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## **BMP Guidance Document**

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# ***BMP GUIDANCE DOCUMENT***

## **I. PURPOSE AND SCOPE OF DOCUMENT**

The Source Water Assessment and Protection Program was created by the 1996 Amendments to the Safe Drinking Water Act, and is the centerpiece of the Act's prevention focus. The program sets into motion a process by which local governments and suppliers of drinking water are encouraged to take proactive steps to protect local drinking water supplies before costly treatment enhancements are required.

As required by the Amendments, the Texas Commission on Environmental Quality (TCEQ) must complete a source water susceptibility assessment for each public water supply system. The assessment provides water systems with additional information regarding the susceptibility of their water supply(s) to 227 individual drinking water contaminants. Contaminants of concern include a wide range of regulated and unregulated water contaminants under the Safe Drinking Water Act, including those that may present a threat to public health such as viruses and bacteria.

Once the Assessment Report is reviewed by the public water supply, the next step is to determine what measures can be implemented to decrease contaminant susceptibility, thereby enhancing and protecting the system's source waters.

Best Management Practices (BMPs) include a broad range of measures targeted to remove or reduce contaminants from entering a water supply system. BMPs may be implemented as a prevention method, implemented at the source of potential contamination, or implemented within waterbodies once contamination has occurred. BMPs can be chosen based on a system's needs, concerns, and budgetary constraints.

The purpose of this document is to assist public water supplies (PWSs) in developing a Source Water Protection Program for their system by guiding through the BMP selection process and providing information on funding opportunities available to help implement the selected BMPs. This guidance document also includes an example Protection Plan and easily implemented BMPs to assist PWSs in starting a source water protection program.

## II. INCENTIVES TO BMP IMPLEMENTATION

Most people would agree that a vaccination to prevent illness is well worth the time, expense, and inconvenience. Similarly, local governments are using source water protection approaches to prevent drinking water supply contamination.

BMP implementation includes inherent benefits to the PWS and the customers they serve. The benefits of protecting source waters are best illustrated when compared to the costs of failing to protect these resources. It's not always possible for all benefits and costs to be measured in dollar terms. Easily quantifiable costs of source water contamination include the costs of treatment, remediation, establishing a new source of water, litigation against responsible parties, and conducting public information campaigns. Not included are such costs to individuals as lost wages, medical bills, reduced property values, and higher water bills.

Incentives to consider in implementing a Source Water Protection Program include:

- ◆ May improve Source Water Susceptibility Assessment results;
- ◆ May reduce monitoring requirements offered by TCEQ;
- ◆ May improve competitive standing in Texas Water Development Board (TWDB) Drinking Water State Revolving Fund (SRF) Intended Use Plan;
- ◆ Demonstrate proactive approach and build confidence in system by including program participation in annual Consumer Confidence Report;
- ◆ Avoid costs of complying with the disinfection byproducts rule;
- ◆ Maintain real estate values in areas served by protected water supplies;
- ◆ Minimize water-related health risks;
- ◆ Avoidance of increased treatment costs and increased capital investment for new treatment technology;
- ◆ Avoid costs of contaminated water supplies (including treatment costs, replacement costs, and damage costs); and,
- ◆ Increased aesthetic and recreational value.

The benefits of source water protection to communities are impressive. Many communities across the state have proven that source water protection is indeed a cost-effective approach to safeguarding their drinking water supplies. Factoring in all of the benefits, such a protection program will prove to be a true bargain.

### III. CHOOSING A BMP

The TCEQ SWAP program has assembled over 100 data sets of potential sources of contamination (PSOCs) from existing TCEQ databases such as the industrial hazardous waste, municipal solid waste, and wastewater permitting program areas; from source water protection inventories and PWS set-back inspections; and databases from other state and federal agencies. Each PSOC is associated with chemical or biological contaminants from the list of 227 drinking water contaminants. Contaminants were assigned to each PSOC based on site-specific information contained within agency documents or from information on contaminants historically associated with various types of activities or processes. Choosing a BMP begins with linking these contaminants and the PSOCs listed in the Assessment Report to an appropriate BMP to resolve the pollutant concern.

#### **Initial Steps in Choosing a BMP:**

**Step 1:** Determine the type and subtype of each PSOC in the Assessment Report and associate to the chemical constituents with that PSOC. The TCEQ website contains a document listing each PSOC type and subtype from the source water assessment and the contaminants associated with each: [http://www.tceq.te.gov/drinkingwater/SWAP/psoc\\_types.html](http://www.tceq.te.gov/drinkingwater/SWAP/psoc_types.html).

The document can be searched by PSOC type, subtype, or by contaminant. By completing this step, the high, medium, and low susceptibility ratings found in the Assessment Report can be linked to specific PSOCs; therefore, determining which PSOCs to prioritize to decrease the water supply's susceptibility.

**Step 2:** Table 1 lists the PSOC Type and Subtype from the Assessment Report and the type of BMP that addresses the associated pollutant. Use Table 1 to determine the appropriate BMP to choose in the next section in this guidance document.

**Step 3:** For each PSOC there may be multiple BMPs that can be implemented. Read the brief description associated with the BMP in the next section of this guidance document. If the BMP seems appropriate for your water system's needs, access the web links provided for additional information on that specific BMP.

**BMP GUIDANCE DOCUMENT**

TABLE 1: BEST MANAGEMENT PRACTICES FOR POTENTIAL SOURCES OF CONTAMINATION

<b>PSOC TYPE</b>	<b>Sub-type</b>	<b>Chemicals or Contaminants associated with...</b>	<b>BMP Type and/or Section in Guidance Document</b>
BUSINESS	Auto Parts Business (New, Used)	Automobiles	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users, Automobile Maintenance Business Section
	Auto Repair, Sales, Salvage, Towing	Automobiles	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users, Automobile Maintenance Business Section
	Cotton Gin	Cotton pesticides	Integrated Pest Management, Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Dry Cleaner	Dry cleaning	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Dry Cleaner, Small Quantity Chemical User Section
	Fertilizer Mfg, Sale, Application	Fertilizer	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Golf Course	Golf course fertilizer and pesticides	Pesticide/Fertilizer Management, Proper Composting, Proper Fueling, Proper Equipment Maintenance, Storm Water Control Measures, Other Businesses Section
	Grain Elevator	Grain preservation pesticides	Stormwater Control, Integrated Pest Management, Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Inorganic Chemical Industry	Inorganic chemical industry	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Metal Plating Business	Metal plating	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users
	Nuclear Power Plant	Nuclear power generation	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Organic Chemical Industry	Organic chemical industry	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Paint Shop	Paint	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users, Other Businesses Section
	Pesticide Mfg, Sale, Application	Pesticides	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Pesticide, Fertilizer Mfg, Sale, Application	Pesticides and fertilizer	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention

**BMP GUIDANCE DOCUMENT**

TABLE 1 (CONT'D)

<b>PSOC TYPE</b>	<b>Sub-type</b>	<b>Chemicals or Contaminants associated with...</b>	<b>BMP Type and/or Section in Guidance Document</b>
BUSINESS	Petroleum Chemical Industry	The petroleum chemical industry	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Petroleum Storage Tank	Petroleum products	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Stormwater Control Measures
	Photo Process Business	Photographic chemicals	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users, Other Businesses Section
	Plastic Mfg, Sale	Plastic chemical industry	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Pulp or Paper Mill	Pulp chemical industry	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Radiochemical Site	Radiochemicals	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Tire Sales, Repair Business	Tires, specifically lead tire weights,	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users Section
	New or Used Oil Site	Automobile oil and waste oil	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Stormwater Control Measures
	Wood Preserving	Wood preservation	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Other Businesses
	Battery Mfg., Sales	All type of batteries	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users
	Boat Storage	Boat fuels and batteries	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users Section
	Oil and Gas Production Tanks	Petroleum products	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Stormwater Control Measures
	Fireworks Business (Mfg or Retail)	Fireworks	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Military Armory	Automobiles	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention



**BMP GUIDANCE DOCUMENT**

TABLE 1 (CONT'D)

<b>PSOC TYPE</b>	<b>Sub-type</b>	<b>Chemicals or Contaminants associated with...</b>	<b>BMP Type and/or Section in Guidance Document</b>
BUSINESS	Sugar Refining	Sugar refining	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
CEMETERY	Cemetery	Chemicals associated with cemeteries	Pesticide/Fertilizer Management, Storm Water Control Measures
CHEMICAL PIPELINE	Pipeline	Pipeline products	Spill Response and Prevention, Proper Hazardous Materials Storage
	Crude Oil	Pipeline products	Spill Response and Prevention, Proper Hazardous Materials Storage
	Highly Volatile Liquids	Pipeline products	Spill Response and Prevention, Proper Hazardous Materials Storage
	Natural Gas Liquids	Pipeline products	Spill Response and Prevention, Proper Hazardous Materials Storage
	Product – Gasoline, Diesel, Jet Fuel	Pipeline products	Spill Response and Prevention, Proper Hazardous Materials Storage
	Natural Gas	Pipeline products	Spill Response and Prevention, Proper Hazardous Materials Storage
	Petroleum Pump Station	Petroleum products	Spill Response and Prevention, Proper Hazardous Materials Storage
	CHEMICAL STORAGE	Chemical Storage	Site specific
Drum, Small Containers, Bags		Site specific	Spill Response and Prevention, Proper Hazardous Materials Storage
Chemical Mixing Site		Site specific	Spill Response and Prevention, Proper Hazardous Materials Storage
Transformer		PCBs	Spill Response and Prevention, Proper Hazardous Materials Storage
CLASS I INJECTION WELL	Class 1 Injection Well	Site specific	Practices for Injection Wells Section
CLASS II INJECTION WELL	Class 2 Injection Well	Salt water brines and petroleum wastes	Practices for Injection Wells Section
CLASS III INJECTION WELL	Class 3 Injection Well	Site specific	Practices for Injection Wells Section
	Brine	Injected chemicals into a potable aquifer and extract the brine (salt) fluids through other wells	Practices for Injection Wells Section
	Sodium Sulphate	Injected chemicals into a potable aquifer and extract the sodium sulphate-bearing fluids through other wells	Practices for Injection Wells Section

**BMP GUIDANCE DOCUMENT**

TABLE 1 (CONT'D)

<b>PSOC TYPE</b>	<b>Sub-type</b>	<b>Chemicals or Contaminants associated with...</b>	<b>BMP Type and/or Section in Guidance Document</b>
CLASS III INJECTION WELL	Sulfur	Injected chemicals into a potable aquifer and extract the sulfur-bearing fluids through other wells	Practices for Injection Wells Section
	Uranium	Uranium, radionuclides, and oxidized metals such as molybdenum, arsenic, sulphate, etc.	Practices for Injection Wells Section
CLASS IV INJECTION WELL	Class 4 Injection Well	Site specific	Practices for Injection Wells Section
CLASS V INJECTION WELL	Class 5 Injection Well	Site specific	Practices for Injection Wells Section
	Untreated Sewage	Site specific	Practices for Injection Wells Section
	Agricultural Drainage	Site specific	Practices for Injection Wells Section
	Cesspool	Site specific	Practices for Injection Wells Section
	Storm Drainage	Site specific	Practices for Injection Wells Section
	Septic Undifferentiated	Site specific	Practices for Injection Wells Section
	Septic Drainfield	Site specific	Practices for Injection Wells Section
	Trash Burning Well	Site specific	Practices for Injection Wells Section
	Auto Repair Floor Drain	Site specific	Practices for Injection Wells Section
GUN RANGE	Gun Range	Metals from bullets, such as lead, copper, antimony	Gun Ranges Section
	Public or Private	Metals from bullets, such as lead, copper, antimony	Gun Ranges Section
	Military	Metals from bullets, such as lead, copper, antimony	Gun Ranges Section
NATURAL RESOURCE PRODUCTION	Natural Resource Production	Site specific	Contact TCEQ for assistance
	Mineral Exploration Hole: Abandoned	Site specific	Contact TCEQ for assistance
	Oil or Gas Well – Abandoned	Petroleum production	Pollution Prevention, Proper Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Oil or Gas Well Abandoned Section
	Oil or Gas Well – Plugged	Petroleum production	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention

