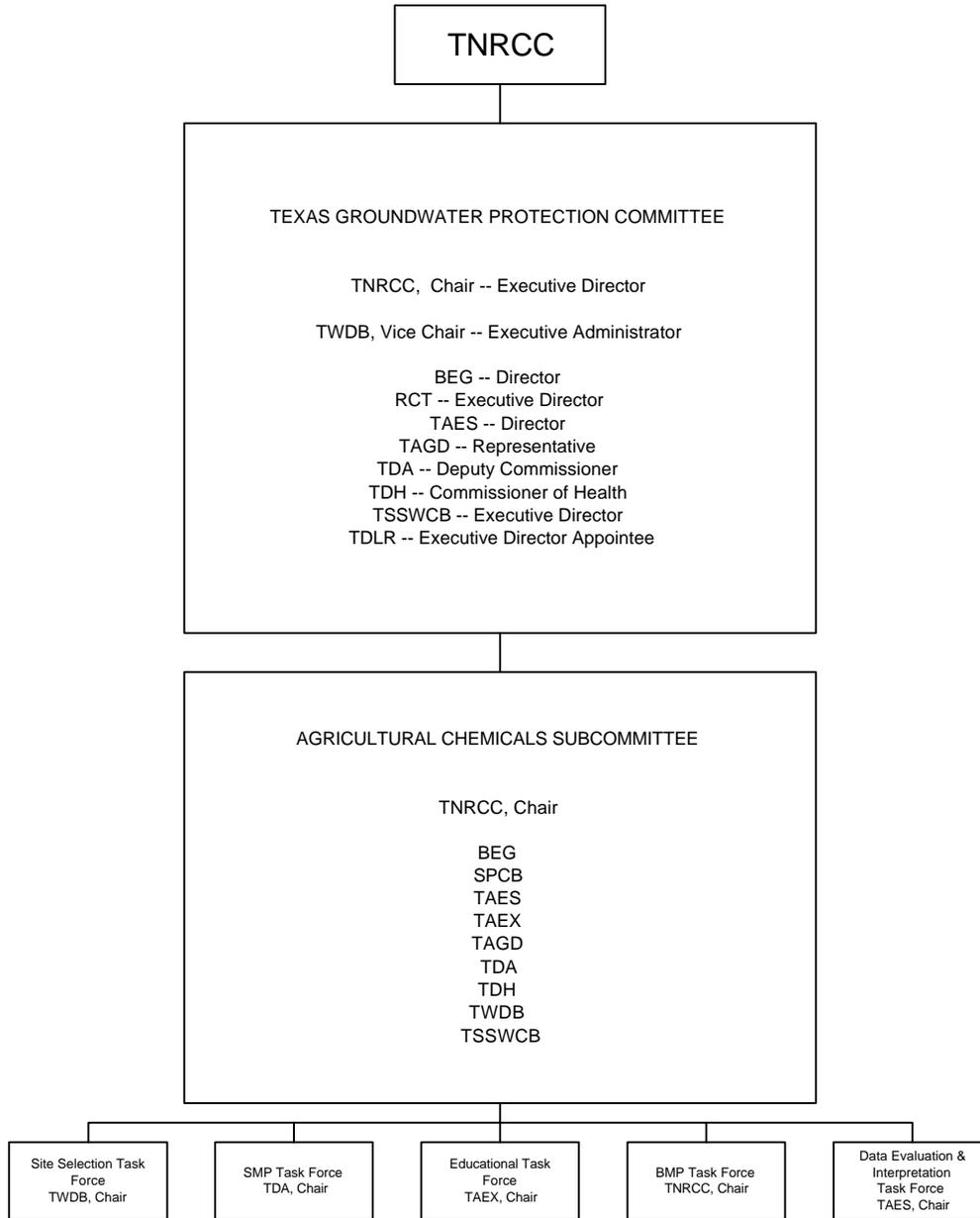
**TABLE 2
PARTICIPATING AGENCIES & INTEREST GROUPS**

TEXAS GROUNDWATER PROTECTION COMMITTEE	
TNRCC, Chair	Texas Natural Resource Conservation Commission
TWDB, Vice-Chair	Texas Water Development Board
BEG	Bureau of Economic Geology at UT Austin
RCT	Railroad Commission of Texas
TAES	Texas Agricultural Experiment Station
TAGD	Texas Alliance of Groundwater Districts
TDA	Texas Department of Agriculture
TDH	Texas Department of Health
TDLR	Texas Department of Licensing and Regulation
TSSWCB	Texas State Soil & Water Conservation Board
AGRICULTURAL CHEMICALS SUBCOMMITTEE	
TNRCC, Chair	Texas Natural Resource Conservation Commission
TDA	Texas Department of Agriculture
BEG	Bureau of Economic Geology at UT Austin
SPCB	Structural Pest Control Board
TAES	Texas Agricultural Experiment Station
TAEX	Texas Agricultural Extension Service
TAGD	Texas Alliance of Groundwater Districts
TDH	Texas Department of Health
TSSWCB	Texas State Soil & Water Conservation Board
TWDB	Texas Water Development Board

TABLE 2 (continued)
PARTICIPATING AGENCIES & INTEREST GROUPS

FEDERAL AGENCIES	
USDA, NRCS	United States Department of Agriculture, Natural Resources Conservation Service
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
PRODUCER GROUPS	
TAN	Texas Association of Nurseryman
TCGM	Texas Citrus Growers Mutual
TCVA	Texas Citrus & Vegetable Association
TCGI	Texas Corn Growers, Inc.
TCPB	Texas Corn Producers Board
TGSPA	Texas Grain Sorghum Producers Association
TPPB	Texas Peanut Producers Board
TTGA	Texas Turf Grass Association
TWGA	Texas Wheat Growers Association
ASSOCIATED GROUPS	
SC	Sierra Club, Lone Star Chapter
TAIA	Texas Ag Industries Association
TAAC	Texas Association of Agriculture Consultants
TCGA	Texas Cotton Ginnery Association
TFB	Texas Farm Bureau
TSTA	Texas Seed Trade Association

**FIGURE 3
PMP ORGANIZATIONAL CHART**



Agricultural Chemicals Subcommittee

The Agricultural Chemicals Subcommittee (ACS) was created by TGPC to specifically coordinate the development of the generic PMP and the future development and implementation of the pesticide-specific PMPs.

TNRCC, as chair of TGPC, will provide information concerning plan development and implementation to all participating agencies. Through the chairmanship of ACS, TNRCC will provide information and coordination for agencies participating in:

- vulnerability assessments;
- monitoring activities;
- groundwater contamination response;
- prevention measures implementation; and
- enforcement.

TNRCC is responsible for the activities of TGPC, ACS, and coordinating the activities of the cooperating agencies and entities, in the development and implementation of the PMP. TNRCC will also be responsible for communication with EPA regarding PMP and related Committee activities. The PMP is prepared and reviewed by ACS and approved by TGPC. TGPC meets quarterly and ACS will meet at least quarterly to monitor activities related to the PMP.

Task Forces

Five task forces were created by ACS to develop and coordinate necessary tasks to the various components of the PMP. The respective agencies chairing these task forces are:

- Site Selection Task Force (SSTF) - Texas Water Development Board;
- Educational Task Force (ETF) - Texas Agricultural Extension Service;
- Pesticide Management Plan Task Force (PMPTF) - Texas Department of Agriculture;
- Data Evaluation and Interpretation Task Force (DEITF) - Texas Agricultural Experiment Station; and
- Best Management Practices Task Force (BMPTF) - Texas Natural Resource Conservation Commission.

Site Selection Task Force (SSTF): The purpose of SSTF is to identify and delineate vulnerable areas in which to conduct groundwater monitoring for pesticides. This is an essential element of the geographic and planning section. SSTF will also determine sampling strategies for determining the boundaries of contamination.

Educational Task Force (ETF): The purpose of ETF is to develop educational information on PMPs and coordinate educational activities to reach the intended audience. ETF will conduct education through public presentations, displays, curriculum development for certification and training of licensed applicators, and brochures for all interested persons. Implementation of the PMP is to be accomplished by ETF through the coordination of the:

- general public educational outreach for the PMP;
- communications for contamination response; and
- BMP information dissemination.

Pesticide Management Plan Task Force (PMPTF): The purpose of PMPTF is to develop as well as to update the generic PMP and to prepare the pesticide-specific PMPs, as needed.

Data Evaluation and Interpretation Task Force (DEITF): The purpose of the DEITF is to assist in the development of the pesticide-specific PMPs with respect to groundwater contamination. DEITF will evaluate the quality of the data and interpret the information available by using best professional judgment. Implementation is accomplished through DEITF's ability to conduct and coordinate the State's response to groundwater contamination under the PMP.

Best Management Practices Task Force (BMPTF): The purpose of BMPTF is to develop the preventative component of the PMP and to identify Best Management Practices (BMPs) that can be used to prevent or curtail pesticide contamination of groundwater. It is the responsibility of BMPTF to identify pesticide-specific and area-specific BMPs to address prevention and investigation of contamination in vulnerable areas.

Many of the participating agencies involved in the development and implementation of this document (generic PMP), have existing programs designed to distribute information associated with their respective programs and responsibilities. These programs are described below. A communication strategy developed by ACS serves as an overview of the PMP communication process and describes how information relative to the implementation of the PMP would be relayed to the appropriate audiences.

Roles and Responsibilities of Participating State Entities

Texas Natural Resource Conservation Commission (TNRCC)

It is TNRCC's policy to help ensure maintenance of the State's groundwater and surface water quality through planning, education, and cooperation with other state agencies and the public and private sectors. TNRCC has the responsibility to coordinate the State's efforts to develop a comprehensive PMP for the prevention of groundwater contamination by pesticides.

State legislation administered by TNRCC, which contains groundwater protection provisions include: the Texas Water Code (also includes the Texas Water Well Drillers Act) and the Texas Solid Waste Disposal Act (TSWDA). In addition, TNRCC is also charged with specific responsibilities related to pesticide contamination of the waters in the state under Chapter 76 of the Texas Agriculture Code.

Additional authority delegated to TNRCC is founded on administrative acts issued from the Office of the Governor. On January 20, 1986, Governor Mark White formally designated the Texas Water Commission (TWC became TNRCC in September, 1993.) as Texas' lead agency with respect to administration of grant funds associated with the Section 106 program of the federal Clean Water Act (CWA). Funding for this program assists TNRCC in developing comprehensive groundwater protection programs for the State. On April 15, 1988, Governor William P. Clements, Jr. formally

designated the TWC as Texas' lead agency with respect to administration of groundwater protection programs under the United States Environmental Protection Agency's (EPA) proposed pesticide strategy for pesticides in groundwater, with the exception of licensing applicators and registering pesticides, which is the responsibility of the Texas Department of Agriculture (TDA).

TNRCC, in response to state and federal mandates, has promulgated rules which establish waste disposal regulatory programs and identify the technical and administrative requirements for meeting the goals of individual programs. The programs may include permitting or other requirements, enforcement procedures, groundwater quality monitoring, and corrective action requirements

TNRCC's power and authority for groundwater protection are based on a number of existing state and federal statutes which include provisions for the protection of groundwater. EPA has authority to provide substantial protection to groundwater. Four federal laws administered in some degree by TNRCC include:

- Resource Conservation and Recovery Act (RCRA);
- Comprehensive Environmental Response, Compensation and Liability Act (CERCLA, also referred to as the Superfund);
- Clean Water Act (CWA); and
- Safe Drinking Water Act (SDWA).

Federal Legislation

TNRCC has received authorization from EPA under RCRA, as amended, to administer its hazardous waste program. RCRA program regulates the generation, transportation, treatment, storage and disposal of hazardous waste. Facilities regulated under RCRA program must obtain a permit for pesticide waste storage, processing or disposal which requires compliance with specified performance standards relating to the protection of groundwater. TNRCC establishes groundwater protection standards for hazardous waste land disposal facilities permitted under the RCRA program, including pesticide manufacturers who land dispose process waste, treat or store process waste, or generate large amounts of process waste. Disposal of empty pesticide containers, container rinse water, and containers with pesticide residues is also regulated.

CERCLA authorizes TNRCC and EPA to initiate an appropriate response to releases or threatened releases of hazardous substances. Such a response may include either an emergency response (removal) action or a more permanent remedial action, or both. Particular emphasis is placed on threats to groundwater when they occur. The program partially finances remedial activities for the cleanup of sites on the National Priorities List (NPL), holds polluters liable for the costs of cleanups, establishes a federal notification requirement for hazardous substance releases, and assists TNRCC's efforts to monitor the location of hazardous sites. Several of the federal and state superfund sites are related to pesticide contamination and are currently ranked for federal or state superfund action.

The Texas State Superfund Program was created in 1985 by amendment to TSWDA to address those sites not eligible for funding under the Federal Superfund Program. The state program follows the same step-by-step process, from corrective action planning to remediation, as described for the

federal program. CERCLA requires that the state program first seek responsible party funding for site cleanup, then seek federal funds, and lastly use state funds.

Under SDWA, EPA may designate sole or principal source aquifers which have been determined to be sensitive to contamination, and if contaminated would pose a public health risk. The Edwards (Balcones Fault Zone) aquifers, in the San Antonio Region and in the Austin Region south of the Slaughter Creek Watershed, are the only designated sole source aquifers in the state. No federal funds may be committed to a project if EPA determines that the project may contaminate the designated aquifer.

Under the authority of the SDWA, the TNRCC regulates the following classes of injection wells.

- Class I. These injection wells are used to inject liquid hazardous or nonhazardous industrial waste and treated municipal wastewater below the lowermost underground source of drinking water.
- Class III. These injection wells are used to inject solutions underground for mineral production enhancement.
- Class IV. These injection wells are used to inject hazardous wastes into or above a formation which contains an underground source of drinking water within one quarter mile. (Class IV well are generally prohibited.)
- Class V. These injection wells are generally used for subsurface disposal of certain nonhazardous fluids into or above fresh water zones.

Class II injection wells fall within the jurisdiction of the Railroad Commission of Texas (RCT). They are used to inject brines and other wastes resulting from the production of oil and gas. Certain Class III injection wells used for brine mining also fall within the jurisdiction of the RCT.

State Legislation

Chapter 26 of the Texas Water Code provides TNRCC with jurisdiction over nonpoint sources of pollution from pesticides. §26.121(a)(2) allows TNRCC to regulate chemical wastes discharged to the waters in the State (which includes groundwater) from tailwater or runoff from agricultural lands. §26.121(a)(3) provides that, except as authorized by TNRCC, no person may commit any other act or engage in any other activity which in itself or in conjunction with any other discharge or activity causes, continues to cause, or will cause pollution of any of the water in the State. This includes the proper or improper handling or application of pesticides, whether waste or product, which result in water pollution.

Chapter 26 of the Texas Water Code also establishes a permitting program for point source discharges into or adjacent to water in the State, including groundwater. TNRCC is mandated to make and enforce rules for protecting and preserving groundwater. Chapter 26 also authorizes state participation in the Federal Superfund Program.

Chapter 26 requires that all spills or discharges of hazardous substances be reported to TNRCC when such incidents affect or threaten to affect water in the state, including groundwater. It establishes

TNRCC as the lead State agency in spill response and provides the authority to require removal of groundwater threats. Chapter 26 also created the Texas Spill Response Fund which may be utilized to provide a State-authorized cleanup of a substantial groundwater threat when no action is taken by the responsible person.

Chapter 27 of the Texas Water Code, as amended in 1981, laid the groundwork for a comprehensive State underground injection control program. Underground injection control wells are regulated by rule under Chapter 331 of Title 30 of the Texas Administrative Code (TAC) and permitted under Chapter 305 of 30 TAC.

TSWDA, Chapter 361, Texas Health and Safety Code, establishes a permitting program for the transportation, storage, processing, and disposal of solid and hazardous wastes. TNRCC administers the program for industrial solid wastes and all hazardous wastes. TSWDA also establishes a State Superfund for remedial action at sites which are not eligible for federal funds.

Programs

Specific to this generic Pesticide Management Plan (PMP), the proper plugging and capping of wells may prevent pesticide contaminated surface waters from entering the abandoned well and mixing with groundwater. Rules require that drillers of water wells, monitor wells, dewatering wells and certain types of injection wells, be licensed and report the drilling, construction, and completion of wells they drill. The rules specify minimum construction and plugging standards and require proper casing and sealing to prevent groundwater pollution from surface and subsurface contaminant sources.

The Public Drinking Water Section of the Water Permits and Resource Management Division regulates public water systems with respect to microbiological standards, chemical standards, construction, and operational practices under the authority of TAC 30 Chapter 290 of the Health and Safety Code. TNRCC is granted primacy for the Public Drinking Water Program of the federal SDWA. Under §1428 of the Safe Drinking Water Act, the Public Drinking Water Section administers the Wellhead Protection Program. A new Source Water Protection Program, encompassing both groundwater and surface water, encourages the development of locally-driven, voluntary incentive-based efforts by public water systems to respond to potential contamination problems, thereby averting any future degradation of the source water.

The Water Permits and Resource Management Division monitors public water supply systems for compliance with TNRCC Drinking Water standards. Currently, most chemical analyses under this program are performed by the Texas Department of Health (TDH) Bureau of Laboratories. Groundwater monitoring is conducted according to standards and procedures established in the federal SDWA.

