United States Environmental Protection Agency | Office of Water (4203) | EPA 833-F-00-007 January 2000 Fact Sheet 2.5

Storm Water Phase II Final Rule

Illicit Discharge Detection and Elimination Minimum Control Measure

This fact sheet profiles the Illicit Discharge Detection and Elimination minimum control measure, one of six measures the operator of a Phase II regulated small municipal separate storm sewer system (MS4) is required to include in its storm water management program to meet the conditions of its National Pollutant Discharge Elimination System (NPDES) permit. This fact sheet outlines the Phase II Final Rule requirements and offers some general guidance on how to satisfy them. It is important to keep in mind that the small MS4 operator has a great deal of flexibility in choosing exactly how to satisfy the minimum control measure requirements.

What Is An "Illicit Discharge"?

Federal regulations define an illicit discharge as "...any discharge to an MS4 that is not composed entirely of storm water..." with some exceptions. These exceptions include discharges from NPDES-permitted industrial sources and discharges from fire-fighting activities. Illicit discharges (see Table 1) are considered "illicit" because MS4s are not designed to accept, process, or discharge such non-storm water wastes.

Table 1

Sources of Illicit Discharges
Sanitary wastewater
Effluent from septic tanks
Car wash wastewaters
Improper oil disposal
Radiator flushing disposal
Laundry wastewaters
Spills from roadway accidents
Improper disposal of auto and household toxics

Why Are Illicit Discharge Detection and Elimination Efforts Necessary?

Discharges from MS4s often include wastes and wastewater from non-storm water sources. A study conducted in 1987 in Sacramento, California, found that almost one-half of the water discharged from a local MS4 was not directly attributable to precipitation runoff. A significant portion of these dry weather flows were from illicit and/or inappropriate discharges and connections to the MS4.

Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, or paint or used oil dumped directly into a drain). The result is untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving waterbodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health.

What Is Required?

Recognizing the adverse effects illicit discharges can have on receiving waters, the final rule requires an operator of a regulated small MS4 to develop, implement and enforce an illicit discharge detection and elimination program. This program must include the following:

- ❑ A storm sewer system map, showing the location of all outfalls and the names and location of all waters of the United States that receive discharges from those outfalls;
- ❑ Through an ordinance, or other regulatory mechanism, a prohibition (to the extent allowable under State, Tribal, or local law) on non-storm water discharges into the MS4, and appropriate enforcement procedures and actions;
- ❑ A plan to detect and address non-storm water discharges, including illegal dumping, into the MS4;
- ❑ The education of public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste; and
- ❑ The determination of appropriate best management practices (BMPs) and measurable goals for this minimum control measure. Some program implementation approaches, BMPs (i.e., the program actions/activities), and measurable goals are suggested below.

Does This Measure Need to Address All Illicit Discharges?

No. The illicit discharge detection and elimination program does not need to address the following categories of non-storm water discharges or flows unless the operator of the regulated small MS4 identifies them as significant contributors of pollutants to its MS4:

- Water line flushing;
- Landscape irrigation;
- Diverted stream flows;
- Rising ground waters;
- Uncontaminated ground water infiltration;
- Uncontaminated pumped ground water;
- Discharges from potable water sources;
- Foundation drains;
- Air conditioning condensation;
- Irrigation water;
- Springs;
- Water from crawl space pumps;
- Footing drains;
- Lawn watering;
- Individual residential car washing;
- Flows from riparian habitats and wetlands;
- Dechlorinated swimming pool discharges; and
- Street wash water.

What Are Some Guidelines for Developing and Implementing This Measure?

The objective of the illicit discharge detection and elimination minimum control measure is to have regulated small MS4 operators gain a thorough awareness of their systems. This awareness allows them to determine the types and sources of illicit discharges entering their system; and establish the legal, technical, and educational means needed to eliminate these discharges. Permittees could meet these objectives in a variety of ways depending on their individual needs and abilities, but some general guidance for each requirement is provided below.

The Map

The storm sewer system map is meant to demonstrate a basic awareness of the intake and discharge areas of the system. It is needed to help determine the extent of discharged dry weather flows, the possible sources of the dry weather flows, and the particular waterbodies these flows may be affecting. An existing map, such as a topographical map, on which the location of major pipes and outfalls can be clearly presented demonstrates such awareness.

EPA recommends collecting all existing information on outfall locations (e.g., review city records, drainage maps, storm drain maps), and then conducting field surveys to verify locations. It probably will be necessary to walk (i.e., wade through small receiving waters or use a boat for larger waters) the streambanks and shorelines for visual observation. More than one trip may be needed to locate all outfalls.

Legal Prohibition and Enforcement

EPA recognizes that some permittees may have limited authority under State, Tribal or local law to establish and enforce an ordinance or other regulatory mechanism prohibiting illicit discharges. In such a case, the permittee is encouraged to obtain the necessary authority, if possible.

The Plan

The plan to detect and address illicit discharges is the central component of this minimum control measure. The plan is dependant upon several factors, including the permittee's available resources, size of staff, and degree and character of its illicit discharges. EPA envisions a plan similar to the one Michigan recommends for use in meeting their NPDES storm

water general permit for small MS4s. As guidance only, the four steps of a recommended plan are outlined below:

❶ **Locate Problem Areas**
EPA recommends that priority areas be identified for detailed screening of the system based on the likelihood of illicit connections (e.g., areas with older sanitary sewer lines). Methods that can locate problem areas include: public complaints; visual screening; water sampling from manholes and outfalls during dry weather; and use of infrared and thermal photography.

❷ **Find the Source**
Once a problem area or discharge is found, additional efforts usually are necessary to determine the source of the problem. Methods that can find the source of the illicit discharge include: dye-testing buildings in problem areas; dye- or smoke-testing buildings at the time of sale; tracing the discharge upstream in the storm sewer; employing a certification program that shows that buildings have been checked for illicit connections; implementing an inspection program of existing septic systems; and using video to inspect the storm sewers.

❸ **Remove/Correct Illicit Connections**
Once the source is identified, the offending discharger should be notified and directed to correct the problem. Education efforts and working with the discharger can be effective in resolving the problem before taking legal action.

❹ **Document Actions Taken**
As a final step, all actions taken under the plan should be documented. This illustrates that progress is being made to eliminate illicit connections and discharges. Documented actions should be included in annual reports and include information such as: the number of outfalls screened; any complaints received and corrected; the number of discharges and quantities of flow eliminated; and the number of dye or smoke tests conducted.