**BMP GUIDANCE DOCUMENT**

TABLE 1 (CONT'D)

<b>PSOC TYPE</b>	<b>Sub-type</b>	<b>Chemicals or Contaminants associated with...</b>	<b>BMP Type and/or Section in Guidance Document</b>
NATURAL RESOURCE PRODUCTION	Oil or Gas Well – Production	Petroleum production	Pollution Prevention, Proper Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Oil or Gas Well Production Section
	Oil or Gas Well – Underground Storage	Petroleum production	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Water Well	Site specific	Pollution Prevention, Proper Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Water Well Active Section
	Water Well: Abandoned	Site specific	Pollution Prevention, Proper Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Water Well Abandoned Section
	Mined Land: Active or Abandoned	Mining processes, mineral, rocks, and their weathering products	Pollution Prevention, Proper Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Mined Land Section
	Service\Observation Wells Oil and Gas Operations	No listing in TCEQ PSOC database	Contact TCEQ for assistance
	Oil and Gas Dry Exploration Hole	No listing in TCEQ PSOC database	Contact TCEQ for assistance
WASTEWATER	Wastewater	Contaminants are associated with wastewater	Contact TCEQ for assistance
	Holding Pond	Contaminants are associated with wastewater	Contact TCEQ for assistance
	Holding Tank	Contaminants are associated with wastewater	Contact TCEQ for assistance
	Industrial Wastewater Outfall	Chemicals associated with this type of wastewater discharge are related to industrial and microbiological contaminants	Contact TCEQ for assistance
WASTEWATER	Land Application Sludge	Chemicals associated with this type of site are municipal and microbiological contaminants	Contact TCEQ for assistance
	Liftstation	Contaminants are associated with wastewater	Contact TCEQ for assistance
	Pipeline	Contaminants are associated with wastewater	Contact TCEQ for assistance

**BMP GUIDANCE DOCUMENT**

TABLE 1 (CONT'D)

<b>PSOC TYPE</b>	<b>Sub-type</b>	<b>Chemicals or Contaminants associated with...</b>	<b>BMP Type and/or Section in Guidance Document</b>
WASTEWATER	Septic System	Contaminants are associated with wastewater	Contact TCEQ for assistance
	Municipal Wastewater Outfall	Chemicals associated with this type of wastewater discharge are related to municipal and microbiological contaminants	Contact TCEQ for assistance
	Treatment Plant	Contaminants are associated with wastewater	Contact TCEQ for assistance
	Agricultural Wastewater Outfall	Chemicals associated with this type of wastewater discharge are related to agricultural and microbiological contaminants	Contact TCEQ for assistance
	Private Wastewater Outfall	Chemicals associated with this type of wastewater discharge are related to microbiological contaminants	Contact TCEQ for assistance
	Cesspool	Contaminants are associated with wastewater	Contact TCEQ for assistance
TRANSPORTATION	Transportation	Site specific	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Airport	Airplanes	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Airports Section
	Boat Ramp	Boat motor fuels	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users
	Heliport	Airplanes	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Highway	No description in TCEQ PSOC database	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention
	Landing Strip	Airplane fuels	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Chemical Aircraft Deicing, Airports Section

**BMP GUIDANCE DOCUMENT**

TABLE 1 (CONT'D)

<b>PSOC TYPE</b>	<b>Sub-type</b>	<b>Chemicals or Contaminants associated with...</b>	<b>BMP Type and/or Section in Guidance Document</b>
TRANSPORTATION	Marina	Boat motor fuels	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Small Quantity Chemical Users
	Military Air Base	Airplanes	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Airports Section
	Railroad	No description in TCEQ PSOC database	Pollution Prevention Plan, Hazardous Materials Storage, Materials Management, Spill Response and Prevention, Railroads Section
WASTE	Waste	Site specific	Contact TCEQ for assistance
	Corrective Action Site – TCEQ	Site specific	Contact TCEQ for assistance
	Domestic Trash or Burn Pile	Contaminants are associated with household trash, equivalent to a landfill	Contact TCEQ for assistance
	Industrial Hazardous Waste TSD	Site specific	Contact TCEQ for assistance
	Municipal Solid Waste – Abandoned, TCEQ	Chemicals associated with these facilities are related to landfills	Contact TCEQ for assistance
	Municipal Solid Waste – Active, TCEQ	Chemicals associated with these facilities are related to landfills	Contact TCEQ for assistance
	Perchlorate Site	Contaminants are limited to the perchlorate anion (ClO <sub>4</sub> <sup>-</sup> )	Contact TCEQ for assistance
	Site Discovery – TCEQ	Site specific	Contact TCEQ for assistance
	Superfund Site – Tceq	Site specific	Contact TCEQ for assistance
	Toxic Release Inventory – TCEQ	Site specific	Contact TCEQ for assistance
	Transfer Station	Contaminants are associated with landfill waste	Contact TCEQ for assistance
	Voluntary Cleanup – TCEQ	Site specific	Contact TCEQ for assistance
	Waste Registration – TCEQ	Site specific	Contact TCEQ for assistance
	Oilfield Sludge Disposal	Contaminants are associated with petroleum	Contact TCEQ for assistance
	Recycling Facility	Contaminants are site-specific	Contact TCEQ for assistance

**BMP GUIDANCE DOCUMENT**

TABLE 1 (CONT'D)

<b>PSOC TYPE</b>	<b>Sub-type</b>	<b>Chemicals or Contaminants associated with...</b>	<b>BMP Type and/or Section in Guidance Document</b>
WASTE	Cattle Dipping Vat	Contaminants are associated with pesticides	Contact TCEQ for assistance
	Livestock or Animal Pens	Contaminants are associated with animal waste	Contact TCEQ for assistance
	Groundwater Contamination Site	Contaminants are site-specific	Contact TCEQ for assistance
	Salt Water Disposal Pit	Contaminants are associated with petroleum brine production	Contact TCEQ for assistance
	Innocent Operator Program – TCEQ		Contact TCEQ for assistance
	Brownfields Sites – TCEQ		Contact TCEQ for assistance
ANIMAL FEEDING OPERATION	Animal Feeding Operation, Not Specific	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Poultry	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Poultry: Chicken	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Poultry: Chicken, Breeder	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Poultry: Chicken, Broiler	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Poultry: Chicken, Layer (Egg)	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Poultry: Chicken, Pullet	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Poultry: Turkey	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Beef	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Beef: Cattle	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Beef: Dairy	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Goat	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Sheep	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Sheep: Lamb	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management
	Swine	No listing in TCEQ PSOC database	Storm Water Control Measures, Pesticide and Fertilizer Management

## IV. TYPES OF BMPS

BMPs include strategies, structural controls, public outreach, regulations, and many other choices. The information included in this section describes the various types of BMPs based on PSOC, contaminant concern, or land use. There are multiple choices available to suit your system's needs. Read the description of the BMP to determine if this type of BMP would best suit your area, needs, and preferences. Access the web links to find more information on the BMP.

### A. EDUCATION AND OUTREACH

The Environmental Protection Agency (EPA) has developed a number of documents to guide in the public outreach process. Please see <http://water.epa.gov/type/watersheds/links.cfm#outreach> for documents such as "Getting in Step: A Guide for Conducting Watershed Outreach Campaigns."

#### 1. *Used Oil Recycling Program*

Texas law prohibits dumping used oil on land or into sewers or waterways. This includes the use of used oil as a dust suppressant. Texas has also banned used oil filters from being placed in or accepted for disposal in a landfill.

TCEQ currently administers a Used Oil Recycling Program. The goals of the program are to:

- ◆ Increase participation of public and private sector organizations and companies as used oil collection centers
- ◆ Increase collection of used oil by collection centers
- ◆ Increase recycling by increasing the number of collection centers
- ◆ Provide education and technical guidance to the regulated community and the public

Call 1-800-CLEANUP or visit <http://www.earth911.org> to locate a used oil collection center. Visit EPA's Used Oil Management Program at <http://www.epa.gov/wastes/consERVE/materials/usedoil> for free educational materials. Grants may be available for this program (for further information see [http://www.tceq.texas.gov/permitting/waste\\_permits/waste\\_planning/wp\\_grants.html#gen\\_info](http://www.tceq.texas.gov/permitting/waste_permits/waste_planning/wp_grants.html#gen_info)).

For further information refer to...

- ◆ "Used Oil Recycling Program." TCEQ (accessed June 2006). [http://www.tceq.texas.gov/permitting/registration/used\\_oil/recycling.html](http://www.tceq.texas.gov/permitting/registration/used_oil/recycling.html)
- ◆ "Menu of BMPs: Developing a Used Oil Recycling Program." U.S. EPA, July 2001. [http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=108](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=108)

## **2. *Illegal Dumping Control***

Illegal dumping control primarily involves public education to inform the public of the stormwater and related consequences. Additional illegal dumping controls may involve clean-up, enforcement, and tracking and evaluation of illegal dumping sites.

### **Types:**

- ◆ Clean-up
- ◆ Community Outreach & Involvement
- ◆ Enforcement
- ◆ Tracking and Evaluation
- ◆ Monitor Dumping Sites
- ◆ Storm Drain Stenciling/Marking

**Cost:** The cost of illegal dumping control varies depending on the approach. Costs can be minimized by involving the public in prevention, reporting, and clean-up.

For further information refer to...

- ◆ “Pollution Prevention Fact Sheets: Illegal Dumping Control.” The Stormwater Manager’s Resource Center. [http://www.stormwatercenter.net/Pollution\\_Prevention\\_Factsheets/IllegalDumpingControl.htm](http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/IllegalDumpingControl.htm)
- ◆ “Menu of BMPs: Illegal Dumping Control.” U.S. EPA, July 2001. [http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=31](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=31)
- ◆ Texas Illegal Dumping Resource Center. <http://www.tidrc.com/index.htm>

## **3. *Preventing On-Site Wastewater Treatment Failure***

The foremost source of surface water and groundwater contamination in the United States is effluent from cesspools, privies, and improperly functioning septic systems. Government regulations ensure that septic systems conform to certain standards, and a reputable contractor can make sure the system is installed properly. However, homeowners have a major influence on how well the septic system works. Preventing on-site wastewater treatment failure includes public education regarding maintenance, proper use, and registration. Additionally, there are a number of methods that may be implemented in order to prevent and correct failing systems:

- ◆ For PWSs that have jurisdictional authority, pass and enforce septic system maintenance ordinances. Ensure that homeowners obtain and renew a septic system maintenance certificate.
- ◆ If homeowners fail to comply, consider shutting off the water supply to homes with septic systems that are grossly failing.



***BMP GUIDANCE DOCUMENT***

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- ◆ Implement a septic system tracking program which requires the registration of all systems and encourages inspection and pumping of these systems.
- ◆ Implement a municipal septic system program in which the homeowners pay an annual fee for the municipality to assume responsibility for the maintenance and repair of septic systems.
- ◆ Educate homeowners regarding the importance of proper operation and maintenance of their septic systems (free homeowner's brochures are available at [http://www.epa.gov/owm/septic/homeowner\\_guide.pdf](http://www.epa.gov/owm/septic/homeowner_guide.pdf)).
- ◆ Develop guidelines for installing new septic systems: These guidelines will help ensure that all new systems are properly designed and sited.
- ◆ Utilize field screening in order to find areas that require further investigation to identify failing systems. Examples of field screening techniques are the brightener test (utilizes phosphorous based elements to identify failing systems) and color infrared aerial photography (utilizes variations in vegetative growth or stress patterns to identify failing systems).