The TNRCC has applied for and received federal funding under the FIFRA Pesticides and Ground Water Work Program every year since FY 1990. With the help of the Agricultural Chemicals Subcommittee of the Groundwater Protection Committee, various activities have been completed under these programs including the development of a generic PMP entitled Texas State Management Plan for Agricultural Chemicals in Ground Water, which was completed in 1991; the identification

of the top ten pesticides used in Texas with the potential to contaminate groundwater; the identification of atrazine as the first chemical of concern; and monitoring for atrazine in the Brazos River Alluvium in Burleson County. The goal of the FIFRA Pesticides and Ground Water Work Program is to help implement the PMP concept in Texas.

The TNRCC through the Groundwater Assessment Section of the Water Planning and Assessment Division, has compiled a database containing the results of groundwater monitoring statewide for pesticides. The database, called the Pesticides in Groundwater Database, is part of an interagency effort of the Texas Groundwater Protection Committee to assess the groundwater impacts of agricultural chemicals. Information has been gathered from many sources including state agencies, federal agencies, groundwater conservation districts, agricultural producers, growers groups, and chemical industry groups. Information compiled in the database includes well identification, location, and construction; analytical results; quality control evaluation; and site specific pesticide use history.

Texas Department of Agriculture (TDA)

Federal Legislation

The Agriculture Code, Section 76.007 (a) provides for TDA as the lead agency for pesticide regulation in Texas under the provisions of the Agriculture Code. TDA recognizes the importance of maintaining our State's natural resources to protect our water, air, land, plants, animals and the public health and the interrelationships that exist among them, while maintaining the healthy economic well-being and productivity of all Texans.

TDA recognizes that the development and implementation of the PMP are essential, and will support the PMP process through its state regulatory provisions under the Texas Agriculture Code and its federal enforcement provisions under the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA).

Within TDA, the Pesticides Programs Division has specific responsibilities relative to groundwater and pesticides. Under provisions of Texas Agriculture Code (Texas Pesticide Law), TDA regulates the labeling, distribution, transportation, and disposal of pesticides and compliance with the statute and its authorized rules. In addition, TDA has primary enforcement responsibility for pesticide use violations under Section 26 of FIFRA and enforces provisions of the federal pesticide law and regulations through a cooperative grant agreement with EPA.

State Legislation

Under the Texas Agriculture Code, TDA's responsibilities include:

Pesticide Product Registration: TDA registers all pesticides to be used, sold or distributed in Texas. TDA must confirm that the pesticide, its labeling, or other required information submitted for registration, comply with provisions of the statute.

Applicator Licensing: TDA licenses private and certain commercial and non-commercial applicators who use or supervise the use of these pesticides.

Inspections: The Texas Agriculture Code provides TDA with the necessary authority to conduct sampling. This section authorizes the agency to enter any public or private premises at reasonable times to inspect or sample land exposed or reported to be exposed to a pesticide. The law further provides that if the TDA is denied access to any land to which access was sought at a reasonable time, it may apply to a magistrate for a warrant authorizing access to the land. Land is defined as any land or water area, including airspace, and any plant, animal, structure, building, contrivance, or machinery, whether fixed or mobile, appurtenant to or situated on a land or water area or airspace, including any used for transportation.

Investigation of Alleged Misuse: TDA investigates complaints regarding suspected pesticide misuse and conducts pesticide use observations to determine if certain pesticides are being used properly or if the use of a particular pesticide poses unreasonable risks to human health or the environment.

State-limited-use Pesticide Designation: TDA may regulate a pesticide as a state-limited-use pesticide if TDA determines that when used as directed or in accordance with widespread and commonly recognized practice, the pesticide requires additional restrictions to prevent unreasonable risk to man or the environment, taking into account the economic, social and environmental costs and benefits of use of the pesticide. Section 76.003 authorizes TDA to regulate the time and conditions of use of a state-limited-use pesticide and requires that it be purchased or used only with permission of TDA; under direct supervision of TDA in specific areas under certain conditions; or in specified quantities and concentrations.

Pesticide Product Cancellation: TDA is authorized to deny or cancel a registration if the use of the pesticide has demonstrated uncontrollable adverse environmental effects; use of the pesticide is a detriment to the environment that outweighs the benefits derived from its use; or, even if properly used, the pesticide is detrimental to vegetation except weeds, to domestic animals, or to public health and safety.

Agriculture Resources Protection Authority (ARPA)

The ARPA was created by Senate Bill 489 during the 71st Legislative Session in 1989. As set forth in §76.009 of the Texas Agriculture Code, ARPA is the coordinating body for the policies and programs of management, regulation, and control of pesticides conducted by TDA, TSSWCB, TAES, TDH, TNRCC, and SPCB. In addition, ARPA helps to avoid overlapping responsibilities of state agencies, provides for all involved agencies to participate in the regulation of pesticides, and clarifies various areas of responsibility.

ARPA is composed of the following fifteen members: The presiding Officer will be appointed by the Governor. The Commissioner of Agriculture; the Director of TAES; the Dean of the College of Agricultural Sciences of Texas Tech University; the Dean of The University of Texas School of Public Health at Houston; the Director of the Environmental Epidemiology Program of TDH; the Chief of the Groundwater Assessment Section of TNRCC; the Director of the Institute for International Agribusiness Studies of Prairie View A&M University; the Director of the SPCB; the Director of TSSWCB; and six members appointed by the governor to represent the interests of consumers, producers of agricultural products, licensed applicators, licensed pesticide dealers or manufacturers of agricultural chemicals, farm workers, and environmental conservation or protection efforts.

ARPA may cooperate with and advise the agencies mentioned above and any other state agency that may be concerned with the regulation of pesticides and review any rule relating to pesticides that is proposed by an agency for which ARPA is the coordinating body. ARPA can inform and advise the governor on matters involving pesticides, prepare and recommend to the governor and to the legislature any legislation the authority considers proper for the management and control of pesticides, and make annual reports to the governor and the appropriate legislative oversight committees.

Texas Water Development Board (TWDB)

TWDB conducts many active groundwater resource assessment programs. Boundaries and various characteristics for all of the State's major and minor aquifers have been identified and include water availability, recharge, and other geologic information. In addition, groundwater pumpage data have been tabulated within each river basin together with the aquifer(s) being utilized and the quantity of water needed for a 50-year planning period. To accomplish this, TWDB collects data on the State's aquifers to include the occurrence, availability, quality, and quantity of groundwater present and the current and projected demands on groundwater resources.

State Legislation

TWDB's legislative authority to conduct groundwater data collection and studies is cited in Chapter 16 of the Texas Water Code. Portions of §16.015, pertain to TWDB's responsibility to conduct studies and investigations of the physical characteristics of water-bearing formations and of the source, occurrence, quantity, and quality of the underground water supply of the State; and study and investigate feasible methods to conserve, preserve, improve, and supplement water supply.

TWDB does not have regulations that require enforcement and would be limited to providing technical support to the agencies involved and, when applicable, in resampling wells to determine the extent or limits of contamination. Quality Assurance/Quality Control (QA/QC) is stressed and, although TWDB is not a regulatory agency, data obtained from its monitoring program meet the high standards required to make credible water-quality evaluations.

Programs

TWDB maintains a current water-level observation well network of approximately 7,600 wells from which annual measurements are attempted. These data are used to assess the quantity of water and any changes in storage within each producing area. The results are then distributed to the public in the form of news releases, presentations, and TWDB publications. Data obtained from the water-level measurement program are entered into the groundwater database.

One of TWDB's Groundwater Monitoring Programs is the ambient groundwater quality sampling program which is designed to determine the quality of groundwater in the State's aquifers. Major and minor aquifers in Texas are monitored for groundwater quality on a 6-year cycle. Prior to sampling in an area, water/land use criteria and aquifer properties are considered in determining which parameters should be analyzed. In agricultural areas that are deemed vulnerable to contamination, the following constituents are analyzed: nutrients, major anions and cations, trace metals, boron, and occasional pesticide scans.

In addition to this program, TWDB also conducts water-quality evaluations as part of its groundwater studies, Critical Area evaluations, well development control activities, cooperative agreements with other entities (such as Texas Alliance of Groundwater Districts [TAGD]), short-term studies, and responses to public inquiries. In time, the combination of these programs will provide data on all groundwater sources in the State, regardless of size. The areas covered under these programs are governed by each project's purpose; and may cover all or parts of major/minor or other aquifers, single well/wellfield analysis, small geographic areas, or within specified geopolitical boundaries.

Collected water-quality data are processed and stored by state well number, date of collection, and STORET Water Quality File code in TWDB's groundwater database. Indicators of sample reliability, collecting entity, and analytical laboratory are also stored along with sample results. Hard copies of the data are stored in TWDB's Map and File Room along with located well data by county and state well number. Since wells are identified with latitude and longitude, Geographic Information Systems (GIS) can spatially present water-quality data throughout the State. Eligible entities (local soil and water conservation districts and underground water conservation districts) can obtain water-quality equipment by way of matching funds administered by the TWDB through the Agricultural Water Conservation Fund. Selected constituents reported by grant recipients are also included in the database. Results of these sampling efforts will be provided to the appropriate agency along with the sampling methodology, the QA/QC program, and the project plans utilized.

Pesticide data collected in connection with the groundwater quality monitoring program will be made available to the Pesticide in Groundwater Database. Any constituents found to be in excess of predetermined MCLs or HALs will be brought to the attention of the agency or agencies that have regulatory jurisdiction over said contamination. Agricultural Chemical Subcommittee members working in cooperation with TWDB during a specific study will be provided copies of all data collected. Agencies requesting chemical specific determinations to be made during TWDB's routine monitoring activities will be notified whether funding is available to permit the collection and analysis of samples for pesticide content. If analytical costs are to be provided from other sources, TWDB staff would collect samples providing the area to be sampled is within an aquifer currently being monitored.

Allocations of future water demands to available supplies are continuously analyzed by TWDB's Water Resources Planning Division staff. Water supplies are determined using existing or under-construction reservoirs, locally available groundwater, and projected municipal and industrial return flows. If a groundwater supply is found to be contaminated, TWDB staff also recommend the best alternate source which could be developed to provide additional supplies.

TWDB addresses public awareness by providing well owners with the results of chemical-quality analyses of water samples collected from their wells, and indicating on the analysis report any constituents that are in excess of primary and secondary drinking water standards. Reports and newspaper releases are routinely compiled to inform residents of the groundwater quality within an area and of any possible contaminants in the drinking water. The responsible regulatory agency would also be notified in the event any pesticide contaminants are discovered.

Texas Department of Health (TDH)

TDH oversees the epidemiology and toxicology programs. TDH would be involved in the PMP, if a well was sampled and the analysis showed that the well is contaminated at a level of potential health risk. Participating agencies, or the Agricultural Chemicals Subcommittee, will consult with the Texas Department of Health (TDH) for its expertise in epidemiology and toxicology. While TDH will not be involved with individual contamination occurrences, they will be consulted for assistance with health effects, when data for an identified vulnerable area indicates nonpoint source contamination. TDH will assess the amount of risk and make suggestions if bottled water should be supplied or any other precautions should be taken in the area affected by the contamination.

Texas State Soil and Water Conservation Board (TSSWCB)

TSSWCB was created by House Bill 20, Acts of the 46th Legislature in 1939. TSSWCB is charged with the overall responsibility for administering and coordinating the state's soil and water conservation program with the state's soil and water conservation districts. Other more specific responsibilities include carrying out the state role under the United States Department of Agriculture (USDA) Watershed Protection and Flood Prevention Program; planning, implementing, and managing programs and practices to abate agricultural and silvicultural nonpoint source pollution; and administering a state brush control program.

State Legislation

Title 7, Chapter 201 and 203 of the Texas Agriculture Code contain the provisions of law pertaining to soil and water conservation. In addition to its responsibilities for creation, reorganization and division of soil and water conservation districts, TSSWCB is charged with the following general powers and duties:

- to offer appropriate assistance to the directors of conservation districts in carrying out programs and powers;
- to coordinate the programs of the conservation districts to the extent possible through advice and consultation;
- to secure the cooperation and assistance of the federal government, federal agencies, and state agencies;
- to disseminate information throughout this state concerning the activities and programs of the conservation districts;
- to encourage the formation of a conservation district in each area in which the organization of a conservation district is desirable;
- to prepare information of public interest describing the functions of the Board and make the information available to the general public and to appropriate state agencies;
- to plan, implement, and manage programs and practices for abating agricultural and silvicultural nonpoint source pollution; and
- to administer the State Brush Control Program under Chapter 203.

In addition, TSSWCB administers three state programs which provide financial assistance to soil and water conservation districts. The Conservation Assistance Program (CAP) provides funds to soil and water conservation districts on a matching basis to assist them with annually recurring operating expenses.

A general Technical Assistance Program provides funds to districts to provide for salaries and payroll taxes for full-time and part-time technicians that assist landowners in applying soil and water conservation practices. A Technical Assistance Program under Subchapter H, Chapter 201, Agriculture Code provides funds for technical assistance to landowners and operators for soil and water conservation land improvement measures.

Programs

A water quality management plan program is available for those areas within the state where critical soil and water conservation needs are known to exist, including water quality needs. Funds are available for implementing soil and water conservation plans developed jointly by the landowner/operator and local soil and water conservation district as endorsed and approved by the TSSWCB.

The Watershed Protection and Flood Prevention Program, administered by the National Resources Conservation Service (NRCS), provides for a project-type approach to soil and water resource conservation. TSSWCB is responsible in Texas for approving applications and setting priorities for project planning.

Section 201.026 of the Agriculture Code designates TSSWCB as the lead agency relating to abating agricultural and silvicultural nonpoint source pollution. CWA under Section 319 provides funding for implementing approved nonpoint source management programs which were developed under provisions of the same section. TSSWCB has obtained approval of its Agricultural/Silvicultural Nonpoint Source Management Program from EPA, and is currently involved in developing, implementing, and managing programs to address agricultural and silvicultural nonpoint source concerns for both surface and groundwater.

The regional watershed activities are to:

- address specific problems and concerns;
- determine the effect on the groundwater;
- maintain consistency with CWA and the State Coastal Zone Management Program; and
- incorporate the programs authorized in Senate Bill 503.

In fulfilling its responsibility to secure the cooperation and assistance of the federal government and federal agencies, TSSWCB works with numerous federal agencies to secure cooperation and assistance that helps soil and water conservation districts provide assistance to landowners in developing and carrying out sound soil and water conservation programs on their property. These programs include consideration of both surface and groundwater quality and quantity. Federal agencies with which interaction occurs include the NRCS, Farm Service Agency (FSA), Agriculture Resource Service (ARS), U.S. Forest Service, Cooperative Extension Service, and Cooperative Research Service.

TSSWCB's role in implementation of the PMP will be one of support and coordination for activities relative to point source pollution or nonpoint source pollution caused by operations other than agricultural or silvicultural. For activities related to agricultural or silvicultural nonpoint source pollution, the State Board will function in its legislatively assigned role as lead agency.

TSSWCB will, in concert with involved soil and water conservation districts, coordinate and guide the activities of appropriate federal, state, and local agencies in the development and implementation of programs for the abatement of agricultural and silvicultural nonpoint source pollution as required by the facts of the situation.

Texas Alliance of Groundwater Districts (TAGD)

State Legislation

Underground water conservation districts in Texas have the authority to protect underground water from pollution as provided in Chapter 36 of the Texas Water Code. All of the groundwater districts who are members of the TAGD, formerly the Texas Groundwater Conservation Districts Association formed on May 12, 1988, have Chapter 36 powers. The power to prevent contamination of groundwater is granted in the definition of "Waste" in the Definitions section of § 36.001, Chapter 36, Texas Water Code. The districts are local or regional in their jurisdiction and have, for the most part, elected boards of directors. Among their legislatively granted authorities is the power to monitor groundwater quality. A number of districts also have the authority to bring civil court proceedings for injunctive relief against an entity causing groundwater contamination.

Subchapter D, Powers and Duties, grants to the districts the authority to make and enforce rules which must be reasonable (§36.101 Rule-making Power and §36.102 Enforcement of Rules). This same subchapter also grants to the districts the authority to develop plans (§36.107 Research and Planning) and regulate the spacing and production of water wells to prevent waste of the groundwater (§36.116 Regulation of Spacing and Production).

Management of groundwater in Texas, as supported by the legislature, is implemented on the local level. District Board of Directors are granted the power and authority to adopt certain specific rules or programs to protect the local groundwater supply. This gives to the local district the authority to adopt certain rules and programs which may be in addition to the authority a state agency has. It may mean the implementation of additional requirements placed on a practice or water user which will further protect water quality. Districts normally work with the state agencies to avoid duplication of efforts. This authority of a local district does not remove or impede a state agency's authority for the management or protection of groundwater from pollution.

Programs

The purpose of TAGD is to educate the public and further groundwater conservation and protection activities, and to provide a means of communication for the exchange of information between individual districts as well as the general public. TAGD maintains contact with members of the private sector and various local, state, and federal officials and their agencies in order to obtain timely information on

activities and issues relevant to groundwater districts. District membership in TAGD is voluntary. As of February 1996, 28 of the 41 groundwater conservation districts are members of TAGD. Figure 4 shows all of the districts which have been created and confirmed through local election as of February 1996.

Groundwater conservation districts are involved in a wide range of activities related to the conservation and protection of groundwater. Two areas in which districts have been particularly

active are groundwater monitoring and groundwater management planning. District groundwater monitoring programs are primarily of a reconnaissance nature. Most programs are designed to track water quality trends and identify possible contaminants. Districts work cooperatively with TWDB's groundwater quality monitoring network. Generally the sampling and analytical procedures and equipment employed are less sophisticated and accurate than the sampling and laboratory procedures required to document or prove contamination. However, some districts have monitoring programs with highly accurate and sophisticated sampling and laboratory procedures similar to those of TWDB, in which changes in ambient or natural water quality conditions are monitored on a long-term basis. Groundwater studies of specific areas, contaminants, or constituents are also conducted by some districts. District groundwater quality monitoring can be used to identify problems which may then be referred to appropriate state agencies for more detailed investigation and analysis.