Educational Outreach
Outreach to public employees, businesses, property owners, the general community, and elected officials regarding ways to detect and eliminate illicit discharges is an integral part of this minimum measure that will help gain support for the permittee's storm water program. Suggested educational outreach efforts include:

- Developing ***informative brochures, and guidances*** for specific audiences (e.g., carpet cleaning businesses) and school curricula;
- Designing a program to ***publicize and facilitate public reporting*** of illicit discharges;
- ***Coordinating volunteers*** for locating, and visually inspecting, outfalls or to stencil storm drains; and
- Initiating ***recycling programs*** for commonly dumped wastes, such as motor oil, antifreeze, and pesticides.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect the needs and characteristics of the operator and the area served by its small MS4. Furthermore, they should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could include the following measurable goals:

Target Date	Activity
1 year.....	Sewer system map completed; recycling program for household hazardous waste in place.
2 years.....	Ordinance in place; training for public employees completed; a certain percentage of sources of illicit discharges determined.
3 years.....	A certain percentage of illicit discharges detected; illicit discharges eliminated; and households participating in quarterly household hazardous waste special collection days.
4 years.....	Most illicit discharge sources detected and eliminated.

The educational outreach measurable goals for this minimum control measure could be combined with the measurable goals for the Public Education and Outreach minimum control measure (see Fact Sheet 2.3).

For Additional Information

Contact

☞ U.S. EPA Office of Wastewater Management
- Phone: 202 260-5816
- E-mail: SW2@epa.gov
- Internet: www.epa.gov/owm/sw/phase2

Reference Documents

☞ Storm Water Phase II Final Rule Fact Sheet Series
- Internet: www.epa.gov/owm/sw/phase2

☞ Storm Water Phase II Final Rule (64 *FR* 68722)
- Internet: www.epa.gov/owm/sw/phase2
- Contact the U.S. EPA Water Resouree Center
  - Phone: 202 260-7786
  - E-mail: eenter.water-resource@epa.gov

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Illicit Discharge Detection and Elimination

Identifying Illicit Connections

One of the ways to identify illicit connections is by inspecting storm drain system using video equipment (Source: Drain Patrol, no date)

BMP Topics

BMP Menu

1. Public education & outreach on storm water impacts

2. Public involvement & participation

3. Illicit discharge detection & elimination

4. Construction site storm water runoff control

5. Post-construction storm water management in new development & redevelopment

6. Pollution prevention & good housekeeping for municipal operations

Measurable Goals

Storm Water Phase II

Fact Sheets

Failing septic systems

Industrial/business connections

Recreational sewage

Sanitary sewer overflows

Identifying illicit connections

Wastewater connections to the storm drain

Description

Illicit connections are defined as "illegal and/or improper connections to storm drainage systems and receiving waters" (CWP, 1998). A discharge of industrial wastewater to a storm sewer is "illicit" because it would ordinarily require a permit under the Clean Water Act. Many building owners or operators are not aware that improper connections exist in their facilities. Identifying and removing illicit connections is a measure for reducing storm water pollution. In extreme cases of illicit dumping, legal action is necessary.

From 1987 to 1998, Wayne County, Michigan, investigated 3,851 businesses and industries for illicit connections to the county's storm sewer system. Of those investigated, about 8 percent had illicit connections, and where one illicit connection was found, there was an average of 2.4 improper connects at that business. To prioritize the investigation, the county relied on Standard Industrial Classification (SIC) codes of the businesses. The prioritization system was found to be successful in locating illicit discharges (Johnson and Tuomari, no date; Tuomari, no date). The City of Hialeah, Florida, uses its storm water management plan

system

Illegal dumping

Additional

to emphasize illicit discharge detection and removal as part of its overall monitoring activities. There are at least 252 outfalls in the city, 72 of which drain into city rights-of-way. After considering the costs associated with removing illicit discharges, the city chose a proactive field screening program approach to remove these discharges (City of Hialeah, 1999).

Applicability

Identifying illicit and improper connections are necessary for all sewer systems, especially in areas where pollutants with unknown sources have been detected in receiving waters. The level and types of industrial activities and the surrounding land uses and ordinances will affect the methods used to identify illicit connections.

Implementation

Some practices used to discover and prevent illicit connections are

- Instituting building and plumbing codes to prevent connections of potentially hazardous pollutants to storm drains.
- Organizing structures to be inspected by building age, with older buildings identified as priorities. Buildings whose processes have the potential to affect water quality also should be given priority.

- Mapping each area to be surveyed and indicating the route of the sewer system and the locations of storm drains on the map. This enables planners to estimate the likely locations of illicit connections. A Geographic Information System (GIS) is an appropriate tool for identifying illicit discharges. The location of illicit discharges can be maintained by a geo-coded address. The attributes for illicit discharges are SIC code, owner/occupant information, inspection schedule, inspection dates, and comments (Huey, 2000).

Top

To help municipalities detect illicit connections to storm sewers, the North Central Texas Council of Governments (NCTCOG) used GIS to develop a 1/4-mile grid cell overlay for the entire 16-county NCTCOG region. The initial report suggested that illicit connections were not as prevalent in the North Central Texas area, and sewage material was observed in about 10 percent of the sites (NCTCOG, 2000).

The City of Greensboro, North Carolina, is using GIS technology as part of its storm water management program. This GIS system is used to in conjunction with the program's monitoring aspect to identify illicit connections. More information on this program can be found on their Dynamic Watershed Management Project Web site (Bryant et al., 1999 and City of Greensboro, 2000).

- Survey individual buildings to discover where connections to storm drains exist.
- Inspect sewer lines with television equipment to visually identify all physical connections.
- Compare the results of the field tests and the video inspection with the known connections on the map. Suspicious areas should be further investigated.
- Institute mandatory inspections for new developments or remodeling to

identify illicit connections to the storm sewer system.

- Remove and test sediment from the catch basins or equivalent structures.
- Inspect connections in question to determine whether they should be connected to the storm drain system or to the sanitary sewer. Use methods of identification such as dye testing, visual inspection, smoke testing, or flow monitoring, as described below.
    - *Dye Testing.* Flushing fluorometric dye into suspicious downspouts can be useful to identify illicit connections. Once the dye has been introduced into the storm system via the connection in question, the water in the collection system is monitored to determine whether an illicit connection is present.
    - *Visual Inspection.* Remotely guiding television cameras through sewer lines is another way to identify physical connections.
    - *Smoke Testing.* Smoke testing is another method used to discover illicit connections. Zinc chloride smoke is injected into the sewer line and emerges via vents on connected buildings or through cracks or leaks in the sewer line. Monitoring and recording where the smoke emerges, crews can identify all connections, legal and illegal, to the sewer system. Mechanisms on drains should prevent the smoke from entering buildings; however, in some instances, this will occur. It is important to notify the public that the smoke is non-toxic, though it should be avoided as it can cause irritation of the nose and throat for some people.
    - *Flow Monitoring.* Monitoring increases in storm sewer flows during dry periods can also lead investigators to sources of infiltration due to improper connections.
    - *Infrared, Aerial, and Thermal Photography.* Researchers are experimenting with the use of aerial, infrared, and thermal photography to locate dischargers by studying the temperature of the stream water in areas where algae might be concentrated and in soils. It also examines land surface moisture and vegetative growth. This technique assumes that a failing OSDS, for example, would have more moisture in the surface soil, the area would be warmer, and the vegetation would grow faster than in the surrounding area (Johnson and Tuomari, no date).