EPA has developed The Wastewater Information System Tool (TWIST) as an off-the-shelf, user-friendly management tool that allows PWSs and authorities to effectively inventory and manage on-site wastewater treatment systems. TWIST is designed to track information related to homes and facilities served, permits, site evaluations, types of systems, inspections, and complaints. The system can be queried, create reports, and has mapping applications.

TWIST can answer questions such as:

- ◆ How many systems near drinking water sources have not been maintained?
- ◆ Are there systems older than 35 years sited less than 50 feet from the lake shore?
- ◆ Which systems require inspection within the next year?
- ◆ How many systems of similar types have malfunctioned over the last three years?

A free CD ROM of TWIST is available by calling 1-800-490-9198 or 513-489-8190, or sending a written request to:

USEPA/NSCEP  
P.O. Box 42419M  
Cincinnati, Ohio

Fax: 301-604-3408  
E-mail: [nscep@bps-limit.com](mailto:nscep@bps-limit.com)

See

<http://water.epa.gov/infrastructure/septic/The-Wastewater-Information-System-Tool-TWIST.cfm>

for more information.

**Cost:** ~~The cost for local government BMPs varies depending upon the BMP chosen and the number of septic systems served.~~ According to the EPA, the estimated cost for a

dye test to test for grossly failing systems was \$290 and the estimated cost for visual inspection was \$95 (1996 dollars).

For further information refer to...

- ◆ “Source Protection: A National Guidance Manual Surface Water Supplies.” New England Interstate Water Pollution Control Commission, p. 60–61, 2000.  
<http://www.neiwpcc.org/spmanual.asp> (ordering information only)
- ◆ “Pollution Prevention Fact Sheets: Septic System Controls.” The Stormwater Manager’s Resource Center. [http://www.stormwatercenter.net/Pollution\\_Prevention\\_Factsheets/SepticSystemControls.htm](http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/SepticSystemControls.htm)
- ◆ “Menu of BMPs: Preventing Septic System Failure.” U.S. EPA, July 2001.  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=25>
- ◆ “Septic Systems Home.” U.S. EPA. <http://water.epa.gov/infrastructure/septic>

#### **4. Preventing Pollutants from Boating Activities**

Maintaining, storing and operating boats can contaminate waterways in a variety of ways. Pollutants from recreational activities enter the water from a variety of sources including sewage from recreational boats and chemicals from boat maintenance. Litter, sewage, dust from hull maintenance, solvents from engine repair, and paint chips can all be released directly into the water. The most serious pollutant potential is direct leakage of fuel into the water body. The vast majority of watercraft engines are of the two-stroke type—an inefficient engine known to pass an average of 25% to 30% of its raw fuel directly into the water. There is also a significant spill risk associated with fueling stations at or near marinas.

The following actions can be taken to reduce pollutants from boating activities:

- ◆ Boater education
- ◆ Enforcement of rules and regulations
- ◆ Signage
- ◆ Designated fish cleaning/disposal areas
- ◆ For recreational boat sewage:
  - ◇ Pump out stations
  - ◇ No-discharge area designations
- ◆ For boat maintenance chemicals:
  - ◇ Mooring management areas
  - ◇ Limits on boat docks/moorings
  - ◇ Vegetative erosion control on shoreline

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***BMP GUIDANCE DOCUMENT***

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- ◇ Fueling stations with spill containment equipment
- ◇ Catch basins at boat launches
- ◇ Encourage high pressure spray washers (not detergents)
- ◇ Require boat maintenance to take place out of the water

**Cost:** The cost of preventing pollutants generated by recreation varies depending on the method chosen. For example, workshops can cost as little as \$15 (1992 dollars) per facility but they generally have low attendance. Distributing literature costs approximately \$53 (1992 dollars) per marina for display racks or \$45 (1992 dollars) per marina for monthly mailers. Posting signs costs about \$105 (1992 dollars). Annual maintenance costs for pump-out systems range from \$36 to \$200 (2001 dollars).

For further information refer to...

- ◆ “Source Protection: A National Guidance Manual Surface Water Supplies.” New England Interstate Water Pollution Control Commission, p. 73–75, 2000.  
<http://www.neiwpcc.org/spmanual.asp> (ordering information only)
- ◆ “Menu of BMPs: Sewage from Recreational Activities.” U.S. EPA, July 2001.  
[http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=27](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=27)
- ◆ “Environmental Best Management Practices for Small Businesses: Marinas.” Small Business Environmental.  
[http://www.smallbiz-enviroweb.org/Industry/bmpfiles/BMP\\_Marina-8.pdf](http://www.smallbiz-enviroweb.org/Industry/bmpfiles/BMP_Marina-8.pdf)
- ◆ “Marina’s Chapter Factsheet.” U.S. EPA.  
<http://water.epa.gov/polwaste/nps/czara/marina.cfm>
- ◆ “Best Management Practices (BMPs) for Marinas and Small Boatyards in British Columbia.” Environment Canada, August 1995. <http://research.rem.sfu.ca/frap/9516.pdf>

## **5. Community Hotlines**

Community hotlines encourage citizens to help prevent and correct illegal pollution activities by providing a telephone number or e-mail address for reporting illegal activities that may impact water quality. The EPA, in partnership with some states and the private sector, has developed an environmental information line. The Lower Colorado River Authority has developed a hotline to report illegal dumping, 1-877-NO-DUMPS. TCEQ also has a number of hotlines for reporting:

- ◆ 1-888-777-3186 receives environmental complaints
- ◆ 1-877-901-0700 receives reports on internal fraud, waste or abuse
- ◆ 1-800-453-7664 receives reports on smoking vehicles
- ◆ 1-800-832-8224 receives reports on spills and illegal discharges to the environment

**Design Considerations:**

- ◆ Frequency of Complaints
- ◆ Anticipated Construction
- ◆ New Regulations

**Cost:** The costs associated with developing a community hotline can be estimated by comparing the cost of training staff to hiring a professional hotline service.

For further information refer to...

- ◆ “Menu of BMPs: Community Hotlines.” U.S. EPA, July 2001.  
[http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=24](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=24)

**6. Volunteer Stormwater Activities/Programs**

Volunteer stormwater activities and programs utilize community volunteers to help prevent stormwater pollution. A public water supply may develop any number of various programs to promote a clean water supply. These programs include:

- ◆ **Adopt-a-Stream Programs:** Groups or organizations adopt a water body for which they are responsible for studying, cleaning-up, monitoring, protecting, and restoring. For further information see the EPA website at:
  - ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=20>
- ◆ **Reforestation Programs:** Areas are identified for reforestation and then groups, organizations and individuals partake in growing and planting trees. For further information see the EPA website at:
  - ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=18>
- ◆ **Storm Drain Marking:** Storm drain marking is a program in which storm drains are labeled to discourage dumping and illegal disposal. For further information see the EPA website at:
  - ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=15>
- ◆ **Stream Clean-up and Monitoring:** Stream cleanup and monitoring events involve teams of individuals who collect trash around a water body and may even record data about the debris that is collected. For further information see the EPA website at:
  - ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=16>
- ◆ **Volunteer Monitoring:** Volunteer monitoring programs recruit small groups to collect data from a water body. They may also be involved in collecting trash and restoring habitats. Texas Watch, the state’s volunteer monitoring program, is involved in monitoring streams throughout Texas. They have education

materials, curriculum, and an abundance of information regarding recruitment, training, and data. For further information on Texas Watch and information from EPA, see the following websites:

◇ <http://txstreamteam.meadowscenter.txstate.edu/>

◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=17>

- ◆ **Wetland Plantings:** After obtaining a permit from the U.S. Army Corps of Engineers, determining a site's history, and selecting plants, a group may begin restoring a wetland by planting diverse native vegetation. For further information see the EPA website at:

◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=19>

**Cost:** The cost of volunteer stormwater activities and programs varies depending on the program selected and the manner in which the program is implemented. The costs are largely minimized due to the volunteer nature of the programs.

For further information refer to...

- ◆ “Menu of BMPs: Stormwater-Related Activities.” U.S. EPA, July 2001.  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse>

## **B. PRACTICES FOR HOMEOWNERS**

Educating homeowners in pollution prevention can be an effective tool by creating stewardship and awareness within the source water area. The following EPA brochure provides general educational information to homeowners regarding stormwater pollution prevention: [http://www.epa.gov/npdes/pubs/solution\\_to\\_pollution.pdf](http://www.epa.gov/npdes/pubs/solution_to_pollution.pdf). A public water supply may choose to implement educational programs in a number of areas as described below.

### **1. Proper Management of On-Site Wastewater Treatment Systems**

Proper maintenance of septic systems is essential to prevent pollution of ground and surface water. Many prevention methods involve interacting with homeowners to ensure maintenance activities are appropriately targeted and scheduled within design specifications of the system. Please see the section entitled “Preventing On-Site Wastewater Treatment Failure” in the Education and Outreach section of this document for further information regarding interacting with homeowners.

### **2. Effective Site Design, Landscape Planning, and Lawn Care**

Effective site design, landscape planning, and lawn care minimize stormwater contamination, increase infiltration thereby reducing runoff quantity, filter water through plant uptake, and reduce soil erosion. Educational information is available at:

- ◆ <http://www.cabmphandbooks.com/Documents/Development/SD-10.pdf>
- ◆ [http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=97](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=97)
- ◆ <http://www.tceq.texas.gov/assets/public/assistance/sblga/cswp3inst.pdf>

### **3. Pesticide and Fertilizer Management**

Pesticide and fertilizer management reduces or eliminates contamination entering urban runoff and groundwater. This protects the health of aquatic organisms and reduces the threat to human health. Educational information is available at:

- ◆ <http://www.tceq.texas.gov/assets/public/assistance/sblga/cswp3inst.pdf>
- ◆ [http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=97](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=97)

### **4. Pet Waste Management**

Pet waste management includes education and enforcement to encourage proper disposal of pet waste. Education often includes signage, mailings, and commercials. Example brochures can be found at:

- ◆ [http://www.co.thurston.wa.us/health/ehrp/pdf/pet\\_waste\\_bro.pdf](http://www.co.thurston.wa.us/health/ehrp/pdf/pet_waste_bro.pdf)
- ◆ [http://adem.alabama.gov/moreInfo/pubs/CWP\\_Pet.pdf](http://adem.alabama.gov/moreInfo/pubs/CWP_Pet.pdf)

Further information regarding pet waste management can be found at:

- ◆ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=4>
- ◆ [http://www.stormwatercenter.net/Pollution\\_Prevention\\_Factsheets/AnimalWasteCollection.htm](http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/AnimalWasteCollection.htm)

### **5. Proper Disposal of Household Hazardous Wastes**

Proper disposal of household hazardous wastes reduce pollutants from entering stormwater. Education, hazardous waste disposal programs, and recycling centers are effective management measures. TCEQ has developed a household hazardous waste (HHW) management program to assist citizens and municipalities in the following areas:

- ◆ Educational Information
- ◆ Regulatory Information
- ◆ Technical Assistance for Setting up a HHW Collection Program
- ◆ General HHW Information

Please see the following websites for general information regarding creating a management program, and the benefits of proper disposal:

- ◆ <http://www.tceq.texas.gov/p2/hhw/hhw.html>
- ◆ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=3>

The major steps in organizing a household hazardous waste collection event include:

- ◆ Advance Planning
- ◆ Selecting a Date and Location
- ◆ Public Education and Publicity
- ◆ Funding
- ◆ Hiring a Licensed Hazardous Waste Management Firm

Please see <http://www.tceq.texas.gov/p2/hhw/howto.html> for more information regarding organizing an event in your area.

Grants are available for developing household hazardous waste collection programs through Texas Councils of Governments (COGs). Please see [http://www.txregionalcouncil.org/display.php?page=regions\\_map.php](http://www.txregionalcouncil.org/display.php?page=regions_map.php) for information regarding your region's COG.