Bureau of Economic Geology (BEG)

BEG, established in 1909 as the successor to the Texas Geological Survey and the Texas Mineral Survey, is a research entity of The University of Texas at Austin. It also functions as the State Geological Survey, and therefore as a quasi-State agency, and the BEG Director represents Texas in the Association of American State Geologists.

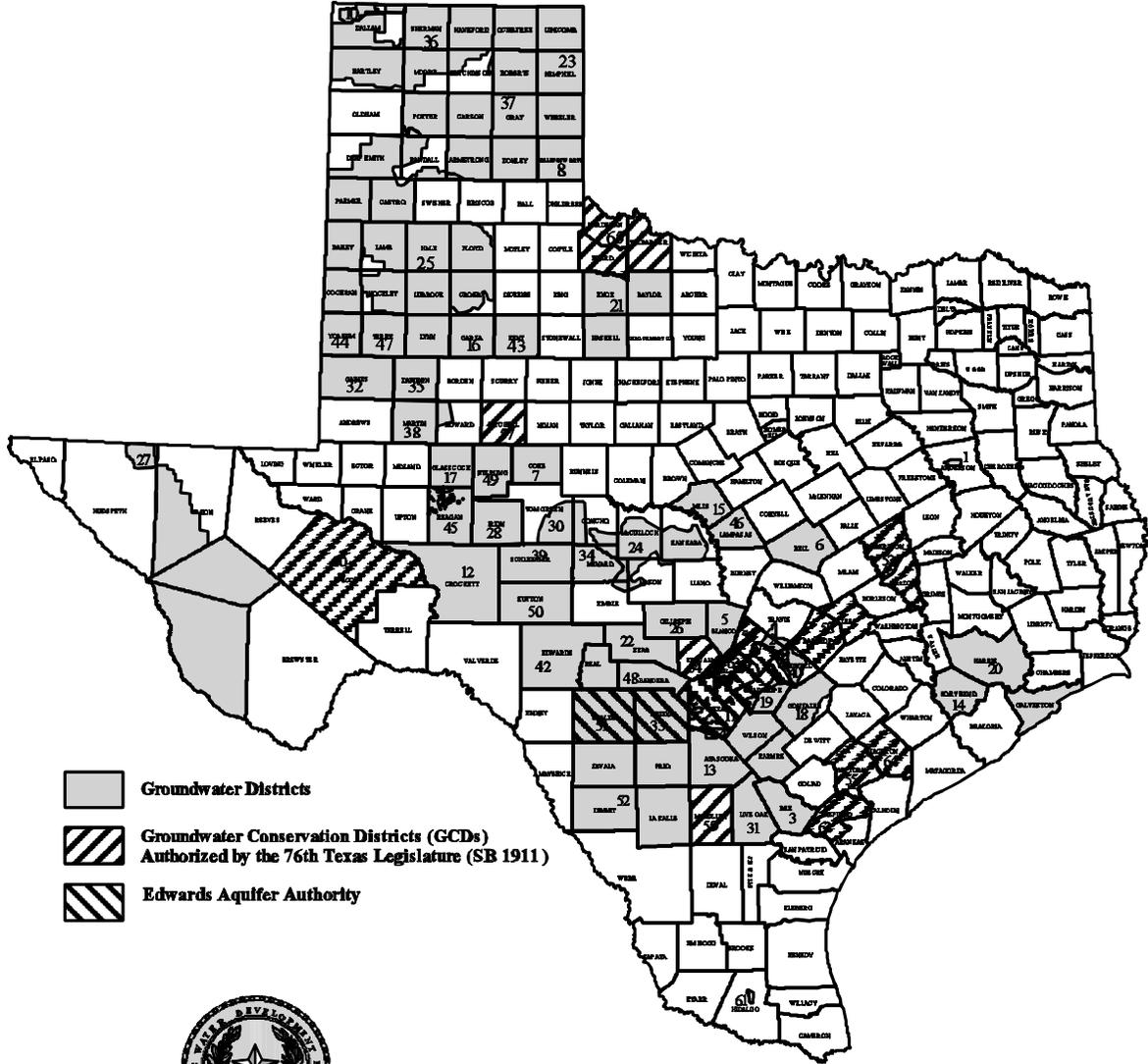
Extensive advisory, technical, and informational services relating to the geology and groundwater resources of Texas are provided by BEG. In addition, BEG conducts basic and applied research projects in energy and mineral resources and in hydrogeology, groundwater resources, and geochemistry. Some projects are conducted jointly with other units of the University as well as with state, federal, and local agencies. BEG provides ongoing services to governmental agencies including reviews of environmental impact statements that are submitted to the Office of the Governor of Texas and permit applications that are submitted to the Surface Mining and Reclamation Division of the Railroad Commission of Texas (RCT) and to the Environmental and Consumer Health Protection Division of TDH.

Railroad Commission of Texas (RCT)

Pursuant to various provisions of the Texas Natural Resources Code and the Texas Water Code, the Oil and Gas Division of RCT administers programs to prevent the pollution of groundwater by activities associated with the exploration, development, and production of oil, gas, or geothermal resources. Pursuant to the federal SDWA, EPA delegated authority to RCT to administer an underground injection control program dealing with underground injection of produced oil and gas wastes, injection wells associated with enhanced oil recovery, and underground hydrocarbon storage.

FIGURE 4

GROUNDWATER CONSERVATION DISTRICTS



- Groundwater Districts
- Groundwater Conservation Districts (GCDs)
Authorized by the 76th Texas Legislature (SB 1911)
- Edwards Aquifer Authority



DISCLAIMER

This map was generated by the Texas Water Development Board. No claims are made by the accuracy or completeness of the information shown herein nor to its suitability for a particular use. The scale and location of all mapped data are approximate. Boundaries for groundwater conservation districts are approximate and may not accurately depict legal descriptions.



0 30 60 90 120 150 Miles

Groundwater Conservation Districts

- 1 Anderson County UWCD
- 2 Barton Springs/Edwards Aquifer CD
- 3 Bee GCD *
- 4 Bexar Metropolitan Water District
- 5 Blanco- Pedernales GCD *
- 6 Clearwater UWCD
- 7 Coke County UWCD
- 8 Collingsworth County UWCD
- 9 Culberson County GCD
- 10 Dallam County UWCD No. 1
- 11 Edwards Aquifer Authority
- 12 Emerald UWCD
- 13 Evergreen UWCD
- 14 Fort Bend Subsidence District
- 15 Fox Crossing Water District
- 16 Garza County Underground and Fresh WCD
- 17 Glasscock County UWCD
- 18 Gonzales County UWCD
- 19 Guadalupe County GCD
- 20 Harris-Galveston Coastal Subsidence District
- 21 Haskell/Knox UWCD
- 22 Headwaters UWCD
- 23 Hemphill County UWCD
- 24 Hickory UWCD No.1
- 25 High Plains UWCD No.1
- 26 Hill Country UWCD
- 27 Hudspeth County UWCD No.1
- 28 Irion County WCD
- 29 Jeff Davis County UWCD
- 30 Lipan-Kickapoo WCD
- 31 Live Oak UWCD
- 32 Llano Estacado UWCD
- 33 Medina GCD
- 34 Menard County UWCD
- 35 Mesa UWCD
- 36 North Plains GCD
- 37 Panhandle GCD
- 38 Permian Basin UWCD
- 39 Plateau UWC and Supply District
- 40 Plum Creek Conservation District
- 41 Presidio County UWCD
- 42 Real-Edwards Conservation and Reclamation District
- 43 Salt Fork UWCD
- 44 Sandy Land UWCD
- 45 Santa Rita UWCD
- 46 Saratoga UWCD
- 47 South Plains UWCD
- 48 Springhills Water Management District
- 49 Sterling County UWCD
- 50 Sutton County UWCD
- 51 Uvalde County UWCD
- 52 Wintergarden GCD

**Groundwater Conservation Districts (GCDs)
Authorized by the 76th Texas Legislature
(SB 1911)**

- 53 Brazos Valley GCD
- 54 Cow Creek GCD
- 55 Crossroads GCD
- 56 Hays Trinity GCD
- 57 Lone Wolf GCD
- 58 Lost Pines GCD
- 59 McMullen GCD
- 60 Middle Pecos GCD
- 61 Red Sands GCD
- 62 Refugio GCD
- 63 Southeast Trinity GCD
- 64 Texana GCD
- 65 Tri-County GCD

* Districts not confirmed as of October 5, 2000.
Other confirmed districts adapted from the TNRCC Report SFR-13,
"Underground Water Conservation Districts, Report to the 74th
Legislature."

The Surface Mining and Reclamation Division (SMRD) of RCT has been delegated the authority to regulate surface coal mining in Texas by the Office of Surface Mining and Reclamation Control Act. SMRD requires groundwater monitoring before, during, and following surface mining of coal or uranium to detect any changes that may take place due to mining. Also, groundwater is monitored in reclaimed areas of coal mines to measure water quality, quantity, and recovery of water levels. The final reclamation bond release requires the evaluation of monitoring data to ensure that impacts on groundwater have been properly mitigated.

RCT staff does not have jurisdiction related to pesticides. However, staff does have considerable experience in groundwater pollution prevention and contamination investigation activities associated with the pit permitting program under Oil and Gas Division Statewide Rule 8. Aquifer vulnerability in conjunction with design, use, and fluid type are used as a basis for approval or denial of a permit. Applications for pipeline permits for the conveyance of liquids receive a review for vulnerability to leaks and spills of the aquifers that out crop along the route. Best professional judgment is used in the decision to grant or deny a permit.

Texas Agricultural Extension Service (TAEX)

State Legislation

The Smith-Lever Act of 1914 created the Cooperative Extension System, whose role is informational and educational. The basic function of Cooperative Extension is... “to aid in diffusing among the people of the United States useful and practical information on subjects relating to agriculture and home economics, and to encourage the application of the same...” The Cooperative Extension System results from a partnership of federal (USDA), state (land grant universities) and county governments (Commissioners’ Courts).

Accordingly, TAEX is an agency of the Texas A&M University System, responsible for educational programs for farmers, ranchers, homeowners, producer groups, and other citizens of Texas in the fields of agriculture, home economics, community resource development, and youth development. TAEX has no regulatory responsibility, role or function, addressed by the PMP. Specifically, TAEX does not have legal authority to participate in the following: conduct or require others to conduct monitoring of groundwater; supply or require others to supply alternative sources of water, provide contingency planning, or provide remedial action; require/supply public well closure; apply penalties for misuse of pesticides, fertilizers, or other materials; enforce “other relevant authorities”; prohibit use of a pesticide; and disapprove rules which regulate or control pesticides.

Programs

Educational Materials: TAEX develops educational materials on water quality, pesticide use, handling and management, groundwater protection, best management practices, and other current issues which require unbiased information. Educational materials include fact sheets, news releases, videos, displays, slide sets, bulletins, and technical papers.

Educational Programs: TAEX addresses environmental concerns through multi-disciplinary educational programs. Programs are coordinated by county and departmental faculty and can be co-sponsored by other agencies, producer groups, and private industry. The long-range extension programming process allows TAEX to address current local issues with quality educational programs. The educational programs for pesticide applicators generally provide CEU credits and can be lectures, tours, field days, displays or any other effective program delivery method.

Demonstrations: TAEX utilizes on-farm demonstrations to educate clientele on implementation of BMPs. The demonstrations allow clientele to view the BMP while it is implemented and understand how it can be implemented in their operation.

Best Management Practice Development: TAEX utilizes demonstration projects and applied research programs for the development of BMPs. The development of better methods for protection of our environmental resources will be a continuing effort.

Texas Agricultural Experiment Station (TAES)

TAES is the official agricultural research agency in Texas. Headquartered at Texas A&M University, TAES promotes food and fiber production that emphasizes water conservation and the protection of natural resources. TAES operates a system of 14 research centers which are located in the major land and natural resource regions of Texas. The Texas Water Resources Institute (TWRI) is an administrative unit of TAES that guides internal water-related research. Several federal and state statutes provide the legal basis for research within TAES. These statutes are briefly summarized as follows:

Federal Legislation

TAES originated April 3, 1887, when the Texas Legislature accepted the Hatch Act passed by Congress just one month earlier. Section 2 of the Hatch Act highlights public expectations. "It is further the policy of the Congress to promote the efficient marketing, distribution and utilization of products of the farm as essential to the health and welfare of our peoples and to promote a sound and prosperous agriculture and rural life...". It is also the intent of Congress to assure agriculture a position in research equal to that of industry, which will aid in maintaining an equitable balance between agriculture and other segments of our economy.

McIntire-Stennis, the Forest Research Act of October 10, 1962 (PL. 87-788), was established to assist states in forestry research and to increase scientific competence through research and graduate study. The federal funds available to Texas are shared by Texas A&M University and Stephen F. Austin University.

Other Federal Acts include: 1) The Research Facility's Act of July 22, 1963 (PL. 88-74): helps finance construction and remodeling of buildings and other capital facilities. 2) The Water Resources Research Act of July 17, 1964 (PL. 88-379): supplements present programs in water to assist each state in addressing priority water issues through programs of research, training and technology transfer. In a letter dated August 13, 1964, Governor John Connally designated Texas A&M University as the land grant institution in Texas for the establishment of TWRI. TWRI operates as a

unit within TAES. 3) Subsequent Acts (PL. 95-467 in 1978 and PL. 98-242 in 1984): continue to provide federal funds for the institute programs which are open to the faculty at all Texas universities on a competitive basis.

State Legislation

The Texas Legislature has established several statutes and provisions for agricultural research, mostly as part of the Education Code of Texas. Chapter 88 outlines the Agencies and Services of the Texas A&M University System. TAES is defined in several key sections. Section 88.201 outlines "...experiment stations for the purpose of making experiments and conducting investigations in the planting and growing of agricultural and horticultural crops and soils, and the breeding, feeding, and fattening of livestock for slaughter." Section 88.202 outlines the Main Station Experiment Station located at College Station, under the supervision of the Board of Regents. Section 88.203 outlines substations and facilities.

TAES is dependent upon allocations by the Board of Regents of The Texas A&M University System for Permanent University Fund bond proceeds, under amendment to Article VII of the State Constitution (1956) which includes TAES.

TAES has no regulatory role in groundwater quality protection nor does it seek one. The agency's function is to provide the necessary research information and develop management systems for the safe, sustainable production, marketing, and distribution of agricultural products. TAEX also supports formulation of policies that ensure both environmental protection and the continued ability to produce adequate supplies of food and other agricultural products.

Programs

Research: The broad goals of TAES groundwater research program are to protect, preserve, and efficiently use water resources, and to develop sustainable agricultural production systems. Groundwater programs of TAES stress the development of management strategies, technologies, and educational programs to support sustainable agriculture. TAES groundwater quality research focuses on reductions in pesticide use; the control, fate, and transport of pesticides; and the remediation of contaminated groundwaters.

Training: TAES also plays a vital role in training future professionals that will deal with environmental problems such as groundwater protection. Undergraduate and graduate students are often employed on research projects. Also, most TAES scientists hold appointments with Texas A&M University and incorporate the latest research information in formal classroom instruction. Presentations of environmental concerns in context with broader ecosystem issues will assist in producing a generation of responsible practitioners and professionals necessary to implement and enforce effective groundwater protection strategies.

Structural Pest Control Board (SPCB)

SPCB is authorized to promulgate rules and regulations governing the methods and practices of structural pest control to prevent adverse effects on human health and the environment. SPCB has

established regulations which authorize it to enforce label instructions regarding application and disposal of pesticides in the urban environment. The label instructions must first be approved by the EPA or TDA. Many label instructions contain information relating to proper application and disposal to prevent groundwater contamination. SPCB also has the authority to take action against any licensee for engaging in pest control practices that could be injurious to the public health, safety, or to the environment. SPCB may use this authority to penalize pest control licensees for actions that could contaminate groundwater.

Federal Legislation

SPCB enforces EPA-approved labels under FIFRA. Many pesticide labels prohibit use or disposal of pesticides in areas where groundwater might be contaminated. Licensees in structural pest control are prohibited from violating these label provisions by 22 TAC Section 597.1(12).

State Legislation

Licensing: SPCB licenses businesses, certified commercial applicators, certified non-commercial applicators, technicians, technician apprentices, non-commercial applicator apprentices, and vegetation management technicians for the regulation of people engaged in the business of structural pest control by offering to engage in, advertising for, soliciting or performing services for compensation related to control of pests. SPCB develops the standards and criteria for licensing individuals engaged in the business of structural pest control.

Inspections: The Texas Structural Pest Control Act provides the necessary authority to monitor use and investigate complaints with respect to label violations. This will be sufficient to meet any increased demand created by the implementation of the PMP. The Texas SPCB currently employs fifteen (15) investigators who respond to complaints from consumers and other regulatory agencies. These investigators randomly observe pesticide use and conduct biennial compliance inspections of all commercial licensees. We expect that a small portion of the time of each of these fifteen (15) investigators will be devoted to enforcement and compliance assistance with respect to the PMP.

SPCB responds to complaints from the general public, licensees and other regulatory entities regarding misapplication of a pesticide by its licensees. Information gathered is reviewed by the Headquarters Office and enforcement action is taken if a use inconsistent with the label is determined.