On November 17 and 30, 1999, the Arkansas Department of Health used infrared technology to identify illicit discharges from septic systems into Lake Conway, Arkansas. Lake Conway, located in Faulkner County, Arkansas, is a man-made lake used mostly for recreational fishing. Approximately 90 percent of the residents within 1 mile of the lakefront have onsite wastewater treatment systems. Of the 2,500 to 3,500 residents who living within 300 feet of the shoreline, only 250 are connected to the public sewer system. Most of these systems are more than 30 years old and were installed before state regulations. The inspector used a state policy helicopter that was equipped with a Forward Looking Infrared imaging system, video equipment, and a global positioning system. The results of this two-day survey indicated that there are approximately 380 malfunctioning and improperly constructed septic systems within 300 feet of the lakefront (Eddie, 2000). Facility owners should be required to correct the problem by eliminating the discharge and connecting to the sanitary sewer system

Some agencies use a priority system for identifying illicit discharges. According to the Southeast Michigan Council of Governments (1987, cited in Tuomari, no date), a priority scheme for detecting illicit discharges from businesses should be as follows:

1. Automobile-related businesses/facilities and heavy manufacturing
2. Printers, dry cleaners/laundries, photo processors, utilities, paint stores,

water conditioners, chemical laboratories, construction companies, and medium light manufacturing
3. Institutional facilities, private service agencies, retail establishments, and schools

Limitations

There are several limitations to programs to detect illicit connections. First, a local ordinance is necessary to provide investigators with access to private property in order to perform field tests (Ferguson et al. 1997). Second, rain fall can hamper efforts to monitor flows and visual inspections. In addition, smoke testing and dye testing may become more difficult, depending on the severity of the storm event. Smoke testing has roughly the same efficiency as door-to-door investigation, and both smoke and dye testing are more accurate than visual inspection.

Despite the difficulty in identifying these connections due to budget and staff restraints, it is important to understand that these connections are illegal and should be identified and reported regardless of cost. Jurisdictions can offset some of these costs by encouraging the reporting of illicit discharges by employees, thereby saving expense on inspectors and directing resources more efficiently.

Maintenance Considerations

Identifying illicit discharges requires teams of at least two people (volunteers can be used), plus administrative personnel, depending on the complexity of the storm sewer system. To help identify illicit discharges, the City of Raleigh, North Carolina, has illicit discharge regulations and dry weather screening for illicit discharges and connections. By taking baseline samples throughout the city, pollution control efforts can be better established for future identification of illicit discharges. This inventory, combined with the city's mapping effort, will be added to the city's GIS to allow for improved tracking of illicit discharges and spills (City of Raleigh, 1998).

Effectiveness

An illicit discharge detection program can be an effective method to reduce the quantity of industrial or commercial pollutants that enter the storm drain system. For example, the Department of Environmental Protection in Montgomery County, Maryland, has an illicit discharge detection and elimination program called "Pipe Detectives," which uses volunteer monitoring and community hotlines to identify suspicious discharges (MCDEP, 1997). When discharges are reported, DEP consults maps of the surrounding areas and targets those areas for additional monitoring to narrow the search for the illicit connection. In one instance, a "milky white" discharge was reported in an area with many small businesses and large apartment buildings. Businesses were sent informational letters advising them of the illegal discharge and requesting their assistance in identifying it by allowing DEP to survey the properties. Through this cooperative effort, three illicit connections were detected and removed, including a sink that was used to wash paintbrushes (the source of the milky white discharge).

The City of Denver Urban Drainage and Flood Control District (UDFCD) in an independent agency whose functions include master planning, design and construction, maintenance, floodplain management, and management of the South Platte River. The master planning aspect includes major drainageway master planning, outfall systems planning, preparation of drainage criteria manuals for local governments and the district, support of special projects, and

identified $100 million in necessary drainage improvements. The district uses pollutants and education materials to limit illicit discharges to storm drains (City of Indianapolis and Marion County, 2000).

As part of the Rogue River National Wet Weather Demonstration Project, Wayne County, Michigan, offers training for illicit discharge elimination. Four training courses are offered: Overview, Basic Investigations, Advanced Investigations, and Prevention of Construction-Related Illicit Discharges. More information on these training opportunities can be found at *http://www.wcdoe.org/rougeriver/techtop/index.html*.

EPA's Surf Your Watershed (*http://www.epa.gov/surf*) can help citizens and business/industry owners identify into which watershed their storm drains flow.

The Conservation Technology Information Center (CTIC), a non-profit data and technology information transfer center, has created *Know Your Watershed* (*www.ctic.purdue.edu/KYW*). This web site allows individuals to learn their watershed address by entering their city, county, or river name, or their ZIP code.

Cost Considerations

The cost of smoke testing, dye testing, visual inspection, and flow monitoring can be significant and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary. Case studies in Michigan have estimated the cost of two field staff and required support at $182,000 to $187,000 annually (Ferguson et al., 1997). Wayne County's budget for illicit detection investigations was $735,151 from 1996 to 1997 and $599,041 for 1997 through 1998 (Johnson and Tuomari, no date).

Many programs offset some of their cost by encouraging the reporting of illicit discharges by employees, thereby saving expense on inspectors and directing resources more efficiently. Programs have also saved money by using student interns to locate and map dry weather flows from outfalls, or by contracting with academic institutions to perform outfall monitoring.

Some programs have used funds available from "environmental fees" or special assessment districts to fund their illicit connection elimination programs. The Huron River Pollution Abatement Project used annual assessments of the city of Ann Arbor and a per parcel basis for the rest of the district to fund the costs of illicit connection removal efforts. The project provided Washtenaw County with a total of $1.7 million over the life of the program to finance their efforts. Fort Worth, Texas, charges an "environmental fee" to local residents and businesses to fund storm water-related efforts, including illicit connection detection. Approximately $2.5 million dollars a year is raised through these fees.

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Once the source is identified, the offending discharger should be notified and directed to correct the problem. Education efforts and working with the discharger can be effective in resolving the problem before taking legal action.

❹ Document Actions Taken

As a final step, all actions taken under the plan should be documented. This illustrates that progress is being made to eliminate illicit connections and discharges. Documented actions should be included in annual reports and include information such as: the number of outfalls screened; any complaints received and corrected; the number of discharges and quantities of flow eliminated; and the number of dye or smoke tests conducted.

Educational Outreach

Outreach to public employees, businesses, property owners, the general community, and elected officials regarding ways to detect and eliminate illicit discharges is an integral part of this minimum measure that will help gain support for the permittee's storm water program. Suggested educational outreach efforts include:

- Developing ***informative brochures, and guidances*** for specific audiences (e.g., carpet cleaning businesses) and school curricula;
- Designing a program to ***publicize and facilitate public reporting*** of illicit discharges;
- ***Coordinating volunteers*** for locating, and visually inspecting, outfalls or to stencil storm drains; and
- Initiating ***recycling programs*** for commonly dumped wastes, such as motor oil, antifreeze, and pesticides.