Educational information regarding alternatives to household chemicals can be found at: <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=104>

## **6. Proper Residential Car Washing**

Residential car washing contributes nutrients, metals, hydrocarbons and other pollutants to the storm drain system. Encouraging proper residential car washing includes education and car wash kits. Further information can be found at:

- ◆ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=96>
- ◆ [http://www.stormwatercenter.net/Pollution\\_Prevention\\_Factsheets/CarWashing.htm](http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/CarWashing.htm)

## **7. Water Conservation**

Encouraging water conservation plays a key role in managing water. Although water conservation is beyond the scope of this document, below are some helpful tips and information.

A water conservation template brochure can be found at:

- ◆ [http://www.epa.gov/Region8/env\\_ed/eforce/gw/brochure.pdf](http://www.epa.gov/Region8/env_ed/eforce/gw/brochure.pdf)

A homeowner friendly website with water saving tips can be found at:

- ◆ <http://www.h2ouse.org>

Further information regarding homeowner education on water conservation can be found at:

- ◆ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=2>
- ◆ <http://www.awwa.org/resources-tools/water-knowledge/water-conservation.aspx>

### **C. STORMWATER CONTROL**

Stormwater pollution is a source water concern due to the increased volume and rate of runoff from impervious surfaces, and the concentration of pollutants in the runoff. Both of these components are directly related to development in urban and urbanizing areas. Together, these components cause changes in hydrology and water quality that result in a variety of problems, including habitat modification and loss, increased flooding, decreased aquatic biological diversity, and increased sedimentation and erosion. EPA recommends an approach that integrates the control of stormwater peak flows and the protection of natural channels to sustain the physical and chemical properties of aquatic habitat. Additionally, stormwater runoff pollution can be reduced by properly utilizing urban design, stormwater treatment, residential maintenance, and education.

For more information see

- ◆ <http://www.tceq.texas.gov/assets/public/permitting/assess/401cert/attachment1.pdf>
- ◆ [http://www.epa.gov/smartgrowth/pdf/sg\\_stormwater\\_BMP.pdf](http://www.epa.gov/smartgrowth/pdf/sg_stormwater_BMP.pdf)
- ◆ <http://www.env.gov.bc.ca/wat/wq/bmps/npsaction.html#3>

Public water supplies seeking to implement stormwater control BMPs may be eligible for EPA 319 Grant Funding. Contact EPA Headquarters for further information. The “Funding Sources” section of this document provides additional information and contacts for this and other grants.

#### **1. Infiltration BMPs**

Infiltration BMPs seek to decrease the quantity of stormwater runoff by allowing the water to percolate through the ground and to increase the quality of the runoff by filtering the water. There are a number of distinct infiltration BMPs that may be chosen.

#### **Types:**



- ◆ **Vegetated/Grassy Swales:** Grassy swales are shallow, vegetated channels that convey stormwater runoff in order to remove pollutants by sedimentation and infiltration. Further information can be found at:
  - ◇ <http://www.cabmphandbooks.com/Documents/Development/TC-30.pdf>
  - ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=75>
- ◆ **Infiltration Trenches:** Infiltration trenches are long and narrow trenches filled with stones that receive stormwater runoff. They usually require pre-treatment that will remove the large grain size sediment in order to prevent clogging of the voids. Further information can be found at:
  - ◇ <http://www.cabmphandbooks.com/Documents/Development/TC-10.pdf>
  - ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=70>
- ◆ **Infiltration Basins and trenches:** Infiltration basins filter stormwater runoff using natural rock and soil material. Infiltration trenches utilize the soil material to filter the stormwater. Further information can be found at:
  - ◇ <http://www.cabmphandbooks.com/Documents/Development/TC-11.pdf>
  - ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=69>
- ◆ **Porous Pavement:** Porous pavement is a permeable surface with a stone reservoir underneath to allow for storage before infiltration. Further information can be found at:
  - ◇ [http://www.stormwatercenter.net/Assorted Fact Sheets/Tool6\\_Stormwater\\_Practices/Infiltration Practice/Porous Pavement.htm](http://www.stormwatercenter.net/Assorted Fact Sheets/Tool6_Stormwater_Practices/Infiltration Practice/Porous Pavement.htm)

## **2. Filtration BMPs**

Filtration BMPs primarily seek to increase the quality of runoff by filtering the water. There are numerous filtration BMPs that may be chosen.

### **Types:**

- ◆ **Bioretention:** Bioretention is the practice of removing stormwater pollutants through a variety of physical, biological, and chemical treatment processes involved in soil and plant-based filtration. The process usually consists of a grass buffer strip, sand bed, ponding area, organic or mulch layer, planting soil, and plants. Further information can be found at:
  - ◇ <http://www.cabmphandbooks.com/Documents/Development/TC-32.pdf>
  - ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=72>
- ◆ **Vegetated/Grassed Buffer/Filter Strips:** Grassed buffer strips are densely vegetated areas of land that treat sheet flow before flowing into a surface water

body. They serve to decrease the velocity of the runoff, hold soils in place, allow some infiltration, and filter by vegetation. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Development/TC-31.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=50>

- ◆ **Media Filters:** Media filters usually consist of a settling chamber and a sand (or other media) filtration chamber designed to treat stormwater runoff. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Development/TC-40.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=73>

- ◆ **Catch Basin Inserts:** Catch basin inserts are socks, boxes, or trays that are placed inside a storm drain inlet in order to filter sediment and debris. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Development/MP-52.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=77>

### **3. Retention/Detention**

Retention/detention ponds retain water in order to decrease the quantity and increase the quality of runoff. A number of distinct retention/detention BMPs may be chosen.

#### **Types:**

- ◆ **Stormwater/Wet Basins/Ponds:** Wet ponds are permanent pools of water which have capacity to accommodate stormwater runoff. Generally they also include an area of vegetation around the pond to provide removal of dissolved solids. They can be distinguished from wetlands because they are generally deeper and have less vegetative cover. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Development/TC-20.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=68>

- ◆ **Constructed Wetlands:** Constructed wetlands are permanent pools of water designed to treat runoff. They can be distinguished from wet ponds because they are generally shallower and have more vegetative cover. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Development/TC-21.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=74>

- ◆ **Retention/Irrigation:** Retention/irrigation systems are systems which capture stormwater runoff in a pond/basin in order to distribute the water in an irrigation system. This distribution of runoff over a large area serves to reduce the infiltration requirements of the soil. Further information can be found at:

◇ <http://www.cabmphandbooks.com/Documents/Development/TC-12.pdf>

- ◆ **Extended Detention Basins/Dry Ponds:** Extended detention basins are basins designed to detain stormwater runoff for a given period of time in order to allow sedimentation of particulates to take place in the basin. Further information can be found at:

◇ <http://www.cabmphandbooks.com/Documents/Development/TC-22.pdf>

◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=67>

- ◆ **In-Line Storage:** In-line storage systems are placed in storm drains in order to regulate flow into the storm drain. They do not provide any treatment. Further information can be found at:

◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=78>

- ◆ **On-Lot Treatment:** On-lot treatment practices are BMPs that treat runoff from individual lots. One example is a rain barrel to store rooftop runoff. Further information can be found at:

◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=81>

◇ [http://www.stormwatercenter.net/Pollution\\_Prevention\\_Factsheets/rain\\_barrels.htm](http://www.stormwatercenter.net/Pollution_Prevention_Factsheets/rain_barrels.htm)

#### **4. Construction Site Stormwater Runoff Control**

Construction practices increase pollutant loads and stormwater runoff quantity. There are many BMPs that aid in construction site stormwater runoff control and treatment.

##### **Types:**

- ◆ **Vortex Separators/Swirl Concentrators:** Vortex separators force the water to move in a circular fashion in order to utilize centrifugal force to remove suspended solids. Further information can be found at:

◇ <http://www.cabmphandbooks.com/Documents/Development/MP-51.pdf>

◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=79>

- ◆ **Water Quality Inlets/Oil and Grit Separators/Trapping Catch Basins:** Water quality inlets consist of one or more chambers which promote sedimentation of coarse materials and separation of free oil. Further information can be found at:

◇ <http://www.cabmphandbooks.com/Documents/Development/TC-50.pdf>

- ◆ **Wet Vaults:** Wet vaults are vaults with permanent pools of water that are intended to treat stormwater runoff. They may provide for extended detention of stormwater. Further information can be found at:

◇ <http://www.cabmphandbooks.com/Documents/Development/MP-50.pdf>

- ◆ **Silt Fences:** Silt fences are filter fabric entrenched fences supported by poles designed to detain sediment. Silt fences should be used as a temporary means

to block sediment while allowing water to pass. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Construction/SE-1.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=56>

- ◆ **Gravel Berms/Filter Berms:** Gravel berms are temporary ridges that are designed to filter and decrease the velocity of sheet flow. Gravel bag berms are another form of gravel berms in which gravel-filled bags are used to create the ridge. Gravel berms can withstand higher flow rates than silt fences. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Construction/SE-6.pdf>
- ◇ [http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=37](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=37)

- ◆ **Check Dams:** Check dams are barriers constructed of various materials placed across constructed swales or drainage ditches. They are designed to decrease the water velocity in the channel. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Construction/SE-4.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=36>

- ◆ **Inlet Protection:** Storm drain inlet protection prevents sediment and debris from entering a storm drain. Methods include entrenched fabric fences, excavated drop inlet, gravel/sand bags, and block and gravel. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Construction/SE-10.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=60>

- ◆ **Sediment Basins/Rock Dams:** Sediment basins trap sediment-laden runoff in order to allow the sediment to settle out before the runoff is discharged. The basins are created by excavation or the construction of an earthen embankment. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Construction/SE-2.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=57>

- ◆ **Sediment Traps:** Sediment traps detain sediment-laden runoff in order to promote settling of sediment and protect downstream receiving waters. The basins are created by excavation or the construction of an earthen embankment across a drainage swale or low drainage area. Water is discharged from the basin via an outlet or spillway filled with large stones or aggregate. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Construction/SE-3.pdf>
- ◇ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=59>

- ◆ **Street Sweeping and Vacuuming:** Street sweeping and vacuuming utilize self-propelled and walk-behind equipment in order to remove sediment, debris, and oil and grease from pavement and prevent it from entering storm drains. Further information can be found at:

- ◇ <http://www.cabmphandbooks.com/Documents/Construction/SE-7.pdf>

For further information regarding construction site stormwater runoff control refer to...

- ◆ “Stormwater Best Management Practice (BMP) Handbooks: Construction Handbook” California Stormwater Quality Association, 2003. <http://www.cabmphandbooks.com>

## **5. Low Impact Development**

Low impact development can prevent the increase of pollution in stormwater runoff due to development. Low impact development is a philosophy in site development that focuses on maintaining pre-development site hydrology, and dispersing and treating runoff on-site, rather than the rapid conveyance of runoff off-site. This is accomplished through relatively simple and inexpensive microscale site planning and hydrologic control techniques such as:

- ◆ Minimal site disturbance
- ◆ Protection of natural infiltration
- ◆ Reduced directly connected impervious surfaces
- ◆ Use of open drainage systems
- ◆ Use of microscale stormwater controls
- ◆ Use of functional landscaping
- ◆ Use of other non-point source pollution controls
- ◆ Public/community outreach

Further information can be found at:

- ◆ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=10>
- ◆ [www.epa.gov/smartgrowth](http://www.epa.gov/smartgrowth)
- ◆ <http://www.lowimpactdevelopment.org/>

## **D. ZONING**

Zoning or classifying for land use has the capability to limit development in key areas and promote development in others. There are many different zoning techniques that can be implemented in various ways to achieve the desired result.