Misuse Investigation: SPCB responds to complaints from the general public, licensees and other regulatory entities regarding misapplication of a pesticide by its licensees. Information gathered is reviewed by the Headquarters Office and enforcement action is taken if a use inconsistent with the label is determined. The procedures used include residue sampling and are adopted by SPCB in its policy manual. If an investigation determines that a misapplication of a pesticide has occurred on the premises of a consumer, SPCB shall immediately notify the consumer and applicator of the misapplication. Information gained through the investigation can be used as case referral to other agencies, such as TDA, TDH, TNRCC or EPA.

Roles and Responsibilities of Federal Agencies

Federal agencies also have certain roles and responsibilities with respect to the PMP process. Some Federal agencies will have regulatory responsibilities which will make them involved such as the United States Environmental Protection Agency (USEPA). Most, however, will be data and information resources. The United States Geological Survey (USGS) is primarily a gatherer and disseminator of data, such as groundwater monitoring data. The United States Department of Agriculture (USDA) agencies S the Agricultural Research Service; the Cooperative State Research, Education and Extension Service; and the Natural Resources Conservation Service S perform and promote research and the application of new technology generated from basic research. Some of the types of technology, pertinent to the PMP process, which they may be able to provide, include application of BMPs and technology dealing with the modeling of pesticide transport through the root zone.

Cooperative efforts are common among Federal and State agencies especially between Federal Agencies and the State agencies which have similar missions on the state level . Some examples are the United States Environmental Protection Agency (USEPA) cooperating with TNRCC and TDA, on regulatory matters; the USGS with the TWDB, in monitoring activities; and the USDA with TAEX and TAES, in technical development and application. Due to the range of issues and the legal, technical, educational, and other inputs required, the PMP process will need cooperative input from several Federal agencies. It is anticipated that advice and input will be requested from Federal agencies as the need arises in both the development of Chemical Specific PMPs and implementation of the PMPs.

United States Environmental Protection Agency (USEPA)

In December of 1970, the USEPA was created to protect the public health and the quality of the natural environment. The mission of the United States Environmental Protection Agency is to protect public health and to safeguard and improve the natural environment S air, water, and land S upon which human life depends. EPA's purpose is to ensure that:

- federal environmental laws are implemented and enforced fairly and effectively;
- environmental protection is an integral consideration in U.S. policies concerning economic growth, energy, transportation, agriculture, industry, international trade, and natural resources;
- national efforts to reduce environmental risk are based on the best available scientific information; and
- all parts of society - business, state and local governments, communities, citizens - have full access to information so that they can become full participants in preventing pollution and protecting human health and the environment.

EPA becomes involved in a number of ways with the problem of pesticides and groundwater. Some of these are listed below:

- EPA, under SDWA, may designate sole or principal source aquifers which have been determined to be sensitive to contamination, and if contaminated would pose a public health risk.

Subsequently, no federal funds may be committed to a project if EPA determines that the project may contaminate the designated aquifer.

- Pursuant to the federal SDWA, EPA has delegated authority to various state agencies to administer certain programs. Furthermore, violations of provisions under these federal programs delegated to state agencies can be referred to EPA for enforcement.
- Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) requires EPA registration for all pesticides sold in U.S. It is a violation of FIFRA to use a pesticide in a manner inconsistent with its label, including the specified uses. FIFRA was revised and strengthened substantially in August 1996. EPA registers pesticides. In the process of registration EPA must approve label instructions regarding application and disposal of pesticides. Many label instructions contain information relating to proper application and disposal to prevent groundwater contamination.
- For Federal programs and programs supported by EPA funds, EPA must approve analytical methods used in the chemical analyses of pesticides and other analytes whose measurement is pertinent to the protection of the environment. Furthermore EPA must approve Quality Management Plans (QMPs) and Quality Assurance Project Plans (QAPPs) for any EPA funded projects which involve sampling.
- The Pesticide Management Plan process for the prevention of pesticide contamination of groundwater, is primarily the result of EPA's Pesticides and Ground Water Strategy which EPA initiated through authority it received through FIFRA. The process is largely driven by a proposed EPA rule and by EPA FIFRA Grants. EPA has provided guidance for the development of generic (the present document) and pesticide-specific PMPs.
- EPA funded projects and/or EPA directed programs (such as the PMP program) necessitate collaboration with EPA by state agencies. For the PMP program this requires that EPA be informed of Agricultural Chemical Subcommittee meetings, and other PMP activities.
- TDA and TNRCC have FIFRA cooperative grant agreements with EPA. Through cooperative grant agreements with EPA, TDA receives federal funds to support pesticide enforcement and applicator certification activities, and TNRCC receives federal funds for monitoring and various other PMP activities.
- According to the FIFRA grant agreement with EPA, TNRCC is required to report to EPA, within two working days, any confirmed contamination that equals or exceeds an established MCL or HAL.
- EPA is a source of information in a number of areas. A couple of examples are EPA approved analytical procedures, and the USEPA/OPP's Pesticide Products Database. Analytical procedures are described in EPA publications such as Methods for Chemical Analysis of Water and Wastes. The Pesticide Products Database is an Internet online database which has information on pesticide chemical ingredients and manufacturers. The chemical data is searchable by common, technical, synonym, or trade names; or by CAS number. EPA also offers courses, dealing with subject matters such as pesticides, water quality, and quality assurance/quality control, which are often open to state personnel.

In July 1991, the EPA set forth its groundwater protection goals and guiding principles in Protecting the Nations's Ground Water: EPA's Strategy for the 1990's. The centerpiece of Agency groundwater protection efforts is development of Comprehensive State Ground Water Protection Programs (CSGWPPs). These programs are designed to integrate all State and Federal efforts to protect groundwater, increasing the efficiency and effectiveness of State and Federal resources. The CSGWPPs also mark a new direction in Federal/State cooperation: EPA supports voluntary State initiatives to harmonize diverse groundwater protection activities.

United States Geological Survey (USGS)

The U.S. Geological Survey (USGS) is the Federal Government's primary source of data on the quantity and quality of the Nation's water resources, its principal civilian map making agency, and its primary provider of information on natural hazards and mineral, energy, and biological resources. The USGS makes unbiased scientific information available equally to all interested parties. In Texas, the Water Resources Division of the USGS monitors, assesses, and conducts research pertaining to the State's surface and groundwater resources. Most of these activities are funded cooperatively with over 80 local, State, and Federal agencies. The Survey has a significant presence in Texas with offices in Austin, San Antonio, Houston, Ft. Worth, Wichita Falls, and San Angelo. The Las Cruces, NM, office collects data and conducts studies in the El Paso region of west Texas.

The USGS is a source of hydrologic, water-quality, geologic, and geographic data for the State's groundwater resources. For selected aquifers in Texas, data are available that define the depth to groundwater, aquifer hydraulic properties, aquifer recharge and discharge areas and rates, and groundwater use. Chemical analysis of groundwater samples, including pesticides analyses, also are available for selected wells and springs monitored by the USGS. USGS data and interpretative results are made available to the public in a variety of publications. Data in digital form also can be obtained from the Survey's data base. The USGS maintains a site on the World-Wide Web (WWW) allowing public Internet access to up-to-the-day, if not up-to-the-minute, hydrologic data. For Texas, the USGS has placed a vast amount of hydrologic data and information on the WWW. Using any Internet browser, the public can locate, view, and retrieve data, text, and graphical information generated by the USGS. The Texas USGS website at <http://txwww.cr.usgs.gov> provides public access to the data and information.

The Texas USGS website also contains regularly updated information describing its data-collection programs, current studies, and links to other on-line sources of natural-resources information. The USGS library in Austin, Texas maintains reference material on-line, which includes bibliographic references, report abstracts, and the entire contents of selected recent publications.

United States Department of Agriculture (USDA)

The USDA was founded in 1862 to serve the American people through the promotion of a productive agriculture, a safe and abundant food supply, and through the stewardship of natural resources. The USDA continues this service today through the following missions.

- Farm and Foreign Agricultural Services
- Food, Nutrition, and Consumer Services
- Food Safety

- Marketing and Regulatory Programs
- Natural Resources and Environment
- Research, Education, and Economics
- Rural Development

It is primarily through three agencies that USDA will have opportunity to contribute to the PMP process: the Agricultural Research Service and the Cooperative State Research, Education, and Extension Service (which fall under the Research, Education, and Economics Mission); and the Natural Resources Conservation Service (which falls under the Natural Resources and Environment Mission).

Agricultural Research Service (ARS)

The ARS provides access to agricultural information and develops new knowledge and technology needed to solve technical agricultural problems of broad scope and high national priority. The goal is to ensure an adequate supply of high quality, safe food and other agricultural products to meet the nutritional needs of consumers, sustain a competitive food and agricultural economy, to enhance quality of life and economic opportunity for rural citizens and society as a whole, and to maintain a quality environment and natural resource base. The agency maintains a network of geographically dispersed national and overseas laboratories and the National Agricultural Library (NAL). Research objectives include the following:

- reducing the degradation of the soil, air and water;
- enhancing plant and animal productivity;
- improving the processing of agricultural commodities; and
- improving human nutrition and well-being.

Cooperative State Research, Education and Extension Service (CSREES)

The CSREES works with partners and customers to advance research, extension and higher education in the food and agricultural sciences and related environmental and human sciences to benefit people, communities and the Nation.

CSREES programs are administered through two interactive divisions. The first division, Scientific Programs, houses research and education efforts in Plant and Animal Production, Protection, and Processing; Natural Resources and Environment; Rural, Economic and Social Development; and Children, Youth, Family, Nutrition, and Health. The second division, System and Policy Concerns, includes Partnerships; Competitive Research Grants and Awards Management; Science and Education Resources Development; and Communication, Technology and Distance Education.

CSREES unifies the research functions of the former Cooperative State Research Service and the education/outreach functions of the former Extension Service, in working in cooperation with land grant universities and county governments. Research, education, and extension professionals now function more closely, providing better customer service and an enhanced ability to respond to national crises. The new CSREES is positioned for the 21st century as a dynamic change agent and national research and education network.

CSREES strives to:

- establish national priorities in research, extension, and higher education;
- secure and administer funds for research, education, and extension;
- provide national leadership, analysis, and administrative and financial oversight in research and education;
- assure scientific and programmatic quality and focus;
- represent and broker partner needs, interests, and capabilities to the Executive branch, Congress, and other organizations;
- empower people and communities to solve problems and improve their lives through advanced research and educational technologies;
- maintain and enhance interactive communications networks linking people, communities, states, and federal partners to address critical issues;
- strengthen the Agency's scientific, educational, managerial, and leadership capacity to meet current and future human resource needs; and
- maintain and enhance a diverse, pluralistic, well-trained workforce within CSREES to maximize productivity and effectiveness.

CSREES also focuses on the practical education Americans can use in dealing with the critical issues that affect their daily lives and the Nation's future. Current issues addressed as national initiatives include:

- communities in economic transition;
- decisions for health;
- food safety awareness;
- water quality;
- children, youth, and families; and
- sustainable agriculture.

Natural Resources Conservation Service (NRCS)

The NRCS is the Federal agency that works hand-in-hand with the American people to conserve, improve, and sustain natural resources on private lands. To carry out this mission, NRCS has:

- a nationwide network of conservation specialists who work through some 3,000 locally organized and locally run conservation districts to help individual land users and rural and urban communities;
- the NRCS National Cartography Center in Forth Worth, Texas;
- programs for technical assistance and cost-sharing; and
- a strong technology base that includes:
 - * a national cooperative soil survey;
 - * standards for conservation systems that address such areas as erosion control, animal waste management, irrigation water management, wetlands conservation and restoration, and flood control and streambank stabilization;
 - * a plant materials program that introduces new ways to use plants for revegetation, land stabilization, and landscape enrichment;

- * computer “models” for predicting soil erosion by wind and water, agricultural nonpoint-source pollution of water, the effects of grazing practices on rangeland health, and the effects of management decisions on farm and ranch economics;
- * the National Resources Inventory - the Nation’s most comprehensive and statistically reliable source of data on natural resource conditions and trends on non-Federal land;
- * a snow survey and water supply forecasting program for the western mountain states; and
- * an NRCS/ARS Pesticide Properties Database.

NRCS, through local soil and water conservation districts, provides assistance to land users in the development and implementation of resource management systems. These management plans, developed on a voluntary basis, include best management practices (BMPs) that are effective in the reduction of nonpoint source pollution. By implementing these plans, land users can meet the requirements of EPA’s nonpoint source program under Section 319 of the (CWA).

Cost-share assistance for installing BMPs is available through several federal programs administered by NRCS. These programs include the PL-566 and PL-534 Watershed Protection and Flood Prevention Programs, the Environmental Quality Incentives Program (EQIP), the Wildlife Habitat Incentives Program, the Resource Conservation and Development Program, and the Wetland Reserve Program. NRCS also provides technical assistance to land users participating in the Conservation Reserve Program, a federal cost-share program administered by the Farm Service Agency.

In addition to providing technical and financial assistance for the development of natural resource conservation plans and the installation of BMPs, NRCS provides information, education and training for land users and the general public in the sound use and management of natural resources. Local NRCS Field Office Technical Guides provide guidelines for implementing BMPs that reduce the possibility of both surface water and groundwater contamination from the use of pesticides, including the selection, mixing, and use of agricultural chemicals based on soil type and terrain. NRCS is actively cooperating with the Consolidated Farm Service Agency, the Texas Agricultural Extension Services (TAEX), TSSWCB, local soil and water conservation districts and other agencies in achieving the goals of the USDA Water Quality Initiative. This effort is designed to achieve rapid voluntary adoption by farmers and ranchers of BMPs for controlling agricultural nonpoint source pollution.

The ability of NRCS to provide technical assistance to land users in the planning and application of resource management systems and best management practices that minimize the probability of groundwater contamination is complimentary to the goals and implementation of the PMP.

Role of Pesticide Manufacturers

Industry has taken a proactive role through continued product stewardship to educate and encourage the safe use of pesticides in training and information to their suppliers, dealers, and customers. Developing voluntary best management practices and providing technical support to implement those practices, agricultural chemical manufacturers work with state regulators and local agents to promote the protection of water quality in the state. Through voluntary actions, companies have reduced application rates of their products and established supplemental monitoring programs as

solutions to water quality concerns. In addition to making voluntary label changes, manufacturers have implemented demonstration projects in agricultural education programs to incorporate management practices that address current water quality issues. Industry's role in the development and implementation of the PMP is to provide cooperation and support to ACS, TGPC, and their member agencies.

SECTION IV RESOURCES

Texas state regulatory agencies and academic institutions have a wide variety of programs addressing agriculture, human health, natural resources and environmental protection. Besides the expertise available within these programs, expertise is also often sought from private sectors and non-profit organizations to achieve the common goal of protecting the environment, including water resources. Primary technical expertise required for pesticide-specific PMP development and implementation will be provided by the entities as listed in Table 3 and below:

Technical Expertise

The various resources available for Pesticide Management Plan (PMP) activities from the participating state agencies are discussed below (also see Table 3):

- The Texas Natural Resource Conservation Commission (TNRCC) has program staff to develop and implement strategies regarding prevention of pesticide and waste contamination of groundwater resulting from nonpoint sources and point sources. Point source program implementation and responsibilities are also shared by the Hazardous and Solid Waste, Field Operations, Legal, and Water Quality programs. The agency's personnel are equipped with the appropriate and relevant experience in engineering, hydrogeology, agronomy, environmental assessment, toxicology, computer modeling, hazardous pesticide waste, and disposal.
- The Texas Department of Agriculture (TDA) program staff have extensive knowledge in state and federal pesticide laws, regulations, procedures and policies relating to pesticide registration, enforcement, and applicator certification and training. The staff also have training and technical expertise in areas of agriculture, agronomy, animal science, aquatic biology, ecology, biology, chemistry, entomology, range management, soil science, human health, environmental toxicology, weed science and related disciplines.
- Texas Department of Health (TDH) can be contacted for particular expertise in the areas of epidemiology and toxicology. There are eight public health regions throughout the state that have personnel available to assist with the implementation of PMPs, should the need arise.
- The Texas Water Development Board's (TWDB) program staff consist of hydrogeologists, engineers, environmental quality specialists, geochemists, and engineering technicians with expertise in drilling and geophysical logging. The Hydrologic Monitoring Section consists of geologists, a hydrologist, environmental quality specialists and technicians with expertise in collecting and disseminating groundwater data. The Water Supplies Section consists of hydrologists, engineers, geologists, and engineering technicians. Section expertise includes computer modeling and other related expertise necessary to conduct groundwater studies needed to perform availability and vulnerability assessments. A Geographical Information System (GIS) unit is also available to both Sections. Personnel collecting groundwater samples for analysis have had field training and collect samples in accordance with current field sampling protocol. QA/

**TABLE 3
PMP TECHNICAL EXPERTISE**

PMP Tasks	Primary Responding Parties
Pesticide Product Information	TDA, Registrant
Water Quality Monitoring & Studies	TNRCC, TWDB, TSSWCB, Registrant
Chemistry and Sample Analyses	TNRCC, TWDB, TAES, Registrant
Technical Expertise for Data Evaluation	TNRCC, TDA, TAES, TAEX, Registrant
Site Investigations and Inspections	TNRCC, TDA, TSSWCB, Registrant
Vulnerability Assessments	TNRCC, TWDB, TAES, Registrant
Computer Modeling & Training	TNRCC, TAES, TWDB
Applicator Training & Certification	TDA, TAEX, Registrant
General Public Education on Pesticide Management & Groundwater	TAEX, TDA, TNRCC, TSSWCB, SWCD, End-Users, Registrant
Enforcement	TDA, TNRCC, SPCB
Remediation	TNRCC, TAES, Registrant
GIS Support	TWDB, TSSWCB, TNRCC, TAES
BMP Development	TAEX, TDA, TAES, TSSWCB, Registrant
Prevention Measures	TAEX, TNRCC, TDA, TAES, TSSWCB, Registrant
Record Keeping & Reporting	TNRCC, TDA

QC is stressed and, although TWDB is not a regulatory agency, data obtained from its monitoring program meet the high standards required to make credible water-quality evaluations.