What Are Appropriate Measurable Goals?

Measurable goals, which are required for each minimum control measure, are intended to gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, should reflect the needs and characteristics of the operator and the area served by its small MS4. Furthermore, they should be chosen using an integrated approach that fully addresses the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could include the following measurable goals:

Target Date	Activity
1 year.....	Sewer system map completed; recycling program for household hazardous waste in place.
2 years.....	Ordinance in place; training for public employees completed; a certain percentage of sources of illicit discharges determined.
3 years.....	A certain percentage of illicit discharges detected; illicit discharges eliminated; and households participating in quarterly household hazardous waste special collection days.
4 years.....	Most illicit discharge sources detected and eliminated.

The educational outreach measurable goals for this minimum control measure could be combined with the measurable goals for the Public Education and Outreach minimum control measure (see Fact Sheet 2.3).

For Additional Information

Contact

☞ U.S. EPA Office of Wastewater Management
- Phone: 202 260-5816
- E-mail: SW2@epa.gov
- Internet: www.epa.gov/owm/sw/phase2

Reference Documents

☞ Storm Water Phase II Final Rule Fact Sheet Series
- Internet: www.epa.gov/owm/sw/phase2

☞ Storm Water Phase II Final Rule (64 *FR* 68722)
- Internet: www.epa.gov/owm/sw/phase2
- Contact the U.S. EPA Water Resource Center
  - Phone: 202 260-7786
  - E-mail: center.water-resource@epa.gov

Sources

Maryland Department of the Environment, Water Management Administration. 1997. *Dry Weather Flow and Illicit Discharges in Maryland Storm Drain Systems.* Baltimore, Maryland.

U.S. EPA Office of Water. 1993. *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems: A User's Guide.* EPA/600/R-92/238. Washington, D.C.

Wayne County Rouge River National Wet Weather Demonstration Project. 1997. *Guidance for Preparing a Program for the Elimination of Illicit Discharges.* Wayne County, Michigan.

Faxed to: Leslie Calderon

ILLICIT DISCHARGE DETECTION AND ELIMINATION REGIONAL FORUM

Evaluation Form

In order to help us determine the success of this event in meeting your needs and expectations please take a few moments to write down your comments and suggestions. Your input is very valuable and will help us to formulate the regional strategy and plan accordingly for upcoming forums.

Content:
How beneficial were the topics that were addressed during the presentations?

Not at All Somewhat (Very) Extremely Beneficial

Which topics or presentations did you find most beneficial? GIS topics

Which topics or presentations did you find least beneficial? Wayne County MI. speaker

What other topics could have been included in the forum? Recommendations for a small city

Would you like to see additional forums on this topic? No

What could we as a region undertake cooperatively in the area of Illicit Discharge Detection and Elimination?

Mapping
Sampling

Format:
Do you feel the format and length of the forum was appropriate? (Yes) No
Was the allocated time for each presentation sufficient? Yes (No)
Overall, how satisfied are you with the event?

Not Satisfied Somewhat (Very) Extremely Satisfied

Considering the accessibility of the Grapevine Convention Center and its amenities (size, space, etc.) would you recommend having future forums at this location? (Yes) No

Please include any other feedback comments and suggestions:
Too many speakers including COG staff are not speaking clearly - not speaking to the person in the "back row". Technique needs improvement. Never enough time left for questions. Questions asked to be held often don't get asked.

Please return this form to Leslie Calderon via fax at 817/695-9191or mail at P.O. Box 5888, Arlington, TX 76005 by November 12. Thank you for your feedback.

Uniter ıtes
Envirc .ental Protection
Agency

Office of Water
(4203)

EPA 833-F-99-007
April 1999
Fact Sheet 2.5

EPA

Storm Water Phase II Proposed Rule

Illicit Discharge Detection and Elimination Minimum Control Measure

Storm Water Phase II Proposed Rule Fact Sheet Series

This fact sheet is based on the Storm Water Phase II Proposed Rule. Therefore, the information provided herein is subject to change upon publication of the final Phase II rule in November 1999. A revised series of fact sheets will be provided at that time. A comprehensive list of the current fact sheets is in the text box at left.

This fact sheet profiles the proposed Illicit Discharge Detection and Elimination minimum control measure, one of six measures the owner or operator of a Phase II regulated small municipal separate storm sewer system (MS4) would be required to include its storm water management program to meet the conditions of its National Pollutant Discharge Elimination System (NPDES) permit. This fact sheet outlines the Phase II Proposed Rule requirements and offers some general guidance on how to satisfy them. It is important to keep in mind that the small MS4 owner or operator would have a great deal of flexibility in choosing exactly how to satisfy the minimum control measure requirements.

What Is An "Illicit Discharge"?

Federal regulations define an illicit discharge as "...any discharge to an MS4 that is not composed entirely of storm water..." with some exceptions. These exceptions include discharges from NPDES-permitted industrial sources and discharges from fire-fighting activities. Illicit discharges (see Table 1) are considered "illicit" because MS4s are not designed to accept, process, or discharge such non-storm water wastes.

Why Are Illicit Discharge Detection and Elimination Efforts Necessary?

Discharges from MS4s often include wastes and wastewater from non-storm water sources. A study conducted in 1987 in Sacramento, California, found that almost one-half of the water discharged from a local MS4 was not directly attributable to precipitation runoff. A significant portion of these dry weather flows were from illicit and/or inappropriate discharges and connections to the MS4.

Table 1

Sources of Illicit Discharges
Sanitary wastewater
Effluent from septic tanks
Car wash wastewaters
Improper oil disposal
Radiator flushing disposal
Sump pump discharges
Laundry wastewaters
Spills from roadway accidents
Improper disposal of auto and household toxics

Illicit discharges enter the system through either direct connections (e.g., wastewater piping either mistakenly or deliberately connected to the storm drains) or indirect connections (e.g., infiltration into the MS4 from cracked sanitary systems, spills collected by drain outlets, or paint or used oil dumped directly into a drain). The result is untreated discharges that contribute high levels of pollutants, including heavy metals, toxics, oil and grease, solvents, nutrients, viruses, and bacteria to receiving waterbodies. Pollutant levels from these illicit discharges have been shown in EPA studies to be high enough to significantly degrade receiving water quality and threaten aquatic, wildlife, and human health.

What Is EPA Proposing?