### **Types:**

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- ◆ Incentive Zoning
- ◆ Performance Zoning
- ◆ Urban Growth Boundaries
- ◆ Large Lot Zoning
- ◆ Infill/Community Redevelopment
- ◆ Transfer of Development Rights (TDRs)
- ◆ Limiting Infrastructure Extensions
- ◆ Watershed-Based Zoning
- ◆ Overlay Zoning
- ◆ Impervious Overlay Zoning
- ◆ Floating Zones
- ◆ Incentive Zoning

**Cost:** Zoning involves varied costs. See EPA’s Zoning document for a detailed list of possible costs.

Further information can be found at:

- ◆ “Pollution Prevention Fact Sheets: Watershed Based Zoning.” The Stormwater Manager’s Resource Center (accessed: June 2006). [http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool1\\_Planning/WatershedBasedZoning.htm](http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool1_Planning/WatershedBasedZoning.htm)
- ◆ “Menu of BMPs: Zoning.” U.S. EPA, July 2001. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=93>

## **E. LAND CONSERVATION**

Land conservation helps protect watersheds by preventing development of key areas. Land conservation can be very effective and often garners a high level of public support. In order to guide land conservation practices, a plan of action should be developed that addresses strategies for immediate threats and long term goals.

Types of land conservation:

- ◆ Own and Manage
- ◆ Own and Others Manage
- ◆ Resell to Third Party
- ◆ Allow Limited Development
- ◆ Acquire Partial Interest
  - ◇ Conservation Easement
  - ◇ Other Partial Interests

- ◆ Transfer Development Rights
- ◆ Lease Land
- ◆ Receive Donated Land

**Cost:** Although land conservation can be expensive, funding can be obtained through grants and loans. Purchasing land is often the most expensive form of land conservation. Explore all types of land conservation for the most cost effective alternatives. Refer to the “Funding Sources” section of this document for more information on obtaining grants and loans for land conservation.

Further information can be found at:

- ◆ “Source Protection Handbook: Using Land conservation to Protect Drinking Water Supplies.” The Trust for Public Land, 2005. <http://www.tpl.org/>
- ◆ “Land Use Planning Fact Sheet.” [http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool1\\_Planning/WatershedBasedZoning.htm](http://www.stormwatercenter.net/Assorted%20Fact%20Sheets/Tool1_Planning/WatershedBasedZoning.htm)

## **F. FACILITIES MANAGEMENT**

Public water supplies, municipalities, businesses, and other entities own and operate facilities. These facilities need to be properly managed so that they do not contribute pollution to the waterways. Municipalities and public water supplies should inventory their facilities and associated activities for possible contaminant sources. Then, maintenance staff can be trained on BMPs to decrease the likelihood of contamination.

Major phases of developing a facilities management plan include:

- ◆ Planning and Organization
- ◆ Assessment
- ◆ Identify BMPs
- ◆ Implementation
- ◆ Evaluation

**Cost:** The costs for proper management of facilities vary depending on the facilities and components. Most of the cost is associated with staffing requirements to develop a management plan, train staff, and inspect the facilities.

For further information refer to...

- ◆ “Menu of BMPs: Municipal Facilities Management.” U.S. EPA, July 2001. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=130>

## **G. INTEGRATED PEST MANAGEMENT**

Integrated Pest Management is a safe, alternative means of managing insects, weeds, and other types of pests. Pests are identified, action thresholds are considered, all possible control options are evaluated, and selected controls are implemented. Control options used to prevent or remedy unacceptable pest activity or damage include:

- ◆ Biological – introduce beneficial predators into landscapes
- ◆ Cultural – plant native, pest-resistant plant varieties
- ◆ Mechanical – hand-pick insects, or use traps, barriers, or water blasts to infected areas
- ◆ Chemical – use botanical, mineral, and insecticidal soap or synthetic chemicals

Integrated Pest Management can be used by businesses, homeowners, municipalities, and/or written into development codes. It can be implemented by schools as a way to minimize pollutants and teach stewardship of natural systems.

Further information can be found at:

- ◆ <http://www.austintexas.gov/ipm>
- ◆ <http://www.epa.gov/pesticides/factsheets/ipm.htm>
- ◆ [http://www.lhwmp.org/home/publications\\_detail.aspx?DocID=bAMaNM8GAkU%3d](http://www.lhwmp.org/home/publications_detail.aspx?DocID=bAMaNM8GAkU%3d)

## **H. GENERAL BUSINESS PRACTICES**

Educating businesses about pollution prevention enhances the effort to remove and reduce pollutants in source waters. Below is a menu of various BMPs for businesses that are general practices in pollution prevention. Educating businesses about these actions is an easy way to protect source waters.

### **1. Pollution Prevention Plans**

Businesses should be encouraged to develop and implement pollution prevention plans, targeting elimination and/or reduction of toxic substances, source reduction, reuse and recycling, and energy recovery. Pollution prevention example plans are available and assistance regarding the planning basics. Further information can be found at:

- ◆ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=14>
- ◆ <http://www.tceq.texas.gov/p2/P2Recycle/wrpa/p2planning.html>
- ◆ <http://www.tgpc.state.tx.us/PollutionPrevention.php>



## **2. Proper Hazardous Materials Storage**

Hazardous materials that are not stored properly have much greater chances of entering the waterways. Texas Administrative Code regulates industrial waste and municipal hazardous waste. Refer to [http://info.sos.state.tx.us/pls/pub/readtac\\$ext.ViewTAC?tac\\_view=4&ti=30&pt=1&ch=335](http://info.sos.state.tx.us/pls/pub/readtac$ext.ViewTAC?tac_view=4&ti=30&pt=1&ch=335) for details of the regulations.

Proper hazardous materials storage can include:

- ◆ Sufficient Isle Space
- ◆ Storing Away from High Traffic Areas
- ◆ Stacking in Accordance with Manufacturers' Directions
- ◆ Storing on Pallets
- ◆ Delegating Responsibility to Trained Hazardous Substance Management Personnel
- ◆ Covering or Enclosing Hazardous Materials Areas
- ◆ Considering Usable Life of Container

**Cost:** Costs for storing hazardous materials properly vary depending on the material and type. The EPA estimates that the cost of a pre-fabricated building is \$6 to \$11 per square foot (2001 dollars). The EPA also estimates the cost of a 6-inch concrete slab to be \$3.50 to \$5.00 per square foot. Alternatively, changes in procurement, inventory and disposal practices can minimize the amount of stored hazardous materials.

For further information refer to...

- ◆ "Menu of BMPs: Hazardous Materials Storage." U.S. EPA, July 2001.  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=105>

## **3. Materials Management**

Proper materials management involves the responsible selection, use, storage, and disposal of a product. These actions will help prevent the materials from entering waterways.

Key components of Materials Management include the following:

- ◆ Minimize Materials Used
- ◆ Minimize Waste Generated
- ◆ Routine Housekeeping
- ◆ Proper Collection and Disposal of Wastes
- ◆ Maintenance
- ◆ Regular Inspection

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- ◆ Employee Training
- ◆ Materials Inventory
  - ◇ Identify All Substances
  - ◇ Label All Containers (Name, Unit Number, Expiration Date, Handling Instructions, and Health and Environmental Hazards)
  - ◇ Note Hazardous Chemicals

**Cost:** The major costs associated with proper materials management is the cost of labor. Thus, the cost varies depending on staffing requirements.

Further information can be found at:

- ◆ “Menu of BMPs: Materials Management.” U.S. EPA, July 2001.  
<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=109>
- ◆ “Source Water Protection Practices Bulletin: Managing Small Quantity Chemical Use to Prevent Contamination of Drinking Water.” U.S. EPA, July 2001.  
[http://www.epa.gov/safewater/protect/pdfs/chemical\\_use\\_fact\\_sheet.pdf](http://www.epa.gov/safewater/protect/pdfs/chemical_use_fact_sheet.pdf)

#### **4. Spill Response and Prevention**

In order to protect storm drains from spills and leaks, a spill response and prevention plan should be developed. These plans include spill prevention measures, response procedures, cleanup procedures, reporting and training. Product substitution and use of recycled, reclaimed and reused materials may reduce the toxic materials requiring a spill response and prevention plan.

Key Components of the Spill Response and Prevention Plan include the following:

- ◆ Description of Facility, Address, Activities and Materials
- ◆ Identification of Spill Response Personnel
- ◆ Identification of Potential Spill Areas or Operations
- ◆ Identification of Areas Requiring Berms
- ◆ Facility Map (Including Areas, Activities, Materials, Structural BMPs etc.)
- ◆ Material Handling Procedures
- ◆ Spill Response Procedures
  - ◇ Assessment of Site and Potential Impacts
  - ◇ Containment
  - ◇ Notification
  - ◇ Clean Up
  - ◇ Disposal
  - ◇ Record Keeping

Spill Prevention Measures in the Plan may include the following:

- ◆ Install Leak Detection Devices, Overflow Controls, and Diversion Berms
- ◆ Disconnect Drains to Storm Sewer
- ◆ Preventative Maintenance
- ◆ Minimize Spills
- ◆ Product Substitution
- ◆ Recycle, Reclaim, or Reuse Materials

**Cost:** Costs for spill response and prevention vary depending on the facility but is much less expensive than the cost cleaning up spills. The main cost is labor.

Further information can be found at:

- ◆ “Menu of BMPs: Spill Response and Prevention.” U.S. EPA, July 2001. <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=107>
- ◆ “California Stormwater BMP Handbook, Municipal, BMP Fact Sheets: SC-11 Spill Prevention, Control & Cleanup.” California Stormwater Quality Association, January 2003. <http://www.cabmphandbooks.com/Documents/Municipal/SC-11.pdf>

## **5. *Trash Management***

Trash management involves source control and structural control in order to reduce the amount of trash present in stormwater and entering source waters.

### **Types:**

- ◆ Source Control:
  - ◇ Waste Reduction
  - ◇ Public Education
  - ◇ Infrastructure
  - ◇ Clean-up Programs
- ◆ Structural Control:
  - ◇ Filtration
  - ◇ Centrifugal Separation

**Cost:** The cost of trash management varies depending on the approach. Costs can be minimized by utilizing source control. According to the EPA structural filtration controls range from \$250,000 to \$900,000 and centrifugal separation controls can cost up to \$3 million (2001 dollars).

For further information refer to...

- ◆ “Menu of BMPs: Trash Management.” U.S. EPA, July 2001. [http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet\\_results&view=specific&bmp=5](http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=factsheet_results&view=specific&bmp=5)

## **I. BUSINESS-SPECIFIC BMPs**

Below are links and references to BMPs for specific types of businesses. An abundance of information and measures are available from many sources and agencies, as summarized below. The variety of control measures will allow your system to choose what best suits the business needs and concerns in your area.

### **1. Automobile Maintenance Business**

Since the automobile repair industry is the leading producer of hazardous wastes, businesses performing automobile maintenance can be targeted to reduce hydrocarbons, trace metals, and other pollutants in stormwater runoff. In addition to considering the BMPs in the “General Business Practices” section of this report, an extensive list of additional BMPs specifically for the automotive maintenance business can be found at:

- ◆ <http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse&Rbutton=detail&bmp=95>
- ◆ <http://mauiwater.org/BMPInkbus.html> (See section titled “Auto Body/Repair Shop.”)
- ◆ <http://wrrc.p2pays.org/industry/indsector.htm> (See section titled “Auto Repair and Fleet Maintenance.”)
- ◆ <http://www.peakstoprairies.org/topic/hub/toc.cfm?hub=5&subsec=7&nav=7>
- ◆ <http://www.wrppn.org/hub/toc.cfm?hub=4&subsec=7&nav=7>

### **2. Dry Cleaner**

The solvents dry cleaners use are generally considered to be air pollutants, particularly perchloroethylene (PCE or “perc”). However, Perc can also be released onto the land, where it is likely to migrate into the groundwater or it can be released directly into water. Other potential sources of pollution from dry cleaners are solvents and chemicals, separator water, used carbon and cartridges from absorbers, residues and sludge from stills, filter powder, filters, rags, and extra chemicals and drums. Often the dangers to water supplies results from spills, so a spill response and prevention plan should be developed and implemented. Other business practices such as pollution prevention, hazardous materials storage, and materials management will reduce the risks of pollution. In addition to the BMPs addressed in the “General Business Practices” section of this report, other BMPs can be found at:

- ◆ [http://www.environ.sc.edu/industrial\\_ecology\\_network/dryclean.doc](http://www.environ.sc.edu/industrial_ecology_network/dryclean.doc)
- ◆ <http://www.epa.state.oh.us/dhwm/dryclnfc.htm>
- ◆ <http://extension.missouri.edu/polsol/drycln.htm>

- ◆ <http://mauiwater.org/BMPInkbus.html> (See section titled “Dry Cleaners.”)
- ◆ <http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/dryclng.pdf>

### **3. Gun Range**

Lead bullets and shots at outdoor ranges contribute to lead pollution in the environment and waterways. Range owners/operators should examine the impact of range operations on human health and the environment and implement procedures to manage and/or remove accumulated lead from ranges. The implementation of BMPs has many benefits, including stewardship of the environment, improved community relations, improved aesthetics, increased profitability through recovery, and reduced public scrutiny. The EPA recommends a four step approach to lead management:

- ◆ Step 1 – Control and contain lead bullets and bullet fragments.
- ◆ Step 2 – Prevent migration of lead to the subsurface and surrounding water bodies.
- ◆ Step 3 – Remove the lead from the range and recycle.
- ◆ Step 4 – Document activities and keep records.