- The Structural Pest Control Board (SPCB) program can provide investigators and applicator licensing information resources for the PMP.
- The Texas State Soil and Water Conservation Board (TSSWCB) staff have been actively involved with nonpoint sources of pollution and have specific knowledge on the state's Water Quality Management Plan, especially as it relates to the agricultural and silvicultural components of the assessment of nonpoint source pollution of surface water.
- The Texas Alliance of Groundwater Districts (TAGD) will provide limited resources and technical expertise needed to implement this plan. In many cases the district will have both the information needed and the technical expertise at the local level.
- The Railroad Commission of Texas (RCT) staff have considerable experience in groundwater pollution prevention and contamination investigation activities.
- The Texas Agricultural Extension Service's (TAEX) technical expertise and resources support multi-disciplinary activities and initiatives related to environmental protection, including water-quality protection. Some of the major TAEX program areas of expertise related to the management of pesticides are: agricultural engineering, agricultural economics, soil and crop sciences, entomology, plant pathology, animal science, consumer sciences, wildlife and fisheries, horticulture, agricultural and environmental safety, forest science, poultry science, weed science, and range science. Practices regarding pesticide application and water pollution prevention have become common elements of TAEX programs related to agricultural production. TAEX maintains an active role in informing and educating farmers, ranchers, home-owners, commercial pest control specialists, agribusiness, suppliers, and others concerning groundwater quality management and protection from pesticides.
- The Texas Agricultural Experiment Station (TAES) will serve as a technical resource to provide advice, guidance, technical assistance and, with provision of appropriate resources, conduct and interpret studies related to pesticide use and groundwater protection. Areas of concentrated expertise also include Integrated Pest Management (IPM) and Integrated Crop Management (ICM) programs. Fate and transport of pesticides involve scientists with expertise in environmental soil science, chemistry, weed science, entomology, microbiology, engineering, and ecology. Scientists with these same disciplinary specialties also provide expertise in remediation technologies. In addition, staff at the Texas Water Resources Institute (TWRI) will share their expertise in economics, sociology, and toxicology, if needed.
- Federal agencies, including EPA, NRCS and ARS, may provide technical expertise through their many programs, as well as through informal consultation.
- The registrants and manufacturers will share monitoring data and research results with monitoring agencies on specific groundwater characteristics and settings. The registrants will also

participate in review and comment on proposed water quality research and reports, monitoring programs, and quality assurance project plans, and they will provide methodology and advice on sample analysis as needed.

Financial and Personnel Resources

Implementation of the pesticide-specific PMPs will require significant resources from all agencies involved. Physical and operational costs involved in the implementation of TNRCC's part of the PMP fall under two general categories, initial effort (consisting of pesticide specific plan development and BMP implementation) and base line program maintenance (including monitoring and analysis of program effectiveness).

TNRCC resources for implementation of their portion of this management plan may come from both Federal (319 Clean Water Act and FIFRA) and State (General Revenue) sources. While TNRCC is committed to funding the maintenance of groundwater quality in the state through the administration of existing and new groundwater protection programs that are mandated by state legislation or delegated under federal authority, additional funding sources will need to be identified and pursued if full implementation of the program is to be achieved. If funding falls short of estimated costs, monitoring of groundwater and implementation of BMPs will be greatly reduced. Computer modeling and pesticide use data would replace the gathering of field data.

The TDA receives state appropriations to support pesticide registration and pesticide enforcement program activities. The agency also receives federal funds to support pesticide enforcement and applicator certification activities through a cooperative grant agreement with the EPA. However, no state funding is currently provided specifically to support groundwater protection activities. Funding available to the agency for pesticide related activities is inadequate for TDA to fully carry out its responsibilities in implementing the PMP for groundwater protection. TDA will continue to seek funding to support groundwater protection activities including funds from the EPA.

TWDB during routine monitoring will be able to provide some chemical specific determinations for requesting agencies. However, if analytical costs are to be provided from other sources, TWDB staff would collect samples providing the area to be sampled is within an aquifer currently being monitored by the Board. The Board receives funding from state sources.

TSSWCB receives 319 Funding and state appropriations to support its site-specific water quality management plan program. Under this program priority water quality watersheds are designated based on current state funding. Implementation of a pesticide-specific PMP within these designated watersheds will require funding for 0.50 additional FTEs per involved Soil and Water Conservation District (SWCD). Plan implementation outside existing designated program watersheds will require funding for 1.0 additional FTEs per participating SWCD. TSSWCB also receives Federal funding to implement certain aspects of its Agricultural Silvaculture Nonpoint Source Management Program through §319 of the Clean Water Act.

TAES receives state and federal appropriations to support its activities addressing natural resources. Grant funds are secured for evaluation and development of management practices. With the reduction in traditional funding, outside funds are used to address priority issues. Additional funding

sources will need to be developed for support of two additional FTEs per vulnerable area. At least one FTE will be located at a research center near the vulnerable area. Sufficient support will need to be provided to allow the FTEs to conduct an effective program.

TAEX receives state and federal appropriations to support its program efforts. The majority of the appropriated funds supports the personnel of the TAEX. Grant funds are secured from various outside sources for special initiatives addressing water quality. The hydrologic unit area projects are an example of a coordinated program to address the abatement of nonpoint source pollution in a specific area of the state. Implementation of the pesticide-specific PMP could be addressed in a similar fashion and would require funding of at least two FTEs (Extension Specialist and Extension Associate) for each vulnerable area. The personnel would function to coordinate and provide programming activities in the vulnerable areas. Sufficient support will need to be provided to allow the FTEs to conduct effective programming. Additional funding would need to be secured for development and evaluation of management practices.

The registrants can be a source of financial and in-kind support for monitoring, pollution prevention and contamination response projects with the cooperation of state agencies, universities, and grower organizations.

As noted by each of the responsible entities, there is state and/or federal funding to carry out existing programs. Some of the programs and activities are incorporated into the generic PMP. However, there are many additional functions essential to the success of the PMP process, which are **unfunded** as of the drafting of this document. The total cost of implementing and carrying out the activities of the PMP in Texas is estimated to be about two million dollars per year. Federal, state, and other possible sources of funding will be sought to cover the implementation cost.

SECTION V GEOGRAPHIC PLANNING

The vulnerability of groundwater to contamination, either from a point or nonpoint source of pesticides, is dependent on a variety of site-specific factors including soil and aquifer properties, the types of pesticides and manner of use, and other operational practices such as pesticide application rates, timing of application, method of application, cultivation practices, spillage and disposal, irrigation, and chemigation. Monitoring and management of known point sources of contamination are provided for in Federal and State statutes and rules and are currently being administered by the agencies identified in Sections II and III on *Roles and Responsibilities of Participating Agencies and Entities and Corresponding Legal Authority*.

The assessment of the vulnerability to nonpoint source contamination of groundwaters from the use of pesticides will require the cooperation of each agency listed in the following sections. Information concerning soil properties, aquifer properties, pesticide use, and known contamination will be used to identify areas sensitive to nonpoint source pollution. These areas will be targeted, based on assessed degree of vulnerability, for closer examination by the appropriate state agencies. The Site Selection Task Force (SSTF), besides having responsibility over site selection and monitoring is also in charge of overseeing the vulnerability assessment process.

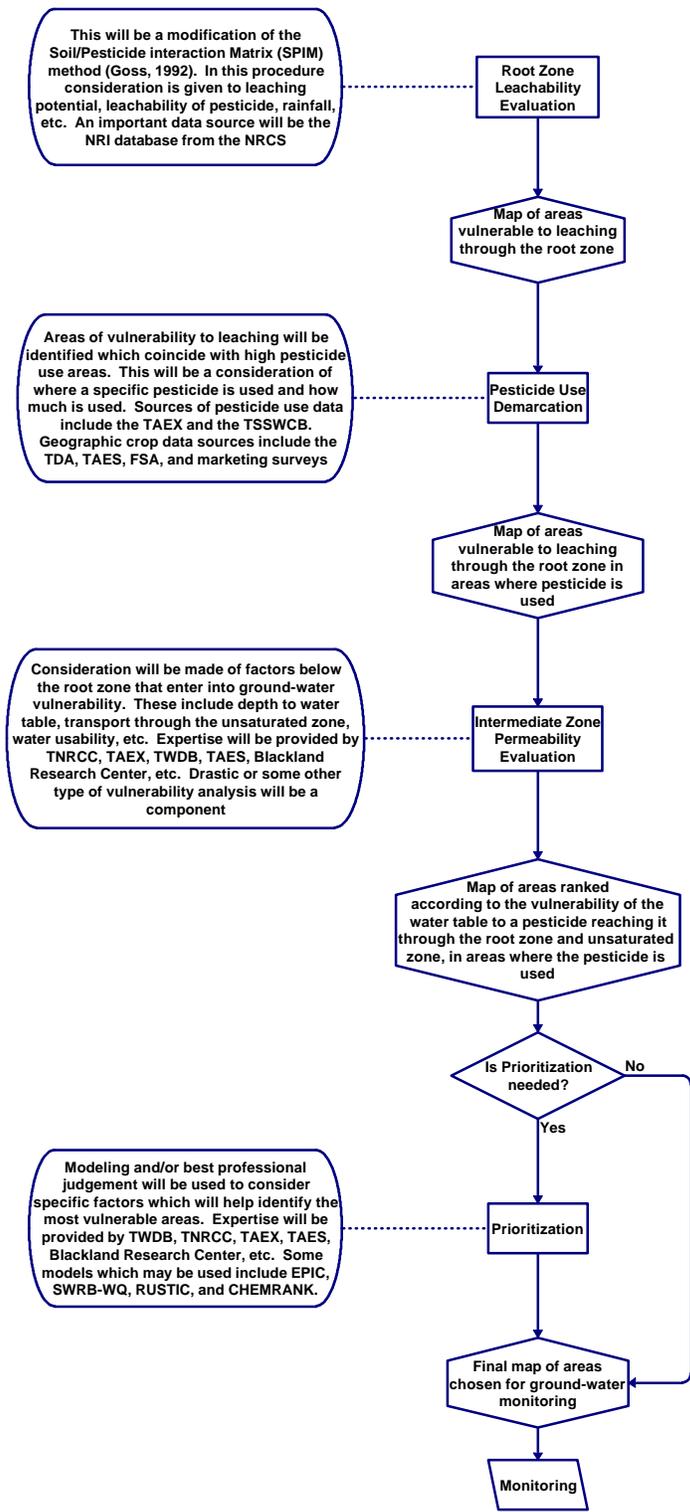
The large amount of cultivated land subject to pesticide applications makes it unfeasible to carry out a comprehensive monitoring program covering the whole extent of possible contamination. It would be more feasible to select the most vulnerable areas for monitoring, and if necessary (if pesticides are detected), move progressively to areas of decreasing vulnerability, until no more pesticide contamination is found. This process necessitates the use of some method of identifying various degrees of vulnerability. To be useful in the planning of monitoring activities this pesticide-specific groundwater vulnerability information needs to be presented on a map.

Determination of Vulnerability

A stepwise analysis will be used in the development of the vulnerability map necessary for the planning of monitoring activities. The analysis will be normally a three-step process with each taking into consideration a different aspect of vulnerability. An optional fourth step would be used when further focusing would be needed. The levels of analysis are Root Zone Leachability Evaluation, Pesticide Use Demarcation, Intermediate Zone Permeability Evaluation, and Prioritization. These steps are described below and are also shown in Figure 5.

Root Zone Leachability Evaluation: This first level of analysis will determine the likelihood of a pesticide leaching down through the root zone. Some modification of the Soil/Pesticide Interaction Matrix (SPIM), simulation model, will be used. This method takes into account the amount of percolation, leaching potential for four defined pesticide leaching classes, and non specific pesticide use in each of these four leaching classes. Data for this step would largely come from the Texas State Soil Survey Data for STATSGO (State Soil Geographic) database, which contains physical and chemical properties, and other soils data. Another valuable resource would be the National Resources Inventory (NRI) database. This database is a multi-resource inventory conducted at 5-year

**FIGURE 5
VULNERABILITY ASSESSMENT PROCEDURE**



intervals by the USDA's Natural Resources Conservation Service (NRCS). Data items include soils, land cover, land use, cropping history, conservation practices, conservation treatment needs, potential cropland, prime farmland, highly erodible cropland, water and wind erosion, wetlands, wildlife habitat, vegetative cover conditions, irrigation and flood susceptibility.

Pesticide Use Demarcation: In the second level of analysis, the actual areas of pesticide use under consideration will be evaluated. This analysis will have the effect of taking the vulnerability map developed in the Root Zone Leachability Evaluation and eliminating all vulnerable areas outside of regions where the pesticide of interest is actually used. Some possible sources of data for this analysis include the Pesticide Use Survey conducted by the TAEX, geographic crop data, marketing surveys, and information furnished by the registrants.

Intermediate Zone Permeability Evaluation: In the third level of screening, water quality factors and factors between the root zone and water table will be taken into consideration. These include such things as water usability, depth to the water table, and transport through the unsaturated zone. This analysis will further refine the vulnerability map especially in eliminating areas where the leaching of pesticides through the root zone is not likely to continue all the way to the water table. DRASTIC or some similar type of vulnerability assessment may prove to be an aid in this analysis. Organizations which may have expertise to contribute in this area include TAES, TWDB, NRCS, TSSWCB, TNRCC, TAEX, and EPA.

Prioritization: The fourth level of screening will be an optional level of analysis to be applied whenever the first three analyses develop a vulnerability map which shows a relatively large area to be in the high vulnerability category, an area excessively large to be properly monitored with a limited budget and limited time. This level of analysis would be more refined, utilizing more specific site information in the targeted areas, which, when combined with best professional judgement, and perhaps computer modeling, would enable a prioritization of the most vulnerable areas and thus a manageable undertaking in monitoring. Factors that would be taken into consideration in the prioritization process would include: water quality as defined in Table 1, population density in the area, location of major and minor aquifers as shown in Figures 1 and 2, amount of groundwater use, and kinds of uses of the groundwater.

Data Sources

As detailed below, soil properties (physical, chemical, and/or biological properties; unsaturated zone organic carbon and clay content; and rates of travel through the unsaturated zone) will be provided by TSSWCB, NRCS, TAES, and TAEX. Aquifer properties (depth to groundwater, recharge areas, discharge areas, rates of travel in the saturated zone, and wellhead protection areas) will be provided by TWDB, TDH, TNRCC, USGS, and when applicable, TAGD. Irrigation and rainfall data will be provided by TNRCC, TWDB, TSSWCB, and when applicable, TAGD.

Data on the usage of pesticides will be provided by quantity and location (NRCS, TSSWCB, SPCB, TAES, Texas Parks and Wildlife Department, TxDOT, and growers groups), agricultural cropping patterns (NRCS, TAEX, TSSWCB, growers groups, and when applicable TAGD), irrigation/chemigation practices (TAEX, TSSWCB, growers groups, and when applicable TAGD), and registration of pesticide by crop (TDA). Chemical properties of the pesticide of concern can be provided

by TDA, TAEX, TAES, ARS, NRCS, EPA, TSSWCB, TNRCC, SPCB, TDH, EPA as well as the pesticide manufacturers.

Evaluation of relationships among the above factors will be conducted by the SSTF using general integrative techniques such as modeling (TNRCC, TAES, NRCS), DRASTIC (TNRCC), mapping and geographic information systems (TAES, TNRCC, TSSWCB, TWDB) to identify the areas in the state that are vulnerable to contamination.

SECTION VI MONITORING

A key element of the management strategy is the development of an anticipatory monitoring system to identify vulnerable areas and to assess the success of the PMP. A series of pesticide groundwater monitoring programs will be performed, each focusing on a selected pesticide and chosen geographical locations. The geographic locations will be chosen on the basis of assessed vulnerability to the leaching of the pesticide in question. The assessment process is described in *Geographic Planning* (Section V). Monitoring programs will consist of sampling and analysis of raw water from wells in the selected areas. This is primarily to determine if normal use of pesticides (nonpoint source) would contaminate the vulnerable groundwaters. Pesticides chosen for monitoring will be those identified by EPA in the draft PMP Rule with a secondary consideration for other pesticides heavily used in the same area.

PMP Monitoring Program

The monitoring program is a combined effort of all the cooperating agencies and entities which participate in the Agricultural Chemicals Subcommittee (ACS) and the various Task Forces formed to pursue specific aspects of the monitoring programs. The two task forces primarily concerned with monitoring are the Site Selection Task Force (SSTF) and the Data Evaluation and Interpretation Task Force (DEITF). SSTF's primary responsibility is to perform the vulnerability assessment (*Geographic Planning*, Section V), choose and prioritize areas to be monitored, select specific wells in each area, draft the monitoring plans, and perform the monitoring. DEITF will determine the proper response, should there be a confirmed detection of a pesticide. It will analyze the collected data: to determine whether the contamination is from a point or nonpoint source, to estimate the time of travel for pesticides from the treated fields, and to determine the extent of the contaminated area. If more data are necessary it will work with the SSTF to determine additional monitoring needs. TNRCC and TWDB will jointly carry out the monitoring program.