Recognizing the adverse effects illicit discharges can have on receiving waters, the proposed rule would require an owner or operator of a regulated small MS4 to develop and implement an illicit discharge detection and elimination program. This program would need to include the following:

- ❑ A storm sewer system map showing the location of major pipes, outfalls, and topography. In addition, if such data exist, the map needs to show the areas of concentrated activities that are likely to be sources of pollution;
- ❑ Through an ordinance, order, or similar means, a prohibition (to the extent allowable under State, Tribal, or local law) on illicit discharges into the MS4, and appropriate enforcement procedures and actions;
- ❑ A plan to detect and address illicit discharges, including illegal dumping, into the MS4;
- ❑ The education of public employees, businesses, and the general public about the hazards associated with illegal discharges and improper disposal of waste; and
- ❑ The determination of appropriate best management practices (BMPs) and measurable goals for this minimum control measure. Some program implementation approaches, BMPs (i.e., the program actions/activities), and measurable goals are suggested below.

Would This Measure Need to Address All Illicit Discharges?

No. The illicit discharge detection and elimination program would not need to address the following categories of non-storm water discharges or flows unless the owner or operator of the regulated small MS4 identifies them as significant contributors of pollutants to its MS4:

- Water line flushing;
- Landscape irrigation;
- Diverted stream flows;
- Rising ground waters;
- Uncontaminated ground water infiltration;
- Uncontaminated pumped ground water;
- Discharges from potable water sources;
- Foundation drains;
- Air conditioning condensation;
- Irrigation water;
- Springs;
- Water from crawl space pumps;
- Footing drains;
- Lawn watering;
- Individual residential car washing;
- Flows from riparian habitats and wetlands;
- Dechlorinated swimming pool discharges; and
- Street wash water.

What Are Some Guidelines for Developing and Implementing This Measure?

The objective of the illicit discharge detection and elimination minimum control measure is to have regulated small MS4 owners and operators gain a thorough awareness of their systems. This awareness allows them to determine the types and sources of illicit discharges entering their system, and establish the legal, technical, and educational means to attempt to eliminate these discharges. Permittees could meet these objectives in a variety of ways depending on their individual needs and abilities, but some general guidance for each requirement is provided below.

The Map

The storm sewer system map is meant to demonstrate a basic awareness of the intake and discharge areas of the system. It is needed to help determine the extent of discharged dry weather flows, the possible sources of the dry weather flows, and the particular waterbodies these flows may be affecting. Since the location of the major pipes and outfalls could be indicated on an existing topographical map, a new map would not need to be created specifically for this purpose as long as the information is clearly presented on the existing map. The permittee would be allowed to choose the type and size of map that best fits its needs.

EPA recommends collecting all existing information on outfall locations (e.g., review city records, drainage maps, storm drain maps), and then conducting field surveys to verify locations. It probably will be necessary to walk (i.e., wade through small receiving waters or use a boat for larger waters) the streambanks and shorelines for visual observation. It may take more than one trip to locate all outfalls.

Legal Prohibition and Enforcement

EPA recognizes that some permittees may have limited authority under State or Tribal law to establish and enforce an ordinance, or similar means, prohibiting illicit discharges. In such a case, the permittee would be encouraged to obtain the necessary authority, if at all possible. Otherwise, the NPDES permitting authority would assume the responsibility for implementation of this component of the minimum measure, yet the permittee would remain ultimately responsible for the quality of its MS4 discharge. Model ordinances, including examples of amendments to local codes or existing ordinances, will be provided in the Phase II storm water guidance for regulated small MS4s, which is part of EPA's planned implementation "tool box" for the final rule (see Fact Sheet 1.0).

The Plan

The plan to detect and address illicit discharges is the central component of this minimum control measure. The plan would be shaped by several factors, including the permittee's available resources, size of staff, and degree and character of its illicit discharges. EPA envisions a plan similar to the one recommended for use in meeting Michigan's general storm water NPDES permit for small MS4s. As guidance only, the four steps of a recommended plan are outlined below:

❶ **Locate Problem Areas**

EPA recommends that priority areas be identified for detailed screening of the system based on the likelihood of illicit connections (e.g., areas with older sanitary sewer lines). Some methods that could be used to locate problem areas include: public complaints and other input; visual screening; water sampling from manholes and outfalls during dry weather; and use of infrared and thermal photography.

❷ **Find the Source**

Once a problem area or discharge is found, additional efforts usually would be necessary to determine the source of the problem. Some methods that could be used to find the source of the illicit discharge include: dye-testing buildings in problem areas; dye- or smoke-testing buildings at the time of sale; tracing the discharge upstream in the storm sewer; employing a certification program that shows that buildings have been checked for illicit connections; implementing an inspection program of existing septic systems; and using video to inspect the storm sewers.

❸ **Remove/Correct Illicit Connections**

Once the source is identified, the offending discharger would need to be notified and directed to correct the problem. Education efforts and working with the discharger can be effective in resolving the problem before taking legal action.

❹ **Document Actions Taken**

As a final step, all actions taken under the plan should be documented. Doing so would illustrate that progress is being made to eliminate illicit connections and discharges. Documented actions should be included in the required annual reports and include information such as: the number of outfalls screened; any complaints received and corrected; the number of discharges and quantities of flow eliminated; and the number of dye or smoke tests conducted.

Educational Outreach

Educational outreach to public employees, businesses, property owners, the general community, and elected officials would be necessary to inform them of what they could do to detect and eliminate illicit discharges, but it would also help to gain support for the permittee's storm water program. The educational outreach efforts should, at a minimum, include:

- Providing ***training programs*** for public employees;
- Developing ***informative brochures, and guidances*** for specific audiences (e.g., carpet cleaning businesses) and school curricula;
- Designing a program to ***publicize and facilitate public reporting*** of illicit discharges;
- ***Coordinating volunteers*** for locating, and visually inspecting, outfalls or to stencil storm drains; and
- Initiating ***recycling programs*** for commonly dumped wastes, such as motor oil, antifreeze, and pesticides.

What Would Be Appropriate Measurable Goals?

Measurable goals, which would be required for each minimum control measure, are meant to help gauge permit compliance and program effectiveness. The measurable goals, as well as the BMPs, would greatly depend on the needs and characteristics of the owner/operator and the area served by its small MS4. The measurable goals should be chosen using an integrated approach that would fully address the requirements and intent of the minimum control measure. An integrated approach for this minimum measure could include the following measurable goals:

Target Date	Activity
1 year.....	Sewer system map completed; recycling program for household hazardous waste in place.
2 years.....	Ordinance in place; training for public employees completed; a certain percentage of sources of illicit discharges determined.
3 years.....	A certain percentage of: illicit discharges determined; illicit discharges eliminated; and households participating in quarterly household hazardous waste special collection days.
4 years.....	Most illicit discharge sources determined and eliminated.

The educational outreach measurable goals for this minimum control measure could be combined with the measurable goals for the Public Education and Outreach minimum control measure (see Fact Sheet 2.3).