Through the use of an effective lead management program, the effects of lead on the environment can be reduced.

Additional information can be found at:

- ◆ [http://www.epa.gov/region2/waste/leadshot/epa\\_bmp.pdf](http://www.epa.gov/region2/waste/leadshot/epa_bmp.pdf)
- ◆ <http://www.oshainfo.gatech.edu/lead/stewardship.pdf>

### **4. Nail Salons**

Nail salon waste such as acetone and other chemicals are hazardous waste and should be treated as such. In addition to the BMPs addressed in the “General Business Practices” section of this report, additional BMPs and information can be found at:

- ◆ <http://www.govlink.org/hazwaste/publications/NailSalons05.pdf>
- ◆ [http://www.epa.gov/safewater/protect/pdfs/chemical\\_use\\_fact\\_sheet.pdf](http://www.epa.gov/safewater/protect/pdfs/chemical_use_fact_sheet.pdf)
- ◆ <http://mauiwater.org/BMPInkbus.html> (See section titled “Beauty Shops.”)

### **5. Petroleum Storage Tank**

Aboveground and underground storage tanks primarily containing petroleum products can contaminate source water if the petroleum is discharged. Furthermore, petroleum spilled, leaked or lost from storage tanks may accumulate in soils or be transported in stormwater runoff. To prevent pollution from above ground storage tanks, implement measures such as secondary containment, routine monitoring, corrosion protection,

periodic cleanup, and evaporation prevention. To prevent pollution from underground storage tanks, implement measure such as proper installation, corrosion protection, spill protection, overfill protection, leak detection, and proper closure. In addition, local jurisdictions may consider implementing registration programs, land use controls, and additional inspection measures. Further information can be found at:

- ◆ <http://www.epa.gov/safewater/protect/pdfs/ast.pdf>
- ◆ <http://www.epa.gov/safewater/protect/pdfs/ust.pdf>
- ◆ <http://mauiwater.org/BMPInkbus.html> (See section titled “Chemical or Petroleum Above Ground Storage.”)

## **6. Small Quantity Chemical Users**

Many businesses, such as dry cleaners, beauty shops, photo finishers, vehicle repair shops, printers, and laboratories, are small quantity chemical users. Improper disposal of these chemicals can pollute the ground and surface waters. A business should begin by assessing what kinds of chemicals are used, monitoring chemical use, and implementing easy and inexpensive practices. Categories of BMPs for chemical use include ways to avoid excess chemical use, proper use and handling of chemicals, and proper storage and disposal of chemicals. Further information can be found at:

- ◆ [http://www.epa.gov/safewater/protect/pdfs/chemical\\_use\\_fact\\_sheet.pdf](http://www.epa.gov/safewater/protect/pdfs/chemical_use_fact_sheet.pdf)

## **7. Tire Sales, Repair Business**

Lead tire weights are used to balance automobile tires. These weights can fall off and can be washed into storm sewers and waterways or placed in landfills. Lead is a highly toxic chemical and can cause serious health problems. Thus, preventing lead from entering source water is an important task. Many safe alternatives for lead tire weights exist such as tin, tungsten, and ZAMAC. Additional information can be found at:

- ◆ <http://www.epa.gov/epaoswer/hazwaste/minimize/leadtire.htm>
- ◆ <http://www.glrppr.org/columbus2004/> (See “Lead Free Wheel Balancing presentation)
- ◆ <http://leadfreewheels.org/>

## **8. Other Businesses**

The EPA created a guide called “Environmental Assistance Services for Small Businesses: A Resource Guide” in order to inform small businesses of the available pollution prevention resources. This guide is available at <http://www.epa.gov/sbo/pdfs/ea-resourceguide.pdf>.

For businesses that use solvents, a “Solvent Alternatives Guide” is available on the web (<http://www.clean.rti.org/>).

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For businesses that use coatings, a “Coatings Guide” is available on the web (<http://cage.rti.org>).

Specific information regarding the following businesses is available on the web (<http://mauiwater.org/BMPlnkbus.html>):

- ◆ Auto Wrecking
- ◆ Ceramics
- ◆ Construction
- ◆ Dry Storage
- ◆ Food Production
- ◆ Golf Courses
- ◆ Machine Shops
- ◆ Outside Manufacturing Activities
- ◆ Photo Processing
- ◆ Recycling and Scrap Businesses
- ◆ Sand and Gravel Pits
- ◆ Wood Finishing
- ◆ Cement and Concrete Facilities
- ◆ Commercial Car and Truck Washes
- ◆ Dental Facilities
- ◆ Equipment Repair
- ◆ Fuel Station
- ◆ Jewelry Manufacturing
- ◆ Medical Facilities and Pharmacies
- ◆ Painting/Finishing
- ◆ Printing
- ◆ Retail and Wholesale
- ◆ Truck Loading and Unloading of Liquids

Specific information regarding the following businesses is available on the web (<http://wrrc.p2pays.org/industry/indsector.htm>):

- ◆ Concrete Batch Plants
- ◆ Dental
- ◆ Electroplating
- ◆ Food Processing
- ◆ Hospital and Medical
- ◆ Laboratories
- ◆ Metal Coating
- ◆ Metal Paint Stripping
- ◆ Photo Processing
- ◆ Road Construction
- ◆ Transport Packaging
- ◆ Construction and Demolition
- ◆ Electronics
- ◆ Fiberglass
- ◆ Furniture and Wood Finishing
- ◆ Hotels
- ◆ Metal Cleaning
- ◆ Metal Machining
- ◆ Offices
- ◆ Restaurants
- ◆ Textiles

Specific information regarding the following businesses is available on the web (<http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/index.html>):

***BMP GUIDANCE DOCUMENT***

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- ◆ Agricultural Chemical, Pesticide and Fertilizer
- ◆ Agricultural Livestock Production
- ◆ Air Transportation
- ◆ Fossil Fuel and Electric Power Generation
- ◆ Healthcare
- ◆ Iron and Steel
- ◆ Metal Casting
- ◆ Metal Mining
- ◆ Nonferrous Metals
- ◆ Oil and Gas Extraction
- ◆ Petroleum Refining
- ◆ Plastic Resins and Man-made Fibers
- ◆ Pulp and Paper
- ◆ Shipbuilding and Repair
- ◆ Textiles
- ◆ Water Transportation
- ◆ Agricultural Crop Production
- ◆ Aerospace
- ◆ Electronics and Computer
- ◆ Ground Transportation
- ◆ Inorganic Chemical
- ◆ Lumber and Wood Products
- ◆ Metal Fabrication
- ◆ Motor Vehicle Assembly
- ◆ Non-Fuel, Non-Metal Mining
- ◆ Organic Chemical
- ◆ Pharmaceuticals
- ◆ Printing
- ◆ Rubber and Plastics
- ◆ Stone, Clay, Glass and Concrete
- ◆ Transportation Equipment Cleaning
- ◆ Wood Furniture and Fixtures

Specific information regarding the following activities is available on the web ([http://www.bieapfrempp.org/toolbox/index.cfm?group\\_ID=3834#bmp](http://www.bieapfrempp.org/toolbox/index.cfm?group_ID=3834#bmp)):

- ◆ Aggregate Concrete Wash-off Water
- ◆ Brewery and Winery
- ◆ Fish Processing Operations
- ◆ Fruit and Vegetable Processing
- ◆ Marinas and Small Boatyards
- ◆ Process Water Management at Fish Processing Plants
- ◆ Steel Structure Painting
- ◆ Wood waste Discharges
- ◆ Asphalt Preparation Operations
- ◆ Dry Bulk Terminals
- ◆ Foundries
- ◆ How to Set Up a Job Site Recycling Program
- ◆ Pressure Wood Preservation
- ◆ Shipbuilding and Repair
- ◆ Wood Preservation



## **J. PRACTICES FOR COMBINED ANIMAL FEEDING OPERATIONS (CAFOs)**

According to the EPA, “Animal feeding lots are agricultural enterprises where animals are kept and raised in confined situations. CAFOs congregate animals, feed, manure and urine, dead animals, and production operations on a small land area. Feed is brought to the animals rather than the animals grazing or otherwise seeking feed in pastures, fields, or on rangeland.” These animals produce manure which can be a source of water pollution (in the form of phosphorous) if it is not properly managed and stored. The manure can instead be turned into a valuable source of plant nutrients that improves the quality and productivity of soils. See <http://www.tceq.state.tx.us/compliance/monitoring/nps/projects/compost.html> for a case study of how manure can be beneficial and profitable. The application of stormwater BMPs to CAFOs will also reduce pollution of the waterways.

### **Types:**

- ◆ Stormwater BMPs
  - ◇ Construct sediment basins to trap and manage solid manure
  - ◇ Gage runoff holding ponds to help avoid capacity issues
  - ◇ Berms around manure storage to prevent runoff
  - ◇ Use grass filter strips to protect surface water
  - ◇ Use bermed feedlots and livestock yards to contain runoff
  - ◇ Locate feedlots on sloped lands to provide good drainage
  - ◇ Use concrete ditches or well maintained grassed waterways to control effluent and carry it to a holding pool
  - ◇ Design storage tanks with sufficient freeboard
  - ◇ Cover livestock holding areas to minimize the mixing of stormwater with manure
  - ◇ Cover compost and manure storage areas to minimize runoff
  - ◇ Utilize gutters to separate clean and dirty water and prevent water from accumulating
- ◆ Land Application and Nutrient Management
  - ◇ Implement and follow a nutrient management plan
  - ◇ Use a calibrated spreader to apply manure evenly
  - ◇ Center pivots with low pressure nozzles to evenly apply liquids from holding pool to avoid runoff
- ◆ Managing the Land
  - ◇ Fence surface waters so cattle do not have direct access
  - ◇ Rotate pastures to provide adequate cover and prevent runoff
  - ◇ Use self watering systems to prevent direct access to surface waters

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- ◇ Centrally locate water tanks to allow cattle rotation on different pastures
- ◇ Clean solids from ditches to allow effluent to flow freely to retention ponds
- ◇ Develop an emergency management system
- ◇ Test soil to help determine nutrient levels and plan for land application of manure
- ◇ Utilize wind-row composting to allow for recycling of manure and aid in planning for nutrient management
- ◇ Secure facilities to prevent accidents and vandalism
- ◇ Berm, secure, and cover silage to prevent runoff

For further information refer to...