Registrants will be notified upon delineation of vulnerable areas and will have an opportunity to cooperate with SSTF and the various participating agencies to monitor areas determined to be vulnerable. It is hoped that registrants will serve to complement the State's efforts toward prevention and protection by providing guidance on the evaluation of the effectiveness of pesticide-specific PMPs.

The monitoring will focus on identifying nonpoint sources of groundwater contamination from the normal use of pesticides. If a pesticide is detected in the groundwater, monitoring may be extended to other less vulnerable locations to delineate the limits of contamination, depending on further evaluation and the availability of resources.

PMP monitoring will take place only after drafting a pesticide-specific monitoring plan. These are documents outlining the details of site selection, well selection, sampling methodology, analytical methodology, and data evaluation. This monitoring will also consider unique characteristics of that pesticide including its chemical properties and use patterns.

Data collected during the monitoring program will be stored in the Pesticide Database at TNRCC and in the Groundwater Database at the TWDB. Data collection will include as a minimum those elements described in EPA's "Definitions for the Minimum Set of Data Elements for Groundwater Quality" (EPA

813/B-92-002, July 1992) which are incorporated into the Texas Data Dictionary (Texas Groundwater Protection Committee AS-109, August 1996).

Pesticides to be Monitored: A series of monitoring programs will be performed to determine if there are any pesticide problems in Texas. Areas assessed to be most vulnerable to the leaching of a specific pesticide may not necessarily overlap with areas assessed to be most vulnerable to another pesticide. This may be due to the unique chemical characteristics of each pesticide and /or its use pattern. Therefore, the monitoring program will focus on a primary pesticide of concern from EPA's list.

Areas to be monitored: Areas to be monitored will be decided considering both the frequency and amount of pesticide use as well as leaching vulnerability of the area. The procedure for determining monitoring areas is given in Section V *Geographic Planning*. Another factor for area selection will be the availability of suitable sampling wells within the monitoring area. Geographic Planning will be performed by the Site Selection Task Force.

Well Selection: Specific wells will be chosen for monitoring following selection of monitoring areas (See *Geographic Planning* Section V). Because of resource constraints, the monitoring program will rely on existing wells, utilizing if possible, only those in use during the sampling period. The Site Selection Task Force will identify the number and location of wells to sample in the monitoring areas.

Selection criteria for monitor wells include the following: (1) wells selected for monitoring shall be in or near a cropping area where the pesticide of concern is known to have been used, based on information supplied by the property owner and/or farmer; (2) driller's logs and other State or Federal groundwater reports should be available; (3) wells should have sufficient completion information to evaluate the structural integrity of the well; (4) surface protection, such as a well house or concrete slab, must be adequate to prevent contaminants from entering the well via the land surface; (5) preference should be given to shallow wells completed in the water table, with a few deeper wells desirable for background comparison; (6) hand dug wells will not be considered suitable for sampling; and (7) wells must be accessible for investigation and sample collection, including physical accessibility and water collection point prior to any treatment system. In addition, wells considered favorable for sampling will not have had pesticides stored, mixed, spilled, or disposed of in close proximity to the wellhead.

To aid in evaluation of data and to identify potential problem agricultural practices and effective BMPs, a pesticide use survey will be conducted at each sampling site. This survey will gather crop data within a quarter-mile radius of the well for the preceding ten years, and will focus on general pesticide use, application methods, and rates. Specific agricultural practices will be noted such as terracing, contour tillage and planting, type of tillage practice, and irrigation/chemigation practices. In addition, questions directed to potential point sources of contamination such as storage, spills, and disposal will be addressed.

Geographic and topographic conditions around the well and well use will be noted, and the survey will include an inventory of potential contaminant sources in the vicinity of the well such as septic systems, landfills, underground storage tanks, pesticide storage facilities, tail water holding ponds, irrigation canals and ditches, and locations of spills. In the area of the well, locations of chemical plants and/or storage facilities, airports or landing strips, military bases, mines, and lakes will be noted. The Monitoring Program Plan will outline in more detail the specific requirements in the selection of wells.

Quality Assurance: Before any sampling begins a sampling methodology will be developed and incorporated into a Quality Assurance Project Plan (QAPP). All groundwater sampling funded by EPA is required to be conducted under an EPA-approved QAPP. The QAPP specifies field sampling procedures including purging, collection, and tagging of samples; collection of field/trip blanks; shipping methodology; record keeping, and chain of custody procedures. Also specified are the methods of analyses, the instrumentation and techniques used for field measurements, the upkeep of field instruments, and other factors which contribute to the quality and reliability of monitoring results.

Laboratory and Immunoassay Analyses for Pesticides: EPA Approved Analytical Methods as well as an immunoassay method will be utilized for pesticide analyses. Only those laboratories that use EPA-approved methods and follow established guidelines will be selected for pesticide analyses. The immunoassay method will be used only as a screening tool to minimize expensive laboratory analyses. The QAPP will specify when and how immunoassay and EPA approved laboratory techniques will be used in the monitoring/analytical process. In the event that positive detections are found and verified, the ACS will develop a course of action, in accordance with *Response to Groundwater Contamination* (Section VIII).

SECTION VII PREVENTIVE MEASURES

Contaminated groundwater can be very expensive and sometimes almost impossible to totally remediate. This is true even if contamination occurs from point sources, where the origin of the pollutant can be identified and addressed. A contamination plume from a point source is influenced mostly by groundwater flow and dispersion, and tends to be confined to a region around the contamination point. A contamination plume derived from a nonpoint source, because of the inherently large extent of nonpoint sources, tends to be expansive, and as a result remediation may not be technologically or economically feasible for most areas. This underscores the importance of preventive measures which are much more economical to implement than groundwater remediation.

Reduction of nonpoint and point source groundwater contamination from pesticides is dependent upon management of vulnerable areas. *Geographic Planning* (described in Section V) will identify these areas. Preventive measures will be encouraged through education. When voluntary efforts are unsuccessful, use-restriction may become mandatory. The pesticide-specific PMPs may restrict the use area, use rate, timing, and/or method of application.

Management Approach

The Agricultural Chemical Subcommittee and its task forces oversee the implementation of preventative measures utilizing a five-tiered approach.

- **General Education:** General information will be shared statewide to raise the awareness of the potential for groundwater contamination by pesticides, independent of any specific findings of vulnerability or contamination. A brochure, display, and slide presentation are some of the items being developed by the Educational Task Force. These materials will be available to the various cooperating agencies and entities for distribution and/or presentation throughout the state.
- **Education Focused on Vulnerable Areas:** Educational efforts will be expanded in any area identified as vulnerable to contamination of groundwater by specific pesticides. This effort will be applied even though monitoring has not shown actual contamination. Dissemination of information may be through public presentations, articles in news letters, the advertisement of available educational literature, as well as the developed resources (brochure, display, and slide presentation).
- **Education and Voluntary Application of Best Management Practices (BMPs) in Areas with Lesser Levels of Pesticides:** Where monitoring has revealed groundwater contamination, but at concentrations lower than the pesticide MCL or HAL, a voluntary BMP program will be encouraged. Furthermore, cooperating agencies may take certain actions within the application of their normal educational programs.
- **Education and Mandatory Application of BMPs in Areas with Greater Levels of Pesticides:** In an area where monitoring has revealed nonpoint source contamination of groundwater by a pesticide at levels greater than the MCL or HAL, an educational program and a voluntary or mandatory BMP program will be initiated. If there is no evidence of improvement under a voluntary

BMP program, a mandatory BMP program may be implemented or the appropriate regulatory option pursued.

- **Cancellation of Pesticide:** If all previous levels of preventive measures fail, the final recourse will be cancellation of the pesticide in the area where the groundwater is contaminated. The cessation of the use of a pesticide guarantees that no more of it will find its way into the groundwater. A final educational effort would need to be made to inform all the users of this pesticide that it could no longer be used in the area.

Best Management Practices

Definition of Voluntary and Mandatory BMPs: BMPs are practices that address the use, storage, and application of pesticides as well as cultural and production practices. Examples of BMPs include (but are not limited to) triple rinsing containers, sprayer calibration, installation of pesticide mixing and loading pads, and proper well head protection. Specific BMPs can be developed for a vulnerable area based on its unique site characteristics. However, the majority of BMPs would be general practices that pesticide users can follow.

Pesticide users can be encouraged to voluntarily use the BMPs or required to use BMPs which are considered mandatory. Voluntary implementation encourages pesticide users to utilize BMPs when they apply pesticides. However, failure to utilize BMPs under a voluntary implementation program does not result in enforcement. The mandatory implementation of BMPs requires pesticide users to follow specific BMPs for continued use of the pesticide. If the pesticide user does not follow the mandatory BMPs, enforcement action can be taken to restrict the pesticide uses. This enforceable option is to limit the use of a pesticide through classification such as “State-Limited-Use.” Alternative measures may include label changes under the authority of EPA or other options as stipulated in the final PMP rule.

Identification of Existing BMPs: One of the major tasks of the BMP Task Force is to identify existing BMPs which can be applied to the prevention of nonpoint source groundwater contamination due to the normal application of a pesticide according to its label. The first step in this process is to identify the agencies and entities which have developed or collected pollution preventive management practices. The primary source is the Natural Resources Conservation Service (NRCS), but TSSWCB, TAES, TAEX, the Alliance for a Clean Rural Environment (ACRE), Farm Chemicals Handbook, and registrants are sources. NRCS has a large near-comprehensive collection. The NRCS BMPs are compiled in a document entitled National Handbook of Conservation Practices (or Field Office Technical Guide).

The Selection of BMPs Appropriate to a Pesticide: The BMP Task Force members have emphasized that the vast majority of BMPs, which apply in some way to the use of a particular pesticide, will not usually be specific to that pesticide, but will apply to leachable pesticides in general. This is because a pesticide can be generally described according to certain properties that relate to its Leachability, namely half-life in soil, solubility in water, and soil sorption index. Considering these properties, one can determine a surface loss potential and a leaching potential for any pesticide. BMPs aimed at reducing groundwater contamination will generally be either those that minimize leaching through reduced deep infiltration, by lessening leaching potential through careful timing of applications, by curbing infiltration, etc.; or those that minimize leaching of pesticides through reduced usage, by providing for more efficient

or diminished applications of the pesticide. Some BMPs will be more applicable under a given set of surface, geological, climatological and agronomic conditions.

An agricultural producer, whether it be under voluntary or mandatory circumstances, will need to make a determination as to which BMPs are feasible for the surface, geological, climatological and agronomic conditions under which he operates. Under surface conditions would fall such characteristics as slope, soil type, and root zone depth. Under the category of geological conditions would be included vadose zone media, depth to water table and seasonal water table conditions. Climatological conditions include such things as annual or seasonal rainfall, seasonal temperatures, and winds. The agronomic conditions category encompasses such things as crop type, tillage practices, application dates, and irrigation practices. Surface geological and climatological conditions are unchangeable for all practical purposes, but agronomic conditions or practices can in many cases be changed so as to reduce the leaching of a pesticide. Any agronomic change must be both economically and physically practical.

It is expected that the suitability of a BMP will be rather consistent within a geographic area. This follows from BMPs being dependent on climate, geology, and surface conditions, which are geographically mappable attributes. Agronomic practices, since they depend to a large extent on geology, climate, and surface conditions, are also mappable. Of course this does not preclude the possibility of a variation in the BMPs that are suitable, even for adjoining fields; and only individual evaluation will assure an appropriate decision. Under the preventive measure level designated as Voluntary Application of BMPs, a list of alternate BMPs determined to be efficacious for the area can be preselected by the BMPTF, so that the agricultural producer can evaluate his own situation and determine which would be appropriate for him.

Implementation of BMPs: An important consideration in the application of BMPs is the determination of when a BMP program should be put into place. The consensus of the BMP Task Force is that a program of voluntary or mandatory application of BMPs should be initiated only after a confirmation of nonpoint contamination of groundwater by the normal use of a pesticide according to its label. However, this does not preclude the initiation of educational programs designed to encourage the voluntary adoption of various BMPs by the agricultural community, especially in vulnerable areas. The decision for the need for voluntary or mandatory application of BMPs would come from the Agricultural Chemical Subcommittee (on recommendation of the Data Evaluation and Interpretation, and BMP Task Forces), and the authority to include application of BMPs as a component of CEUs on laws and regulations or the local banning of a pesticide would come from TDA. Ordinarily a program of mandatory application of BMPs will not be initiated until after the failure of voluntarily implemented BMPs.

In general BMPs can be divided into two economic categories: those with a low cost of implementation, and those with a high cost of implementation. BMPs which would require only some relatively small change in procedure, such as taking into consideration weather forecasts before any application of pesticides, would be low cost implementation. Low cost BMPs would be more likely to be adopted on a voluntary basis. An example of a high cost BMP would be changing furrow irrigation to a higher efficiency irrigation system such as LEPA (Low Energy Precision Application). High cost BMPs would be less likely to be adopted on a voluntary basis. Furthermore, in a mandatory BMP situation, the agricultural producer may prefer to abandon the use of the pesticide than to adopt an expensive BMP,

especially since there is no absolute guarantee that the BMP will be successful. Obviously, it will be very important to determine exactly what BMPs will be prescribed. In many cases, however, it may be that the same BMP that reduces the leaching of the pesticide under investigation (or any leachable pesticide), also has another benefit such as reducing the amount of irrigation water that is needed. This economic benefit would also enter into the formula of determining the overall feasibility of adopting a BMP.

Cooperative Implementation through the PMP: Several agencies will be involved in various ways in the implementation of BMPs. Some agencies will provide education (TAEX, TDA, TNRCC). These agencies in conjunction with other entities (TAES, TSSWCB, TWDB, TAGD and the Registrants) will also serve as the sources of technical information. All the agencies taking part in the PMP process will also be involved indirectly with BMPs through their membership in the Agricultural Chemicals Subcommittee (ACS). Many of these agencies will also be involved through membership in BMPTF and ETF. Should the need for a program for the voluntary or mandatory application of BMPs become evident, the BMPTF would have the responsibility of determining which BMPs would be applicable. The ETF will have the responsibility of coordinating BMP educational activities.

The effectiveness of the BMPs will be evaluated on the basis of monitoring results. This evaluation will be ongoing over an *evaluation period*. The evaluation period will be determined based on site specific scientific considerations and will generally vary according to the pesticide, soil type, depth to groundwater, and other factors such as public health concerns. Progress on BMP effectiveness for each BMP area will be reported to EPA in the Biennial Report (See Records and Reporting, Section XII). BMPs will be considered effective if they result in a downward trend over the evaluation period or at least a stabilization in the level of pesticide in the aquifer (See *Response to Groundwater Contamination*, Section VIII). Groundwater monitoring may need to continue in some form for as long as there is a concern of groundwater contamination.

It will be important to document the proportion of the agricultural producers in vulnerable areas, who have initiated BMPs whether it be under a voluntary or mandatory program. This information will be vital to evaluating effectiveness of the BMPs. Also it will be important to the producer as well as to the BMPTF to ascertain the costs and benefits of BMPs. The primary benefit of the BMPs will be the continued use of a pesticide while safeguarding groundwater quality. Overall the implementation of a BMP should be cost-effective. The economic impact of retaining the use of a pesticide as well as the economic impact of the BMPs, such as reducing the amount of irrigation water used, must be considered.

SECTION VIII RESPONSE TO GROUNDWATER CONTAMINATION

The state's philosophy that the existing quality of groundwater not be degraded and that the quality of groundwater be restored if feasible, has dictated that state agencies exercise best professional judgment and take appropriate actions in responding to incidents involving contamination of groundwater. Actions taken to determine the source of contamination (point or nonpoint), necessary remedial action, assessment of appropriate enforcement options, and steps that will be taken in the event that contamination continues to occur are addressed.

During the course of monitoring, should a laboratory analysis indicate and subsequent resampling and analysis confirm the presence of a pesticide in a well, the first course of action would be to verify the severity of the contamination. In Sections II & III, *Roles and Responsibilities of Participating Agencies and Entities and Corresponding Legal Authority*, the Agricultural Chemicals Subcommittee's (ACS) Site Selection Task Force (SSTF) and the Data Evaluation and Interpretation Task Force (DEITF) are charged with the responsibility of verifying pesticide contamination. After the initial verification, a determination will be made of the extent of the contamination and whether it derives from a point or nonpoint source. The DEITF will make this determination by analyzing monitoring data, pesticide use surveys, and information on well-head protection practices. If the data are inadequate, the DEITF will ask the SSTF to obtain additional monitoring data or additional information.

A careful assessment of any contaminated site will be necessary to determine a suitable course of action. The movement of pesticides within the geophysical matrix is a very complex process. In many cases it may take several years for a pesticide to migrate from the surface to the water table. Furthermore, any observed contamination may be a result of pesticide use many years earlier. Because of the tightening of restrictions placed on pesticide labels over time, application practices current at the time of an initial detection of a pesticide may not be the ones responsible for the contamination observed. A careful assessment of a site will be necessary to determine the cause of a problem, the severity of the problem, and the proper course of action to mitigate it. Components of the assessment will include the confirmation of the level of the chemical; the determination of the extent of the contamination; the determination of the possible contamination source(s); the surveying of present and past agricultural practices; and the identification of the use and value of the groundwater resource. The assessment process will be very important in designing the most appropriate response to contamination.

If the contaminated groundwater is a source of private drinking water that can cause health concerns, steps will be taken to ensure a satisfactory drinking water supply is available. Options for an alternative drinking water source may include bottled water, alternate wells, treatment before use, purchasing water from a nearby source or piping in water from outside the affected area. The Educational Task Force (ETF) would have a role in informing the affected persons of the water contamination and the necessary steps to obtain alternative drinking water, especially if the levels are determined to be unsafe.