For Additional Information

Contact

☞ U.S. EPA Office of Wastewater Management
- Phone : 202 260-5816
- E-mail: SW2@epa.gov
- Internet: www.epa.gov/owm/sw2.htm

Reference Documents

☞ Storm Water Phase II Proposed Rule Fact Sheet Series.
- Contact the U.S. EPA Water Resource Center at 202 260-7786 or at waterpubs@epa.gov
- Internet: www.epa.gov/owm/sw2.htm

☞ Storm Water Phase II Proposed Rule, published on Jan. 9, 1998 in the *Federal Register* (63 FR 1536).
- Internet: www.epa.gov/owm/sw2.htm

Sources

Maryland Department of the Environment, Water Management Administration. 1997. *Dry Weather Flow and Illicit Discharges in Maryland Storm Drain Systems*. Baltimore, Maryland.

U.S. EPA Office of Water. 1993. *Investigation of Inappropriate Pollutant Entries into Storm Drainage Systems: A User's Guide*. EPA/600/R-92/238. Washington, D.C.

Wayne County Rouge River National Wet Weather Demonstration Project. 1997. *Guidance for Preparing a Program for the Elimination of Illicit Discharges*. Wayne County, Michigan.

State will be permitting authority Not EPA

PHASE II SMALL MS4s

REQUIRED LEGAL AUTHORITY TO CONTROL ILLICIT DISCHARGES

40 C.F.R. § 122.26(b).

(2) *Illicit discharge* means any discharge to a municipal separate storm sewer that is not composed entirely of storm water except discharges pursuant to a NPDES permit (other than the NPDES permit for discharges from the municipal separate storm sewer) and discharges resulting from fire fighting activities.

* * *

(13) *Storm water* means storm water runoff, snow melt runoff, and surface runoff and drainage.

40 C.F.R. § 122.34(b)(3).

Illicit discharge detection and elimination. You must:

* * *

(ii) To the extent allowable under State or Tribal law, effectively prohibit, through ordinance, order, or similar means, illicit discharges into your storm sewer system and implement appropriate enforcement procedures and actions;

(iii) Implement a plan to detect and address illicit discharges, including illegal dumping, to your system.

MODEL ORDINANCE PROVISIONS TO CONTROL ILLICIT DISCHARGES

II. GENERAL PROHIBITION

A. No person shall introduce or cause to be introduced into the municipal separate storm sewer system (MS4) any discharge that is not composed entirely of storm water.

B. It is an affirmative defense to any enforcement action for violation of Subsection A of this section that the discharge was composed entirely of one or more of the following categories of discharges:

1. A discharge authorized by, and in full compliance with, an NPDES permit (other than the NPDES permit for discharges from the MS4);

2. A discharge or flow resulting from fire fighting by the Fire Department;

3. A discharge or flow of fire protection water that does not contain oil or hazardous substances or materials [that the Fire Code in this Code of Ordinances requires to be contained and treated prior to discharge, in which case treatment adequate to remove harmful quantities of pollutants must have occurred prior to discharge];

4. Agricultural storm water runoff;

5. A discharge or flow from water line flushing, but not including a discharge from water line disinfection by superchlorination or other means unless [the total residual chlorine (TRC) has been reduced to less than _____ mg/l and] it contains no harmful quantity of [chlorine or] any [other] chemical used in line disinfection;

6. A discharge or flow from lawn watering, [or] landscape irrigation [, or other irrigation water];

7. A discharge or flow from a diverted stream flow or natural spring;

8. A discharge or flow from uncontaminated pumped groundwater or rising groundwater;

9. Uncontaminated groundwater infiltration (as defined as 40 C.F.R. § 35.2005(20)) to the MS4;

10. Uncontaminated discharge or flow from a foundation drain, crawl space pump, footing drain [, or sump pump];

11. A discharge or flow from a potable water source not containing any harmful substance or material from the cleaning or draining of a storage tank or other container;

12. A discharge or flow from air conditioning condensation that is unmixed with water from a cooling tower, emissions scrubber, emissions filter, or any other source of pollutant;

13. A discharge or flow from individual residential car washing;

14. A discharge or flow from a riparian habitat or wetland;

15. A discharge or flow from water used in street washing that is not contaminated with any soap, detergent, degreaser, solvent, emulsifier, dispersant, or any other harmful cleaning substance;

[16. Storm water runoff from a roof that is not contaminated by any runoff or discharge from an emissions scrubber or filter or any other source of pollutant;]

17. Swimming pool water [that has been dechlorinated so that total residual chlorine (TRC) is less than _____ mg/l and] that contains no harmful quantity of [chlorine,] muriatic acid or other chemical used in the treatment or disinfection of the swimming pool water or in pool cleaning.

C. No affirmative defense shall be available under Subsection B of this section if the discharge or flow in question has been determined by the [City Engineer] to be a source of a pollutant or pollutants to the waters of the United States [or to the MS4], written notice of such determination has been provided to the discharger, and the discharge has occurred more than 15[?] days beyond such notice. The correctness of the [City Engineer's] determination that a discharge is a source of a pollutant or pollutants may be reviewed in any administrative or judicial enforcement proceeding.

III. SPECIFIC PROHIBITIONS AND REQUIREMENTS

A. The specific prohibitions and requirements in this section are not [necessarily] inclusive of all the discharges prohibited by the general prohibition in Section II.

B. No person shall introduce or cause to be introduced into the MS4 any discharge that causes or contributes to causing the City to violate a water quality standard, the City's NPDES permit, or any state-issued discharge permit for discharges from its MS4.

C. No person shall dump, spill, leak, pump, pour, emit, empty, discharge, leach, dispose, or otherwise introduce or cause, allow, or permit to be introduced any of the following substances into the MS4:

1. Any used motor oil, antifreeze, or any other motor vehicle fluid;

2. Any industrial waste;

3. Any hazardous waste, including hazardous household waste;

4. Any domestic sewage or septic tank waste, grease trap waste, or grit trap waste;

5. Any garbage, rubbish, or yard waste;

6. Any wastewater from a commercial carwash facility; from any vehicle washing, cleaning, or maintenance at any new or used automobile or other vehicle dealership, rental agency, body shop, repair shop, or maintenance facility; or from any washing, cleaning, or maintenance of any business or commercial or public service vehicle, including a truck, bus, or heavy equipment, by a business or public entity that operates more than 2[?] such vehicles;

7. Any wastewater from the washing, cleaning, de-icing, or other maintenance of aircraft;

8. Any wastewater from a commercial mobile power washer or from the washing or other cleaning of a building exterior that contains any soap, detergent, degreaser, solvent, or any other harmful cleaning substance;

9. Any wastewater from [commercial?] floor, rug, or carpet cleaning;

10. Any wastewater from the washdown or other cleaning of pavement that contains any harmful quantity of soap, detergent, solvent, degreaser, emulsifier, dispersant, or any other harmful cleaning substance; or any wastewater from the washdown or other cleaning of any pavement where any spill, leak, or other release of oil, motor fuel, or other petroleum or hazardous substance has occurred, unless all harmful quantities of such released material have been previously removed;

11. Any effluent from a cooling tower, condenser, compressor, emissions scrubber, emissions filter, or the blowdown from a boiler;