- ◆ <http://www.epa.gov/safewater/protect/pdfs/livestock.pdf>
- ◆ Beef Cattle:
  - ◇ <http://www.epa.gov/oecaagct/beef.pdf>
  - ◇ [http://www.lpes.org/cafo/12FS\\_Beef.pdf](http://www.lpes.org/cafo/12FS_Beef.pdf)
- ◆ Dairies:
  - ◇ <http://www.epa.gov/oecaagct/dairy.pdf>
  - ◇ <http://www.rem.sfu.ca/FRAP/9611.pdf>
- ◆ Poultry:
  - ◇ <http://www.epa.gov/oecaagct/poultry.pdf>
- ◆ Swine:
  - ◇ <http://www.epa.gov/oecaagct/swine.pdf>

## **K. NATURAL RESOURCE PRODUCTION**

### **1. Oil or Gas Well, Abandoned**

Abandoned oil or gas wells are a potential source of ground and surface water pollution often in the form of oil and saltwater. Vice versa, water or other pollutants may pollute the oil rendering it useless for subsequent recovery. Proper plugging of abandoned wells can eliminate the possibility for this pollution. The Railroad Commission of Texas (RRC) regulates abandoned oil and gas wells. The RRC's Statewide Rule 14(b)(2) states that "plugging operations on each dry or inactive well shall be commenced within a period of one year after drilling or operations cease and shall proceed with due diligence until completed. Plugging operations on delinquent inactive wells shall be commenced immediately unless the well is restored to active operation. For good cause, a reasonable extension of time in which to start the plugging operations may be granted pursuant to the following procedures." The owner/operator is responsible for plugging the well. If the owner/operator is unknown or cannot afford to plug the well, the well is eligible to be plugged under the RRC's Well Plugging Program. Each well is given a priority ranking of 1 to 4. A well with

priority of 1 is leaking and receives the highest priority. To augment the cost of the Well Plugging Program, the salvage provision allows for the RRC to salvage well equipment. In order to prevent the transferring of wells to insolvent owners/operators SB 1103 mandates proof of financial responsibility for owners/operators.

Further information can be found at:

- ◆ “Well Plugging Primer.” Railroad Commission of Texas, Varela, January 2000  
<http://www.rrc.state.tx.us/divisions/og/key-programs/plugprimer1.pdf>
- ◆ <http://www.tlma.org/water.htm>

## **2. Oil or Gas Well, Plugged**

See following section, entitled “Oil or Gas Well, Production.”

## **3. Oil or Gas Well, Production**

Oil and gas production can be accomplished in a manner that minimizes potential pollution to ground and surface waters.

The Bureau of Land Management has developed a document with guidelines on best practices, found at:

- ◆ “Surface Operating Standards and Guidelines for Oil and Gas Exploration and Development.” Bureau of Land Management, 2006. <http://www.blm.gov/bmp/gold%20book/FinalGoldBook%20-%202006%204th%20Edition.pdf>

An additional resource for BMPs can be found at:

- ◆ “Best Management Practices for Oil and Gas Well Site Construction.” Ohio Department of Natural Resources: Mineral Resources Management, April 2005. [http://www.ohiodnr.com/mineral/oil/pdf/BMP\\_OIL\\_GAS\\_WELL\\_SITE\\_CONST.pdf](http://www.ohiodnr.com/mineral/oil/pdf/BMP_OIL_GAS_WELL_SITE_CONST.pdf)

## **4. Water Well, Active**

Active water wells can be a source of groundwater pollution if they are not properly constructed. Implementing the proper BMPs can help protect groundwater quality.

Improperly constructed water wells can adversely affect public health. Construction problems, such as inadequate cement, faulty casings, inadequate covers, or lack of concrete pads, allow outside water and any accompanying contaminants to flow into the well. Sources of such contamination can be surface runoff or wastes from farm animals or septic systems. Dug wells, generally of large diameter and shallow depth, are usually poorly protected and are commonly polluted by surface runoff flowing into the well. Still other pollution has been caused by barnyard, feedlot, septic tank, or cesspool effluent draining directly into the well.

Public water supply systems need to supply well logs for all active public water supply wells to TCEQ in order to affect the Assessment Report susceptibility. Well log information, along with aquifer information, is used in the Source Water Assessment Report to determine the capture zone for each well. If this information is missing, a ½ mile radius circle is used to represent the capture zone. Thus if the well log is missing, PSOCs surrounding the wellhead area may increase with the increased area of the capture zone.

For Further Information Refer to...

- ◆ “Reducing Contamination by Improving Wellhead Management and Conditions.” Texas\*A\*Syst, Harris, Hoffman, and Mazac, August 2001. <http://waterhome.brc.tamus.edu/texasyst/wellhead.html>
- ◆ “BMPs for Wellhead Protection.” University of Idaho College of Agricultural and Life Sciences, January 2003. <http://www.uidaho.edu/wq/wqbr/wqbr30.html>
- ◆ <http://www.license.state.tx.us/wwd/wwdfaq.htm>

## **5. Water Well, Abandoned**

Abandoned water wells are not only a safety hazard to humans and animals, but also a source of groundwater contamination. Groundwater contamination from abandoned wells is particularly risky because contaminants enter the groundwater directly, with no natural filtration as soils and bedrock would normally provide. A public water supply should work with TCEQ to ensure that all abandoned domestic and irrigation wells are properly plugged.

In many cases when a well is abandoned, the casing is pulled or the casing may become so corroded that holes develop. This permits ready access for fluids under higher pressure to migrate through the abandoned well and pollute fresh water aquifers.

Procedures for plugging wells:

- ◆ The landowner may hire a licensed water well driller and/or pump installer (required for well types VI–VIII)
- ◆ OR the landowner may plug the well (only types I–V) according to State of Texas Rules and Regulations, Title 16, Texas Administrative Code, Chapter 76.
- ◆ Notify the Water Well Driller/Pump Installer Section of the Texas Department of Licensing and Regulation (TDLR) of your intent. Abandoned wells are regulated by the TDLR and local groundwater conservation districts.
- ◆ Take accurate measurements of the well.
- ◆ Remove all obstructions (e.g., pump, piping).
- ◆ Disinfect the well.
- ◆ Remove casing.
- ◆ Fill the well with plugging material.

- ◆ Mail a state well plugging form to TDLR and the local groundwater conservation district (if applicable).

Further information can be found at:

- ◆ “Landowner’s Guide to Plugging Abandoned Water Wells.” Texas Groundwater Protection Committee, March 2006. <http://www.tceq.texas.gov/publications/rg/rg-347.html>
- ◆ “Well Closing Demonstration.” Blackland Research Center, Water Sciences Laboratory, Hoffman, Lesikar, and Dozier. <http://blackland.tamu.edu/decision-aids/texasyst/>
- ◆ <http://www.license.state.tx.us/wwd/wwdfaq.htm>

## **6. Mined Land, Active**

The effect of mining operations on water supplies varies with the particular material being mined and the method by which the extraction is occurring. Depending upon the relative toxicity of the material, leakage from the disturbed material mining site into groundwater could pose a health matter for both humans and animals in proximity to the quarry. There is always the potential for erosion of soil and runoff of soil into nearby water supplies; this could affect life in nearby creeks and rivers.

Mining activities in Texas predominantly involve quarries. Most quarries are simply pits where sand and gravel or limestone have been dug up, crushed, and hauled off for building materials. This type of quarry is relatively benign since it does not usually involve the use of toxic materials to process ore and it does not leave mine tailings behind.

The diverse activities of mining can be separated into categories of disturbance, processing, waste disposal, and support activities. Each of these activities has the potential for surface and/or groundwater pollution. Designing a water quality monitoring program and preparing a water quality assurance project plan will help identify the sources of contamination from each activity. In addition to pollution prevention and stormwater control measures, mining BMPs can help prevent water pollution.

Types of treatment for wastewaters associated with mining activities include:

- ◆ Metals removal
  - ◇ Chemical precipitation
  - ◇ Ion exchange
  - ◇ Reverse osmosis
  - ◇ Carbon adsorption
  - ◇ Biological treatment
- ◆ Cyanide destruction

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- ◇ Alkaline chlorination process
- ◇ Hydrogen peroxide process
- ◇ Sulfur dioxide/air process
- ◇ Biological treatment of cyanide
- ◇ Natural degradation
- ◆ Solid-liquid separation
- ◆ Sludge removal
- ◆ Passive treatments

Types of BMPs for solid waste associated with mining activities:

- ◆ Waste rock and overburden
  - ◇ Piles and dumps
  - ◇ Mine backfill
  - ◇ Use in facility construction
  - ◇ Use as cover materials
- ◆ Tailings management
  - ◇ Tailings impoundments
  - ◇ Dry tailings facilities
  - ◇ Subaqueous tailings disposal
  - ◇ Mine backfill
- ◆ Spent ore/heap and dump leach management
- ◆ Acid mine drainage
  - ◇ Controlling the acid generation process
  - ◇ Moderating the effects of acid generation
  - ◇ Controlling the migration of acid mine drainage
  - ◇ Collecting and treating acid mine drainage

Steps for proper closure and reclamation:

- ◆ Soils placement and revegetation
- ◆ Runoff and erosion control measures
- ◆ Infiltration control measures
- ◆ Seepage control measures
- ◆ Spent ore treatment and neutralization
- ◆ Post-closure monitoring

Further information can be found at:

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- ◆ “EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska,.” See Appendices. U.S. EPA, January 2003. <http://yosemite.epa.gov/R10/WATER.NSF/Sole+Source+Aquifers/hardrockmining>
- ◆ “Best Practice Environmental Management in Mining: Sustainable Minerals.” Australian Government. Department of Industry, Tourism and Resources, May 2006. <http://www.ret.gov.au/resources/Documents/LPSDP/BPEMOverview.pdf>
- ◆ “EPA Office of Compliance Sector Notebook Project: Profile of the Metal Mining Industry.” EPA, September 1995. <http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/metmins.pdf>
- ◆ “EPA Office of Compliance Sector Notebook Project: Profile of the Non-Fuel, Non-Metal Mining Industry.” EPA, September 1995. <http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/nomtmisn.pdf>

## **7. Mined Land, Abandoned**

Abandoned mines may contaminate local waterways by acid drainage or toxic sediment. Pollution can be eliminated or reduced by implementing the following BMPs:

- ◆ Diversion ditches
- ◆ Mine waste rock/tailings removal and consolidation
- ◆ Stream diversion
- ◆ Erosion control by regrading
- ◆ Capping
- ◆ Revegetation
- ◆ Aeration and settling ponds
- ◆ Sulfate-reducing wetlands
- ◆ Oxidation wetlands
- ◆ Other BMPs to treat acid mine drainage

Further information can be found at:

- ◆ “Best Practices in Abandoned Mine Land Reclamation: The Remediation of Post Mining Activities.” Colorado Division of Minerals and Geology, 2002. <http://mining.state.co.us/bmp.pdf>
- ◆ “Best Management Practices for Reclaiming Surface Mines in Washington and Oregon.” Washington Division of Geology and Earth Sciences, Norman et al. December 1997.

[http://www.dnr.wa.gov/publications/ger\\_ofr96-2\\_best\\_management\\_practices.pdf](http://www.dnr.wa.gov/publications/ger_ofr96-2_best_management_practices.pdf)

## **L. PRACTICES FOR INJECTION WELLS**

Class I, II, and III injection wells are permitted and closely monitored by State regulatory agencies (TCEQ and RRC). However, your community may have

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unidentified Class IV or Class V injection wells. Most Class IV wells are illegal. These wells are of greatest concern to communities and have been identified by EPA as a significant threat to human health and the environment since these wells introduce very dangerous wastes into or above a potential drinking water source. One of the most common examples of a Class IV well is an automotive disposal well, where waste oil and other automotive fluids are disposed into the subsurface.

Class V injection wells can be located anywhere, but they are especially likely to exist in areas that do not have sewers. These unsewered areas are often the same areas where people are most likely to depend on groundwater for their drinking water source. Examples of Class V wells include large capacity cesspools, stormwater drainage wells, and agricultural drainage wells. Class V wells are required to be registered with the TCEQ's Underground Injection Control Program.