For a public drinking water supply, Texas Administrative Code Title 30 Environmental Quality, Part I TNRCC, Chapter 290 Public Drinking Water regulations would apply. At certain levels, the contamination of the drinking water constitutes a violation of 30 TAC Chapter 290 promulgated for the

Safe Drinking Water Act (SDWA). Water systems out of compliance with chemical standards must conduct public notification and produce drinking water that meets the standards by feasible means. Enforcement actions will be pursued if warranted. If there is a detection of a pesticide below a health based standard, but there is no violation and the water is considered safe to drink, the public would be informed through annual Consumer Confidence Reports.

Response actions described below will be based on confirmed contamination, and the decision between some response actions will depend on the results of the site assessment. This strategy represents a guide for determining an appropriate level of response to point and nonpoint source contamination of pesticides in groundwater. Actual response will vary depending on the site, incident specific variables, and pesticide characteristics. Knowledge of MCLs or HALs, pesticide characteristics, vadose zone characteristics, and the effectiveness of any previously applied preventative or moderating measure will be imperative to any action. Furthermore, if special studies undertaken during the assessment process, such as computer modeling and/or core sampling, give additional information, for example the lag time of pesticide travel from the bottom of the root zone to the underlying water table, this data could be used to adjust the proposed responses outlined below.

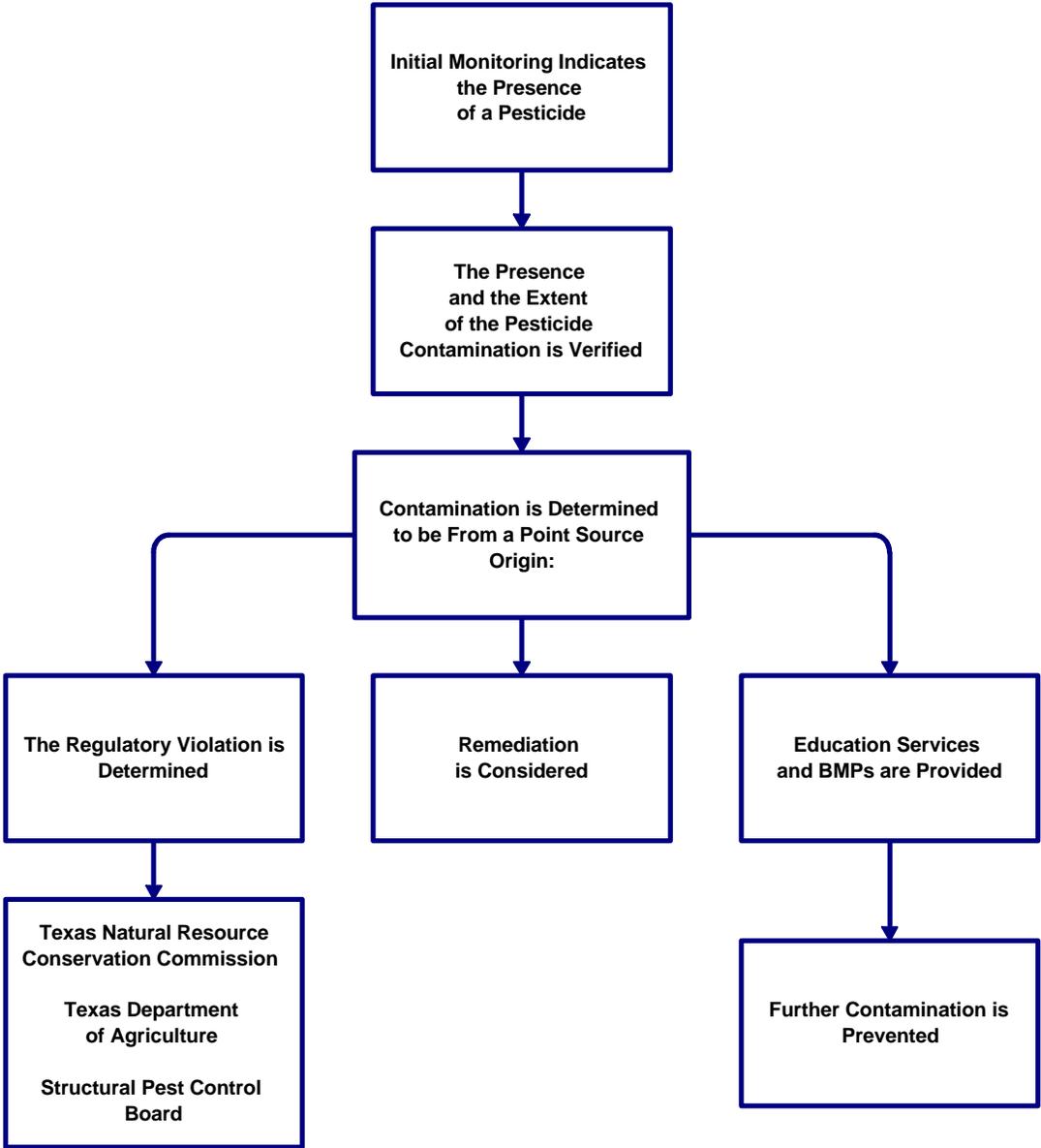
Point Source Contamination

The point source contamination response scheme is shown in Figure 6. If there is a regulatory violation resulting in a point source contamination, several enforcement options could be pursued. Examples include the use of a pesticide in violation of label restrictions or the illegal dumping of pesticides. The appropriate enforcement actions will be taken by TDA, TNRCC, or SPCB depending on which regulations had been violated (See *Enforcement*, Section IX). If the contamination is due to the careless use of the pesticide near a wellhead, the Best Management Practices Task Force (BMPTF) will select BMPs efficacious to the prevention of further point source contamination. The ETF will then disseminate the information necessary to apply these BMPs. If the contamination is deemed to cause a significant degradation of a drinking water supply (See *Statement of Philosophy*, Section I), remediation could be considered by the ACS.

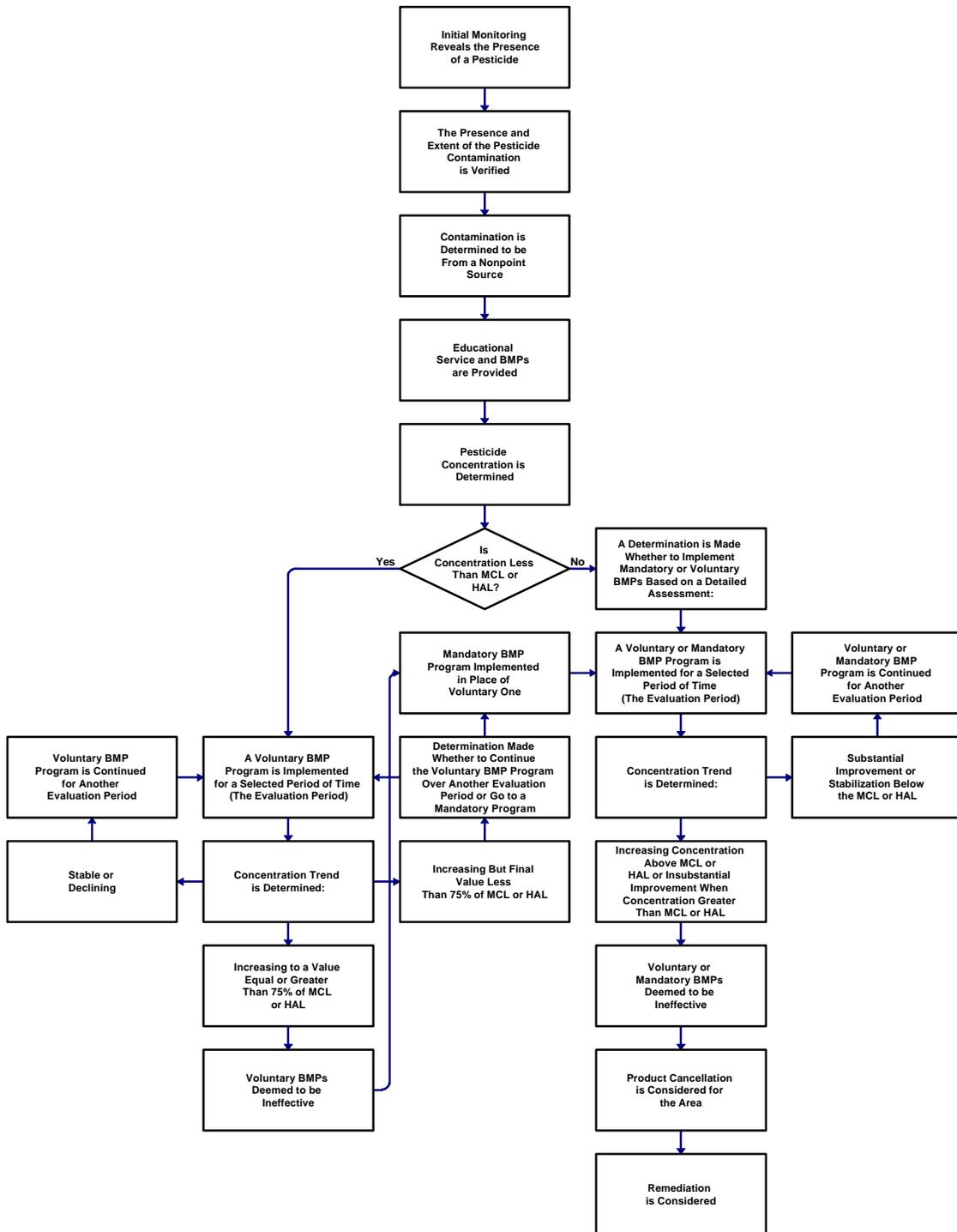
Nonpoint Source Contamination

The nonpoint source contamination scheme is shown in Figure 7. Nonpoint source contamination of groundwater can result in areas where geological characteristics and other factors favor the transport of a pesticide from the point of application, at or near the surface of the soil, to the groundwater table. Certain practices followed by the pesticide applicator can reduce the possibility of leaching. The pesticide label prescribes use requirements to prevent unreasonable adverse effects on the environment. Thus, pesticide use inconsistent with its label can result in nonpoint source contamination of groundwater. When necessary, BMPs more stringent than those prescribed on the label can be implemented in vulnerable areas.

**FIGURE 6
RESPONSE TO POINT SOURCE
PESTICIDE GROUNDWATER CONTAMINATION**



**FIGURE 7
RESPONSE TO NONPOINT SOURCE
PESTICIDE GROUNDWATER CONTAMINATION**



Appropriate preventative measures and possible enforcement actions will be pursued following confirmation of contamination. If, after initial monitoring, there is a confirmation of nonpoint source contamination by a pesticide, and the concentration is less than the MCL or HAL, a program calling for the voluntary application of BMPs will be initially implemented in the area. A list of suggested BMPs suitable for a voluntary program will be selected by the BMPTF and information on their application will be disseminated by the ETF. Ongoing monitoring in the area will be carried out by the SSTF. The monitoring program will continue over the designated evaluation period to determine the effectiveness of the voluntary BMP program (See *Preventive Measures*, Section VII). If monitoring reveals a trend of steady or declining concentration of pesticide below the MCL or HAL, the voluntary BMP program would be deemed effective and would be continued for another evaluation period to confirm continued improvement, stabilization, or total resolution of the contamination problem. However, if during a voluntary BMP program, monitoring reveals an increasing trend of contamination over the evaluation period, but with final concentrations less than 75% of the MCL or HAL, the effectiveness of the BMPs and the educational effort in the area will be evaluated. In the interim the voluntary BMP program will continue until the DEITF recommends either a continuation of the voluntary BMP program or moving to a program calling for the mandatory application of BMPs and until the BMPTF determines what BMPs will be required for a mandatory program.

If, during a voluntary BMP program over the evaluation period, monitoring reveals an increasing trend of pesticide concentration, with the final concentration equal to or greater than 75% of the MCL or HAL, the voluntary program would be deemed ineffective. A mandatory BMP program in the area would be initiated at this time. If after the evaluation period of a mandatory application of BMPs there is no improvement, the mandatory BMP program would be deemed ineffective, and cancellation of the pesticide in the area would be considered if the concentration is greater than the MCL. Whenever a mandatory BMP program follows a voluntary one, or, whenever a voluntary BMP program is continued for another evaluation period, the ETF will follow up its educational activities in the area, including information on any new BMPs and the mandatory nature of their application for mandatory programs.

If, after initial monitoring, there is a confirmation of nonpoint source contamination by a pesticide and the concentration is equal to or greater than the MCL or HAL, a determination will be made as to whether a voluntary or mandatory BMP program will be initially implemented in the area. This determination will be based on a detailed assessment of the uses and value of the groundwater resource, of whether the contamination is the result of present or past agricultural practices, and of what measures will be necessary to address the trend of contamination in the aquifer. The response may include voluntary or mandatory application of BMPs following recommendation by the Agricultural Chemical Subcommittee. If after implementing a voluntary or mandatory BMP program over the evaluation period, monitoring reveals a substantial improvement or a final concentration below the MCL or HAL, the voluntary or mandatory BMP program will continue for another evaluation period to confirm continued improvement, stabilization, or total resolution of the contamination problem. However, if over the evaluation period, monitoring reveals no substantial improvement and the pesticide concentration is greater than or equal to the MCL or HAL, the voluntary or mandatory BMP program would be deemed ineffective, and TDA will seek State-Limited-Use designation or cancellation of the pesticide in the area upon recommendation of the Data Evaluation and Interpretation Task Force through the Agricultural Chemicals Subcommittee. The ACS at the advice of the TGPC will direct the appropriate Task Forces to take the necessary corrective actions.

Remediation

A recommendation for remediation will be considered by the ACS under the following circumstances: (1) if there is a significant point source contamination of groundwater, or (2) when BMPs fail to reverse or stabilize a significant contamination problem. In determining the need for remediation, consideration will be given to groundwater protection policy (See Section I), as well as technical feasibility and cost. Further steps will be taken to identify the parties involved in the remediation process. The source of contamination will be important in determining which agency has jurisdiction for the remediation.

SECTION IX ENFORCEMENT

Three state agencies, the Texas Department of Agriculture (TDA), Texas Natural Resource Conservation Commission (TNRCC), and Structural Pest Control Board (SPCB), have enforcement authority to regulate pesticides in Texas, depending on the circumstances of a detected groundwater contamination as outlined in the preceding sections. The Texas Alliance of Groundwater Districts (TAGD), as an organization, has no regulatory or enforcement authority. Individual groundwater districts may have limited authority for action with regard to groundwater contamination. The enforcement matrix given in Table 4 identifies the state agencies responsible for coordinating the enforcement activities related to pesticide use in Texas. The details are given under *Roles and Responsibilities of Participating Agencies and Entities and Corresponding Legal Authority* in Section II and III. The PMP coordination of enforcement actions will be achieved by these entities under the existing provisions of state and federal laws and regulations. Highlights of such provisions are outlined below:

Texas Department of Agriculture

TDA will provide support for the PMP by the authority of the Texas Pesticide Law, Chapter 76 of the Agriculture Code that stipulates proper use of pesticides. Section 76.1555 of the Law provides the authority for assessing administrative penalties, while Section 76.156 provides authority for civil penalties. These penalties may include a letter of reprimand, fines and/or revocation of the applicator's license. Offenses for which a criminal penalty may be assessed are contained in Sections 76.201 and 76.202. Section 76.007 of the Texas Agriculture Code, provides for interagency cooperation between TDA and TNRCC whenever either agency has probable cause to believe that serious contamination of water has occurred as a result of use, misuse, manufacture, storage, or disposal of pesticides. TDA will also coordinate these efforts with TNRCC through the Texas Groundwater Protection Committee and the Agricultural Chemicals Subcommittee.

Texas Natural Resource Conservation Commission

According to Section 26.121, all point and nonpoint source incidents of groundwater contamination from pesticides are regarded as unauthorized discharges to water in the state, unless the discharge complies with the person's certified water quality management plan approved by the State Soil and Water Conservation Board as provided by Section 201.026 of the Agriculture Code. Complaints of discharges to groundwater or non-compliance with permits, rules, or orders are first investigated by TNRCC inspectors, who then refer the entity for enforcement action. The enforcement options available to the TNRCC are: informal Compliance Agreements; formal Agreed Orders; contested case processing; default orders; referral to the Attorney General for civil lawsuit; referral to the Environmental Protection Agency for federal enforcement action; and criminal prosecution. The commission has the authority to assess administrative penalties under a number of statutes located in the Texas Water Code and Texas Health and Safety Code. The Texas Water Code provides for maximum administrative penalties of \$10,000 per day per occurrence and provides for civil and injunctive remedies for unauthorized discharges into water in the state. Integral to all enforcement options are technical directives aimed at achieving three basic objectives: prevention of the recurrence of contamination; removal or

TABLE 4
TEXAS STATE AGENCY ENFORCEMENT MATRIX

VIOLATION	ENFORCEMENT ENTITY(IES)	AUTHORITY	REFERRAL TO 2ND ENTITY	REPORTS TO:
Misuse, Non-compliance	TDA SPCB	TX. Agriculture Code <i>see Sec. 2&3</i>	TNRCC ^{1,3} SPCB ² TDH ⁴ EPA ⁴	Records <i>see Sec. 12</i>
Groundwater Contamination	TNRCC	TX. Water Code <i>see Sec. 2&3</i>	TDA ⁵ EPA ⁴	Records <i>see Sec. 12</i>
Surface water Contamination	TNRCC	TX. Water Code <i>see Sec. 2&3</i>	TDA ⁵ EPA ⁴	Records <i>see Sec. 12</i>
Drinking Water Standard Exceeded	TNRCC	SDWA <i>see Sec. 2&3</i>	TDA ⁵ EPA ⁴ TDH ⁴	Records <i>see Sec. 12</i>
Improper Disposal	TNRCC TDA	TX. Water Code TX. Agriculture Code <i>see Sec. 2&3</i>	SPCB ² EPA ⁴	Records <i>see Sec. 12</i>

¹ If there is water contamination

² Only if SPCB licensed applicator is involved

³ Only if a public water supply system is affected

⁴ On case-by-case basis or through annual report

⁵ Under the provisions of the Texas Agriculture Code, Section 76.007

containment of the source of contamination; and remediation of groundwater quality to appropriate standards. Other authorities for initiating enforcement include:

- RCRA program;
- CERCLA (Superfund) program;
- Emergency Spill Response;
- Clean Water Act;
- Safe Drinking Water Act;
- Water Code; and
- Cooperative Action Enforcement with the TDA.