12. Any ready-mixed concrete, mortar, ceramic, or asphalt base material or hydromulch material, or material from the cleaning of [commercial?] vehicles or equipment containing, or used in transporting or applying, such material;

13. Any runoff or washdown water from any animal pen, kennel, or foul or livestock containment area [containing more than _____ animals];

14. Any filter backwash from a swimming pool, [or] fountain [, or spa];

15. Any swimming pool water containing [total residual chlorine (TRC) of _____ mg/l or more or containing] any harmful quantity of [chlorine,] muriatic acid or other chemical used in the treatment or disinfection of the swimming pool water or in pool cleaning;

16. Any discharge from water line disinfection by superchlorination or other means if [the total residual chlorine (TRC) is at __ mg/l or more or if] it contains any harmful quantity of [chlorine or] any other chemical used in line disinfection;

17. Any fire protection water containing oil or hazardous substances or materials [that the Fire Code in this Code of Ordinances requires to be contained and treated prior to discharge, unless treatment adequate to remove pollutants occurs prior to discharge. (This prohibition does not apply to discharges or flow from fire fighting by the Fire Department.)];

18. Any water from a water curtain in a spray room used for painting vehicles or equipment;

19. Any contaminated runoff from a vehicle salvage yard;

20. Any substance or material that will damage, block, or clog the MS4;

21. Any release from a petroleum storage tank (PST), or any leachate or runoff from soil contaminated by a leaking PST, or any discharge of pumped, confined, or treated wastewater from the remediation of any such PST release, unless the discharge satisfies all of the following criteria:

    (a) Compliance with all state and federal standards and requirements;

    (b) No discharge containing a harmful quantity of any pollutant; [and]

    (c) No discharge containing more than 50 parts per billion of benzene; 500 parts per billion combined total quantities of benzene, toluene, ethylbenzene, and xylene (BTEX); or 15 mg/l of total petroleum hydrocarbons (TPH).

D. No person shall introduce or cause to be introduced into the MS4 any harmful quantity of sediment, silt, earth, soil, or other material associated with clearing, grading, excavation or other construction activities [, or associated with landfilling or other placement or disposal of soil, rock, or other earth materials,] in excess of what could be retained on site or captured by employing sediment and erosion control measures to the maximum extent practicable [under prevailing circumstances].

E. No person shall connect a line conveying sanitary sewage, domestic or industrial, to the MS4, or allow such a connection to continue.

F. No person shall cause or allow any pavement washwater from a service station to be discharged into the MS4 unless such washwater has passed through a properly functioning and maintained, grease, oil, and sand interceptor before discharge into the MS4.

G. Used Oil Regulation

1. No person shall:

(a) Discharge used oil into the MS4 or a sewer, drainage system, septic tank, surface water, groundwater, or water course;

(b) Knowingly mix or commingle used oil with solid waste that is to be disposed of in a landfill or knowingly directly dispose of used oil on land or in a landfill;

(c) Apply used oil to a road or land for dust suppression, weed abatement, or other similar use that introduces used oil into the environment.

H. [A particular city may want to include, or retain from existing ordinances, certain "nuisance" provisions requiring removal of trash and debris from property, prohibiting stagnant water from being allowed to stand on property, and prohibiting storage of toxic or hazardous substances on property so as to allow exposure to precipitation and storm water runoff, etc.]

I. [A particular city may want to include any provisions deemed necessary to protect special local features critical to control of storm water runoff -- for example, wetlands, swales, or ponds.]

Smaller cities gear up for new EPA regulations

The coming spring promises the typical spate of thunderstorms, warmer temperatures, and bright greens of new growth. But for many smaller cities and counties located in urban areas, future showers will also bring new worries in the form of storm water compliance costs.

Larger cities have already begun implementing storm water programs under Phase I of the Environmental Protection Agency's National Pollutant Discharge Elimination System (NPDES) regulations. With the release of Phase II now expected by September 1999, cities with populations under 100,000 will also be required to develop extensive local storm water management programs to meet NPDES storm water regulations proposed in January 1998.

"To satisfy the proposed permit conditions, the Phase II programs will likely need to include storm water ordinances tailored to local conditions, public information campaigns, and enforcement activities targeting illicit storm water discharges," says Steve Veal, senior vice president and head of Carter & Burgess' Environmental Division.

The costs of compliance

EPA estimates smaller cities will spend between $1.39 and $7.83 per capita on storm water compliance during the first five-year permit term. In other words, the "average" city of 50,000 may spend in excess of $200,000 complying with Phase II over the next five years. Many larger cities have already spent several million dollars to comply with similar storm water regulations under Phase I, far exceeding EPA's original estimate of $35,000 to $75,000 per permit.

Cities are not the only ones who will feel the pinch. The proposed regulations will also likely require NPDES permits for construction activities involving as little as one acre (the current standard is five acres), including parcels under an acre that are part of a larger development. On top of the one-acre requirement, Phase II cities will be required to aggressively monitor construction sites.

The new rules will automatically affect cities with populations less than 100,000 that are located in census-defined urban areas, requiring such cities to obtain permit coverage for storm water discharges from their municipal separate storm sewer systems (MS4s). Small MS4s also include systems operated by state departments of transportation and state, tribal, and federal facilities, such as military installations, penitentiaries, universities, and similar institutions with separate storm sewers.

Under the proposed Phase II regulations, all non-Phase I small MS4s in urbanized areas will be required to apply for NPDES permit coverage by May 31, 2002. Permit coverage is likely to be afforded by a general permit system. In addition to this national automatic designation, each NPDES permitting authority may make designations based on local, watershed-based water quality needs. At this time, more than 35 states are authorized to administer the NPDES program. EPA acts as the NPDES permitting authority in non-authorized states. (The Texas Natural Resource Conservation Commission recently applied for, and was granted, NPDES permitting authority in the state, effective September 1998.)

"For those cities and counties required to develop a storm water permit application or notice of intent in Phase II, the year 2002 isn't very far away," says Veal. "It would be in their best interest to begin planning now for the best way to meet potential storm water permit requirements, including inventorying their storm drainage systems and budgeting for future compliance costs."

Each NPDES permitting authority will be required to select sources of storm water discharges not automatically designated by the Phase II regulations. In addition, permitting authorities are to develop criteria to evaluate whether a storm water discharge exceeds, or would potentially exceed, water quality. According to EPA, local conditions or watershed and total maximum daily load (TMDL) assessments could be used to make exceedance determinations. Once an NPDES permitting authority develops its designation criteria, it must apply these criteria to all non-urban MS4s in places with a population of 10,000 or more and a population density exceeding 1,000 per square mile.

EPA further recommends that each permitting authority consider designating other non-urban MS4s for permit coverage on the basis of water quality impacts. Designation criteria may include discharges to sensitive waters, high growth or growth potential, high population density, contiguity to an urbanized area, significant contribution of pollutants to "waters of the U.S.," and ineffective control of water quality concerns by other programs.