All BMPs do not apply to all situations as each injection well has its own unique characteristics. Suggested BMPs include the following:

- ◆ Communities should continuously monitor for Class IV and V injection wells and assure they meet regulatory requirements under the Underground Injection Control (UIC) Program by immediately reporting them to the TCEQ's UIC Program at 512-239-6633.
- ◆ Develop local guidance for proposed injection wells. Local guidance may address well siting, design, and operation as well as education and outreach to prevent misuse.
  - ◇ Site wells greater than ¼ mile of any source water protection areas, surface streams, public drainage ditches, or other waterways;
  - ◇ Make use of waste exchange services to reuse and recycle as much waste as practical;
  - ◇ Minimize waste by providing employee training as part of an overall commitment to pollution prevention; provide incentives for developing new pollution prevention ideas; clearly label, inventory, and monitor the use and storage of all raw materials and wastes; handle raw materials and wastes carefully to minimize spills and contamination; recycle as much waste as possible; use self-contained circulating solvent sinks to reduce waste volume; and, develop alternative waste handling and disposal methods;
  - ◇ Instead of injecting non-hazardous waste, connect drains to a holding tank and have a licensed hauler transport the wastes to an approved treatment or disposal facility; and
  - ◇ In closing an automotive disposal well, submit a well closure plan to the TCEQ. Temporarily plug the well with cement or a plumber's plug until the plan is approved; after sampling well contents, clean the pipes and drains leading to the well if so directed; remove liquid and sludge from the well and dispose of the waste in compliance with federal, state, and local laws; properly plug the well in accordance with state standards; remove or seal pipes leading to the well with concrete; seal all floor drains leading to the well; and, remove and dispose of visibly contaminated soil in compliance with federal, state, and local laws.



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- ◆ Distribute existing educational materials on injection wells to automotive maintenance shops, dry cleaners, etc.

Further information can be found at:

- ◆ Ground Water Protection Council at [www.gwpc.org](http://www.gwpc.org) or at 405-516-4972
- ◆ EPA UIC Program at [water.epa.gov/typw/groundwater/uic/index.cfm](http://water.epa.gov/typw/groundwater/uic/index.cfm) or at 1-800-426-4791

## **M. TRANSPORTATION**

### **1. Airports**

Airports contribute to water pollution through maintenance and refurbishing operations, fueling, aircraft and vehicle exterior cleaning, aircraft deicing, runway deicing, and general airport operations. When BMP measures are implemented in order to reduce water pollution, they must be done in accordance with FAA requirements. Pollution prevention in these areas may also improve efficiency and increase profits.

BMPs can be implemented in the following categories:

- ◆ Maintenance and refurbishing
  - ◇ Used oil and lubricants
  - ◇ Fluids
  - ◇ Batteries
  - ◇ Machine shop wastes
  - ◇ Small parts cleaning
  - ◇ Depainting
  - ◇ Painting
- ◆ Fueling
  - ◇ Vehicle fueling
  - ◇ Fuel in vehicle operations
- ◆ Aircraft and vehicle exterior cleaning
  - ◇ Aircraft cleaning
  - ◇ Vehicle washing
- ◆ Aircraft deicing
  - ◇ Recycling deicing fluid
  - ◇ Segregation of waste streams
- ◆ General aircraft operations
  - ◇ Runway deicing
  - ◇ General airport operations

For further information refer to...

- ◆ “EPA Office of Compliance Sector Notebook Project: Air Transportation Industry.” EPA, October 1998.  
<http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/index.html>

## **2. Railroads**

Locomotives and locomotive maintenance facilities can be sources of pollution. It is important to reduce or eliminate pollution resulting from water discharge streams, oil, maintenance and repair operations, painting, and fueling.

BMPs can be implemented in the following categories:

- ◆ Water discharge
  - ◇ Cleaning agent reduction/substitution
  - ◇ Water reduction
- ◆ Oil
  - ◇ Recycling
  - ◇ Retention tanks
  - ◇ Material Safety Data Sheets
  - ◇ Spills
- ◆ Maintenance and repair
  - ◇ Batteries
  - ◇ Coolants
  - ◇ Metal scrap
  - ◇ Liquid drum containers
  - ◇ Metal filings
- ◆ Paint
- ◆ Fuel

For further information refer to...

- ◆ “Profile of the Ground Transportation Industry: Trucking, Railroad, and Pipeline.” EPA, September 1997. <http://www.epa.gov/compliance/resources/publications/assistance/sectors/notebooks/grdtrnsn.pdf>

## V. FUNDING SOURCES

Funds are available from a number of state and federal sources in order to help implement source water protection. TCEQ provides assistance in monitoring, education, and outreach. TWDB provides a number of low interest loans and grants. The EPA has many different grants available. The Department of Agriculture, Department of the Interior, Department of Commerce, and the Department of Housing and Urban Development all provides monies to eligible parties. In addition, a number of non-governmental programs exist in order to assist in source water protection. The “Guide to Funding and Technical Assistance for Implementation of Source Water Protection” is an excellent tool in order to find assistance in addressing solutions to possible sources of contamination. The Funding Guide is included as Appendix A.

In addition to this guide, the federal government provides interactive web-based tools in order to locate and apply for federal grant and loan moneys. At the federal grants website ([www.grants.gov](http://www.grants.gov)) users can search grants (by funding opportunity number, dates, CFDA number, funding activity category, funding instrument type, eligibility, and agency), browse grants by category, or browse grants by keyword. The Federal Grants website also offers e-mail alerts when grant opportunities arise. Additionally, the EPA offers a grant search engine called the Catalog of Federal Funding Sources for Watershed Protection (<http://cfpub.epa.gov/fedfund/>). This searchable site details all of the federal funding sources available for watershed protection. It allows the user to search by type of assistance, eligible organization, match required, and a list of keywords. The Trust for Public Land’s “Conservation Finance Handbook” (<http://www.tpl.org/publications/books-reports/conservation-finance-handbook.html>) assists in the passing of legislation to fund land conservation.

## VI. FAST TRACK TO SOURCE WATER PROTECTION

The key to protecting both surface and groundwater sources from pollution is to remember that most threats to water quality are man-made. Therefore with careful planning, most impacts can be lessened. Everyone can act in small ways to protect and conserve drinking water resources and below are some easy ideas to begin implementation:

- ◆ Conserve water by taking short showers, shut water off while brushing teeth, and run full loads of dishes and laundry;
- ◆ Repair leaky faucets;
- ◆ Establish minimum flows and levels to protect water resources and develop recovery strategies where necessary;
- ◆ Promote development of reclaimed water for irrigation purposes;
- ◆ Design and implement a coordinated water quality monitoring program;
- ◆ Use alternative cleaning products that are less harmful to the environment;
- ◆ Dispose of chemicals properly, and use the local recycling center instead of dumping waste down the sink;
- ◆ Inspect and maintain aboveground and underground storage tanks to prevent leakage;
- ◆ Limit fertilizer and pesticide use on plants and lawns;
- ◆ Maintain septic systems with an inspection and waste clean out every three years;
- ◆ Make improvements to aging and often leaky water supply, sewer, and stormwater infrastructures. (The TWDB's State Revolving Fund provides low interest loans to communities for the repair of aging water and sewer infrastructure.);
- ◆ Plant buffers 50 to 100 feet wide between land use activities and surface waters;
- ◆ Carefully monitor and manage permitted discharges to produce the highest quality effluent possible in order to allow the surface water bodies to assimilate the discharges;
- ◆ Design roadway and parking lot drainages to help minimize the impact of petroleum products runoff and sediments;
- ◆ Coordinate water resource and land use planning;
- ◆ Identify alternative water supply options; and
- ◆ Lastly and most importantly is education, so that the average person living in the community knows and understands his/her role in helping to keep drinking water supplies clean so that future generations can enjoy this critically important natural resource.

## VII. EXAMPLE PLAN OF ACTION

Protecting your drinking water supply from contamination can be accomplished by completing five basic steps:

- ◆ Form a community planning team;
- ◆ Work with the TCEQ in defining the land area to be protected;
- ◆ Identify and locate PSOC;
- ◆ Manage the protection area; and
- ◆ Plan for the future.

**Form a Community Planning Team:** Although the size and membership of a community planning team may differ from one community to the next, it is important that the planning team represents all interests in your community. If there are existing groups who have worked together successfully in the past, it may be useful and convenient to build a planning team around them. Perhaps the most important component of this first step is the selection of a leader who can keep the planning team organized, active, and on track. A local official or community leader who has already gained community support may be helpful in guiding management options through the proper channels. The team will also benefit tremendously from the advice of a hydrogeologist, engineer, and land planner who can serve as the group's technical advisor. Once you have formed the planning team, the next order of business will be to define a clear goal and objectives.

**Define the Land Area to be Protected:** The first step for the planning team is to identify the land area that will need to be managed to protect your community's drinking water supply. As part of the State's Source Water Assessment and Protection Program, the TCEQ will delineate the protection area for your system free of charge. There are several good reasons for delineating protection areas. First, maps of source water protection areas identify the areas that are contributing directly to your water supply. Second, you can focus your management efforts on where they are most needed by identifying those areas of greatest concern.

**Identify and Locate Potential Sources of Contamination:** Once you know what areas in your community need to be protected, you can begin to identify and locate the potential threats to the quality of your water supply. Any pollutants that are released within your protection area have the potential to reach your water supply. It might be helpful to divide your protection area into smaller areas based on how the land is used (e.g. residential, commercial, agricultural, etc.) because different types of contaminants can be expected from different types of land uses.

Local volunteers, particularly senior citizens, have proven very effective in identifying potential contamination risks. Perhaps the easiest way to conduct the field search is to make copies of your protection area map, divide the protection area into sections, and

have volunteers mark on the map the contaminant sources they find within their sections. The information collected should include a description of the activity, its location (obtain a GPS latitude and longitude), the volume of material stored and handled, and any permit references. The final product should be a master source water protection area map. This map will identify all of the contaminant sources of concern within the protection area and present some indication of the nature and potential threat posed by those sources.

**Manage the Protection Area:** The management of activities (subdividing land, building roads and highways, construction activities, etc.) within the source water protection area usually is the responsibility of your local government. This responsibility can be an opportunity—a chance to preserve a resource critical to future growth and development. Utilize the tools that are described above to identify the management method that’s best for your community.

**Plan for the Future:** Perhaps the most important step to take in protecting your community’s drinking water supply is to sustain your protection efforts into the future. A year of intense drinking water protection measures is not likely to be adequate to establish long-term drinking water protection. Even modest drinking water protection efforts will be more effective if they are sustained.

The planning team should review the protection program each year to see where your community can improve its efforts. The planning team should think about future water supply needs and the type of program it would like to have in place 5 or 10 years from now. It is important to try and identify potential future problems and figure out ways to head them off before they occur.

However, even the most comprehensive source water protection program may fail to protect your community’s water supply. For this reason, it’s important for your system to be prepared in case its water supply becomes contaminated. Develop a contingency plan for response procedures and alternative water supplies in case the water supply is disrupted by contamination or other events.

## **VIII. HELPFUL REFERENCES**

The TCEQ website:

<http://www.tceq.texas.gov/>

The TCEQ Source Water Protection website:

<http://www.tceq.texas.gov/drinkingwater/SWAP>

Annotated Bibliography of Source Water Materials from EPA:

[http://www.epa.gov/safewater/sourcewater/pubs/qrg\\_swpbib\\_2003.pdf](http://www.epa.gov/safewater/sourcewater/pubs/qrg_swpbib_2003.pdf)

National menu of BMPs from EPA:

<http://cfpub.epa.gov/npdes/stormwater/menuofbmps/index.cfm?action=browse>

Stormwater BMP Handbooks from CASQA:

<http://www.cabmphandbooks.com/>

The Trust for Public Land website:

<http://www.tpl.org/>