Structural Pest Control Board

Compliance with SPCB rules and regulations is assured through periodic unannounced inspections of pest control businesses and observations of pesticide use, as well as responding to citizen complaints. The legal authority of the SPCB includes the authority to impose administrative penalties for misapplication of pesticides and uses which could be injurious to human health, safety or to the environment. These administrative penalties range from \$100 to \$5000 per violation. The authority to administer penalties is provided under Section 10B of the Structural Pest Control Act, Art. 135b-6, TEXAS REVISED CIVIL STATUTES ANNOTATED (Vernon Suppl. 1990).

Texas Alliance of Groundwater Districts

Groundwater Districts have limited enforcement authority at the local level. Enforcement of district rules is limited to injunction, mandatory injunction, or other appropriate remedies in a court of competent jurisdiction. Local districts should be involved in any action taken by a state agency concerning potential violations of state law which impacts groundwater within their districts jurisdictional area. In some cases, the local district may be the entity to alert the appropriate state agency of a rule violation. The district may become a mediator between a private individual and a state agency in an effort to remedy a violation and help avoid penalty action.

SECTION X PUBLIC AWARENESS AND PARTICIPATION

Communication Strategy

The communication strategy will involve reaching out to various public and private entities, and government agencies. The Texas Groundwater Protection Committee (TGPC), through the relevant task forces of the Agricultural Chemicals Subcommittee (ACS), will identify and invite voluntary participation of the interested parties in the Pesticide Management Plan (PMP) process. These parties may include the following:

- universities and colleges;
- registrants;
- agricultural chemical dealers and distributors;
- licensed pesticide applicators;
- trade associations;
- agricultural producers; and
- public interest groups.

Texas Groundwater Protection Committee (TGPC)

The activities of TGPC, i.e., new developments regarding the Comprehensive State Ground Water Protection Program and other information of general concern relating to groundwater protection, will be communicated to agencies through TGPC meetings, ACS and its task force meetings, as well as through TGPC mailings.

Communication of information and activities related to the State Management Plan for Prevention of Pesticide Contamination of Groundwater is the primary responsibility of TNRCC and will be communicated to participating agencies through ACS. ACS meets quarterly and as often as necessary to provide a forum for agencies to present issues of concern, to coordinate the refinement of the generic PMP and to develop the components of a pesticide-specific PMP. In addition regular full members, representatives from chemical manufacturers, producer groups, agricultural interest groups, and public interest groups may participate as non-voting members of the ACS.

The public, under the Open Meetings Act, are advised of all the TGPC meetings of the full Committee. All meetings of the ACS are reported to the full Committee; therefore, reports are available to the public at anytime. Copies of these documents are available, following EPA approval, from all participating agencies and other entities. Scheduled presentations throughout Texas and other bordering states will be done by the Educational Task Force members. Should there be a contamination event, presentations will be made in the affected areas as frequently as the need arises.

Section 26.404 of the Texas Water Code provides that TGPC is subject to the Administrative Procedure and Texas Register Act (APTRA), (Article 6252-13b Vernon's Texas Civil Statutes), the open meetings law, Chapter 271, Acts of the 60th Legislature, Regular Session, 1967 (Article 6252-17, Vernon's Texas Civil Statutes), and the open records law, Chapter 424, Acts of the 63rd Legislature,

Regular Session, 1973 (Article 6252-17a, Vernon's Texas Civil Statutes). APTRA, which governs practices and proceedings before state agencies, provides that persons must be given adequate notice and opportunity for hearing on any rule making or contested case. The open meetings law requires public notice of a meeting of a quorum of a governmental entity where public business or public policy is discussed or considered, or at which any formal action is taken. Unlike APTRA, the open meetings law does not provide persons a right to participate in the deliberations and actions of TGPC. Finally, the open records law provides, with some exceptions, that TGPC documents must be made reasonably available for public inspection and copying.

The PMP process will be an open process, since TGPC will be discussing, considering, and taking action upon the PMP, and since the open meetings law applies to TGPC. The ACS and its Task Forces, such as the PMP Task Force that developed a draft of the PMP, are not entities subject to the open meetings law. However, regular reports of the activities of ACS and its Task Forces are presented at the TGPC meetings.

Agency Specific Public Participation

Each agency has prepared text to identify what procedures are currently used to inform and involve the public, and have related how these procedures will be used to inform the public of important regulatory actions taken in the implementation of the PMP, and the vehicles that will be used to relay this information.

Texas Natural Resource Conservation Commission (TNRCC): TNRCC recognizes that public awareness and participation is vital to the successful development and implementation of both the generic and pesticide-specific plans. TNRCC, through its role as lead agency for TGPC, has tried to involve various interested parties in the development phase of the Generic PMP. TNRCC maintains a mailing list of all interested groups, organizations, and individuals to contact for meetings and to notify for other activities. The meetings are open to the public. Twenty-six entities including federal agencies and state agencies, grower groups, environmental groups, and the pesticide industry have provided comment on the components incorporated within this plan. Through this involvement and through public communication efforts such as hearings, seminars, newsletters, and publications, the public will be informed of the PMP and the relevant regulatory actions. In addition, EPA Region 6 staff will be informed by TNRCC of ACS meetings, PMP activities and other related information.

Texas Department of Agriculture (TDA): TDA will assist in activities designed to increase public awareness, participation, and provide outreach to pesticide users in the area of groundwater protection. These activities include but are not limited to: public hearings, newsletters, public notices, personal appearances and speaking engagements, and selective mailings. Activities in this area will be targeted to reach persons who traditionally utilize services offered by TDA or who are regulated by the agency. For pesticides, a license is required when distributing those chemicals classified as restricted-use (EPA Restricted Chemicals) and those chemicals identified by TDA for State-Limited-Use in Texas. The State-Limited-Use designation requires a hearings process and the public is involved in this process.

Texas Water Development Board (TWDB): TWDB will address public awareness by providing well owners with the results of chemical-quality analyses of water samples collected from their wells, and indicating on the analysis report any constituents that are in excess of primary and secondary

drinking water standards. This will be accomplished within two weeks of receipt of the analytical results from the contract laboratory. Reports and newspaper releases are routinely compiled to inform residents of the groundwater quality within an area and of any possible contaminants in the drinking water. The responsible regulatory agency is also notified in the event any pesticide contaminants are discovered.

Texas Department of Health (TDH): TDH recognizes that public awareness/education is the key to any endeavor which may affect the public health or environmental quality. Promotion of public awareness for professional and public groups will take place via training seminars and meetings conducted for municipalities, citizen groups, and professional business associations. Public hearings will be used as needed to convey regulatory information. Field personnel conduct public awareness activities daily via individual questions from the public and, if health advisories or toxicology information is available, it is provided. Should contamination take place, TDH will provide health advisory, toxicological, and environmental protection information to the public and local officials.

Texas State Soil and Water Conservation Board (TSSWCB): TSSWCB conducts regularly scheduled meetings which are open to the public and conducted in a manner consistent with the Open Meetings Act. TSSWCB has conducted joint public meetings with TNRCC to obtain public input into all phases of its nonpoint source management program. TSSWCB, as part of its nonpoint source management program, develops and implements educational programs primarily aimed at agricultural producers. However, a significant part of the program will or could be geared to informing the public in general about nonpoint source management in Texas.

Texas Alliance of Groundwater Districts (TAGD): Most TAGD Members and the local Groundwater Districts have very active public awareness programs. TAGD publishes newsletters; works with the local news media, affected cities, and counties; and addresses civic groups and other organizations to provide current information. The High Plains Underground Water Conservation District #1 (HPUWCD#1) has several programs designated to educate and inform the public on the proper application and storage of pesticides and serves as the primary entity for distributing water quality information to the public. HPUWCD#1 has used the radio and television media to inform and educate the people of the area in the hazards of groundwater contamination from improper handling of pesticides. Throughout the years, the HPUWCD#1 personnel have been available to present programs to civic organizations and professional meetings regarding groundwater quality. They have provided video cassettes and made available to the schools, educational materials concerning the need to protect the groundwater. TAGD have operated booths at local fairs and other exhibits which detail District activities and programs aimed at groundwater protection.

Texas Agricultural Extension Service (TAEX): TAEX conducts educational programs on water quality and conservation that include a significant public awareness component. Extension Specialist Faculty and County Extension Agents have produced numerous facts sheets, bulletins, videotapes, slide sets and newsletters that focus on: (1) proper management practices; (2) selection and use of pesticides to promote water quality protection; (3) water quality testing and interpretation; and (4) water treatment systems to remove specific pesticides. Educational events such as field days, meetings, displays and exhibits at malls, public buildings, county fairs and other events on pesticides and water quality protection have reached millions of Texas producers and residents. Radio tapes, videotapes, mass media releases and interviews, such as specialist news releases in the weekly TAEX press packet

(sent to several hundred in-state news programs and producers of magazines/journals) and a special news packet once or twice annually on nonpoint source water quality management are developed by Agricultural Communications. Satellite television capability is available for use in broadcasting nonpoint source water quality information.

SECTION XI INFORMATION DISSEMINATION

In the development and implementation of the PMP, it is necessary to disseminate information to various groups and individuals. These include a number of state agencies, agricultural groups, pesticide manufacturers and dealers, individual agricultural producers, and the general public. An initial educational process is necessary to the development of the PMP. This process primarily educates the agencies, groups, and individuals directly taking part in the development process, through communication and meetings of the Agricultural Chemicals Subcommittee (ACS), and meetings and work sessions of the Task Forces. The Educational Task Force (ETF) will specifically plan and coordinate these educational activities through participating agencies and other entities, which are either ancillary or fundamental to their everyday activities. During this early stage, some information is released to a wider audience through news releases and participant outreach publications. This initial outreach to disseminate information to the pesticide user is an important step leading to the future implementation of the PMP. Ultimately, it will be the pesticide users who will need the knowledge to apply pesticides while minimizing the risk of contaminating groundwater.

The level of education required for a specific area will vary according to regional groundwater vulnerability. Areas assessed to be highly vulnerable will require more focused education. Further, areas with documented pesticide groundwater contamination will be subject to preventive measures requiring an increased level of education. Vulnerable areas will be identified according to the *Geographic Planning* process described in Section V, and increasing levels of *Preventative Measures* will be prescribed according to the process described in Section VII. Accordingly, information on PMP activities will be conveyed to pesticide users in a tiered approach based on the vulnerability classification of an area. This will necessitate up to five education levels. Areas assessed as not vulnerable will receive a general education effort. The first will be carried out over the whole state. The other four will correspond to areas assessed as vulnerable areas, areas where a program of voluntary application of BMPs has been implemented, areas where a program of mandatory application of BMPs has been implemented, and pesticide cancellation areas.

General Education

The cooperating agencies and other entities will carry out a general educational effort statewide to describe the PMP process, and to engender a general awareness of the potential risks of groundwater pollution by pesticides. This information dissemination can be accomplished in a number of ways. An educational booth with displays, brochures, and staff with expertise to answer questions can be presented at selected agricultural industry trade association meetings. Information on the PMP process can be presented during the Laws and Regulations component of the training for pesticide applicators. Brochures can be distributed to agricultural industry trade associations and to TAEX County Extension Agents. Information on the most generally applicable pesticide application BMPs can be presented at Pesticide Applicator CEU training sessions. Also news releases describing the PMP process, BMPs, and the risks of groundwater contamination by pesticides can be prepared for agriculturally oriented news publications.

Education in Vulnerable Areas

Additional educational efforts will be implemented in any area identified by *Geographic Planning* (Section V), as being vulnerable to nonpoint source contamination of groundwater by specific pesticides. Public meetings will be held to inform the local pesticide users and agricultural producers of the PMP process in their area and to ask their cooperation in allowing their wells to be sampled. In urban areas information will be provided to civic organizations, home and garden shows, and residents through inserts in their utility bill posting. PMP and BMP information specific to the area will be identified and presented at CEU certification classes in the area. Agencies and other participating entities will cooperate to insure inclusion of PMP information in their local salesperson/growers meetings. Specifically TDA will work with registrants and dealers to ensure that the licensed applicators obtain a copy of the pesticide-specific PMP and become knowledgeable of the precautionary BMPs to prevent activities that may result in contamination of ground and surface waters.

Education for Voluntary BMP Programs

In a vulnerable area where monitoring has revealed nonpoint source contamination by a pesticide, a program promoting the voluntary application of BMPs will be put into place. At this time certain educational activities would be implemented in addition to those described previously. Direct contact with agricultural producers and other pesticide users would be made through workshops and field days. These workshops and field days may be scheduled and announced to all the pesticide applicators in the area. The workshops will provide a more comprehensive classroom instruction on suitable BMPs for the area. Field days will provide actual field demonstrations on the application of BMPs.

Education for Mandatory BMP Programs

If continued monitoring indicates no mitigation of contamination levels during the voluntary BMP program, a program requiring the mandatory application of BMPs will be put into place. The educational activities as described under **Education for Voluntary BMP Programs** will continue with the possible addition of instruction on modified or alternative BMPs. All agricultural producers will be informed that the BMPs are now mandatory for those who want to continue using the pesticide. Also, at this stage TDA may incorporate training on the mandatory BMP program, as a component of the required CEUs on laws and regulations to certify pesticide applicators operating in the affected area.

Cancellation of Pesticide

If it is determined that mandatory BMPs are not reducing pesticide levels in groundwater, the pesticide use will be banned in the local contaminated area. At this point it will be necessary to ensure that all the local pesticide users and agricultural producers are aware that the pesticide can no longer be used.

Involvement in Education by Various Entities

Various agencies and entities will be involved in varying degrees to disseminate information during educational activities and participate in the educational process. The extent of involvement will depend on the general function and purpose of the entity and the specific role the entity has in this process.

TAEX, whose purpose is outreach to the agriculture community, also plays a leading role as Chair of the Educational Task Force. Curriculum will be largely based on the experiences of their established network of county agents. TDA will be an important player in education because of its responsibilities in the labeling and application of pesticides and because of its responsibility in the certification of pesticide applicators. TNRCC will play a large part in education because of its role as lead agency in the PMP process. The other agencies and entities that are members of or participate in the ACS will become involved in information dissemination as PMP implementation activities may fall under their particular jurisdiction. TSSWCB has a significant role in technology transfer.

SECTION XII RECORDS AND REPORTING

State agencies are required to maintain certain records and submit reports pertaining to their regulatory responsibilities, and to make these records available subject to the Texas Open Records Act. Each agency participating in the development and implementation of both the generic Pesticide Management Plan and pesticide-specific Pesticide Management Plans will maintain all pertinent records of plan development and implementation for a period of at least six years (or as required by the final EPA rules).

PMP Records

Texas Natural Resource Conservation Commission (TNRCC) will maintain records for the Texas Groundwater Protection Committee and the Agricultural Chemicals Subcommittee of:

- vulnerability maps, irrespective which entity (such as TWDB or SSTF) produces these maps;
- data used in the production of vulnerability maps;
- educational materials developed by ETF;
- monitoring data inclusive of pesticide use surveys, well construction data, sampling data, and laboratory analysis data. (TWDB and TDA will also maintain any data gathered or generated by the respective agency);
- all laboratory analyses and preventative measures;
- correspondence, minutes of all TGPC, ACS, and task force meetings, Task Force reports, and other pertinent records required by the Open Records Act;
- details of adoption and implementation of the generic PMP and the pesticide-specific PMPs; and
- the Pesticides and Groundwater Database.

In addition, copies of records developed by the five task forces will also be kept by the chairpersons of the respective task forces (SSTF, ETF, DEITF, PMPTF, BMPTF).

TDA will maintain records of:

- label changes;
- any monitoring data and analysis reports; and
- any regulatory and administrative actions.

PMP Reports

The TNRCC, TDA, and other state agencies that utilize grant funds as a resource will provide:

- Progress reports to TGPC and ACS. However, records related to the development and implementation of both generic and pesticide-specific PMPs will be made available to EPA, if requested and subject to available time and resources.
- A report to EPA by TNRCC within two working days of any confirmed contamination that equals or exceeds an established MCL or HAL, according to the reporting requirements under the existing TNRCC/EPA programs for RCRA, CERCLA, and the CWA.

- A Biennial report will be used to evaluate whether pesticide-specific PMPs are effectively implemented. It should address any deficiencies identified during the implementation process and present possible corrective actions. The site-specific designated evaluation period for a given BMP program may not coincide with the biennial EPA reporting period and may extend beyond it. The need for an additional response will be considered at the time of preparing the Biennial Report. However, any possible action will be well scrutinized, since the designated evaluation period had already been scientifically determined as a reasonable minimum time period to ascertain the effectiveness of the BMP program. The Biennial Report will be reviewed by all participating member agencies of TGPC before being submitted to EPA.