Proposed control measures

To satisfy the new Phase II regulations, regulated cities and counties will need to implement the following measures at a minimum:

- Adopt ordinances to regulate storm water discharges from construction sites disturbing one or more acres of land.
- Develop and enforce programs to address storm water runoff from new development and redevelopment, including: (a) ordinances limiting growth, (b) ordinances protecting sensitive areas, (c) ordinances minimizing impervious ground cover, and (d) ordinances maintaining open spaces.
- Develop a system for detecting and eliminating illicit discharges, including adopting ordinances prohibiting such discharges and implementing an inspection program.
- Develop an education and outreach program for their communities.
- Reduce pollutant runoff from municipal operations by imposing certain best management practices (BMPs).
- Comply with any state and local public notice requirements and public participation initiatives in the adoption, implementation, and enforcement of storm water management programs.

"Ultimately, Phase II programs will be quite similar to those adopted by Phase I cities," says Candace Watkins, senior storm water engineer at Carter & Burgess. "In the proposed Phase II regulations, EPA places significant emphasis on development controls—controls that could become the focal point for heated political discussions in small, rapidly growing cities."

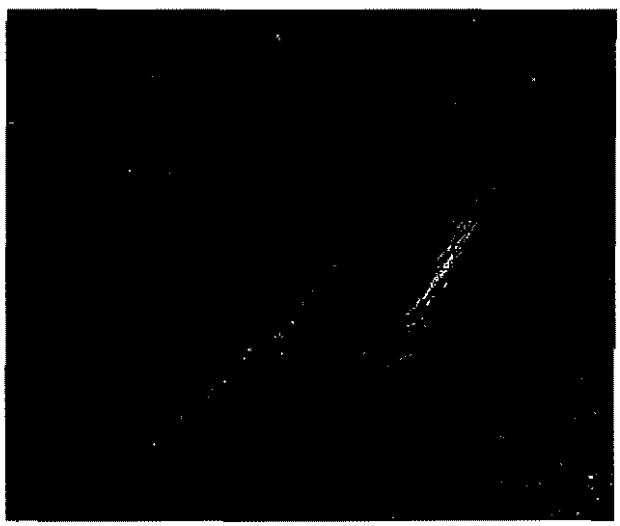
According to Veal, Phase II implementation may prove particularly difficult for many counties, since counties often have limited regulatory authority.

Permit options

EPA anticipates developing a general permit for Phase II regulated MS4s. The general permit has not yet been proposed, and EPA has not indicated when such a permit will be available for review and comment. The proposed regulations do allow applicants up to three years to apply for an individual permit, if they choose not to be covered by the general permit.

Funding compliance

As noted above, compliance costs for Phase II cities could be significant. Many Phase I cities—and some proactive Phase II cities—have implemented storm water utilities to fund compliance costs. Monthly storm water utility fees in those cities generally range from $1 to $10 for a typical residence. ■



With the release of Phase II regulations, cities with populations under 100,000 will be required to develop extensive local storm water management programs to meet NPDES storm water regulation proposed early in 1998.

Technically Speaking . . .

A special report from Carter & Burgess, Inc. *Summer 1998*

Construction Sites as Small as 1 Acre To Be Regulated

EPA Storm Water Regulations Proposed for Smaller Cities

Smaller cities and counties can expect to pay millions to meet initial paperwork and ongoing recordkeeping requirements. Additional compliance costs could easily top $100,000 annually.

Thousands of urban cities and counties nationwide will soon be required to develop extensive local storm water management programs to meet regulations proposed earlier this year by the Environmental Protection Agency. To satisfy proposed permit conditions, the programs will likely need to include storm water ordinances tailored to local conditions, controls for developing areas, public information campaigns and enforcement activities targeting illicit storm water discharges.

EPA estimates smaller cities will spend between $1.39 and $7.83 per capita during the first 5-year permit term. In other words, an "average" city of 50,000 may spend in excess of $200,000 for compliance during the first permit term. Many larger cities have already spent several million dollars to comply with similar storm water regulations, far exceeding the EPA's original estimate of $35,000 to $75,000 per permit.

The new rules will automatically affect cities with populations less than 100,000 that are located in census-defined urban areas.

The proposed regulations also require permits for construction activities involving as little as one acre (the current standard is five acres), including parcels under an acre that are part of a larger development.

EPA proposed Phase II regulations for the National Pollutant Discharge Elimination System (NPDES) on January 9, 1998 and is expected to adopt the proposed regulations by March 1, 1999. The new rules will automatically affect cities with populations fewer than 100,000 that are located in census-defined urban areas, requiring such cities to obtain permit coverage for storm water discharges from their municipal separate storm sewer systems (MS4s). MS4s in unincorporated areas located in urbanized portions of counties are also covered by Phase II. Small MS4s also include systems operated by state departments of transportation and state, tribal and federal facilities, such as military installations, penitentiaries, universities and similar institutions with separate storm sewers.

(continued on page 2 . . .)

Inside

Carter-Burgess

Consultants in Planning, Engineering, Architecture, Construction Management, and Related Services

"For those cities and counties required to develop a storm water permit application or notice of intent in Phase II, the year 2001 isn't very far away."

(. . . continued from page 1)

Cities with populations exceeding 100,000 are already covered by Phase I of the NPDES program.

Under the proposed Phase II regulations, all non-Phase I small MS4s in urbanized areas will be required to apply for NPDES permit coverage by May 31, 2002. In addition to this national automatic designation, each NPDES permitting authority may make designations based on local, watershed-based water quality needs. At this time, 38 states are authorized to administer the NPDES program. EPA acts as the NPDES permitting authority in the remaining 12 states, including Texas.

"For those cities and counties required to develop a storm water permit application or notice of intent in Phase II, the year 2001 isn't very far away," said Steve Veal, head of the Environmental Division at Carter & Burgess.

"It would be in their best interest to begin planning now for the best way to meet potential storm water permit requirements, including inventorying their storm drainage systems and budgeting for future compliance costs."

Each NPDES permitting authority will be required to designate sources of storm water discharges not automatically designated by the Phase II regulations. In addition, permitting authorities are to develop criteria to evaluate whether a storm water discharge exceeds, or would potentially exceed, water quality. According to EPA, local conditions or watershed and total maximum daily load (TMDL) assessments could be used to make exceedance determinations. Once an NPDES permitting authority develops its designation criteria, it must apply these criteria to all non-urban MS4s in places with a population of 10,000 or more and a population density exceeding 1,000 per square mile.

EPA further recommends that each permitting authority consider designating other non-urban MS4s for permit coverage on the basis of water quality impacts. Designation criteria may include discharges to sensitive waters, high growth or growth potential, high population density, contiguity to an urbanized area, significant contribution of pollutants to waters of the United States and ineffective control of water quality concerns by other programs.

A city located in an urbanized area but with fewer than 1,000 people may apply for a permit waiver under the proposed rules, if water quality modeling indicates the city's storm water discharges do not contribute to water quality violations within the applicable watershed.

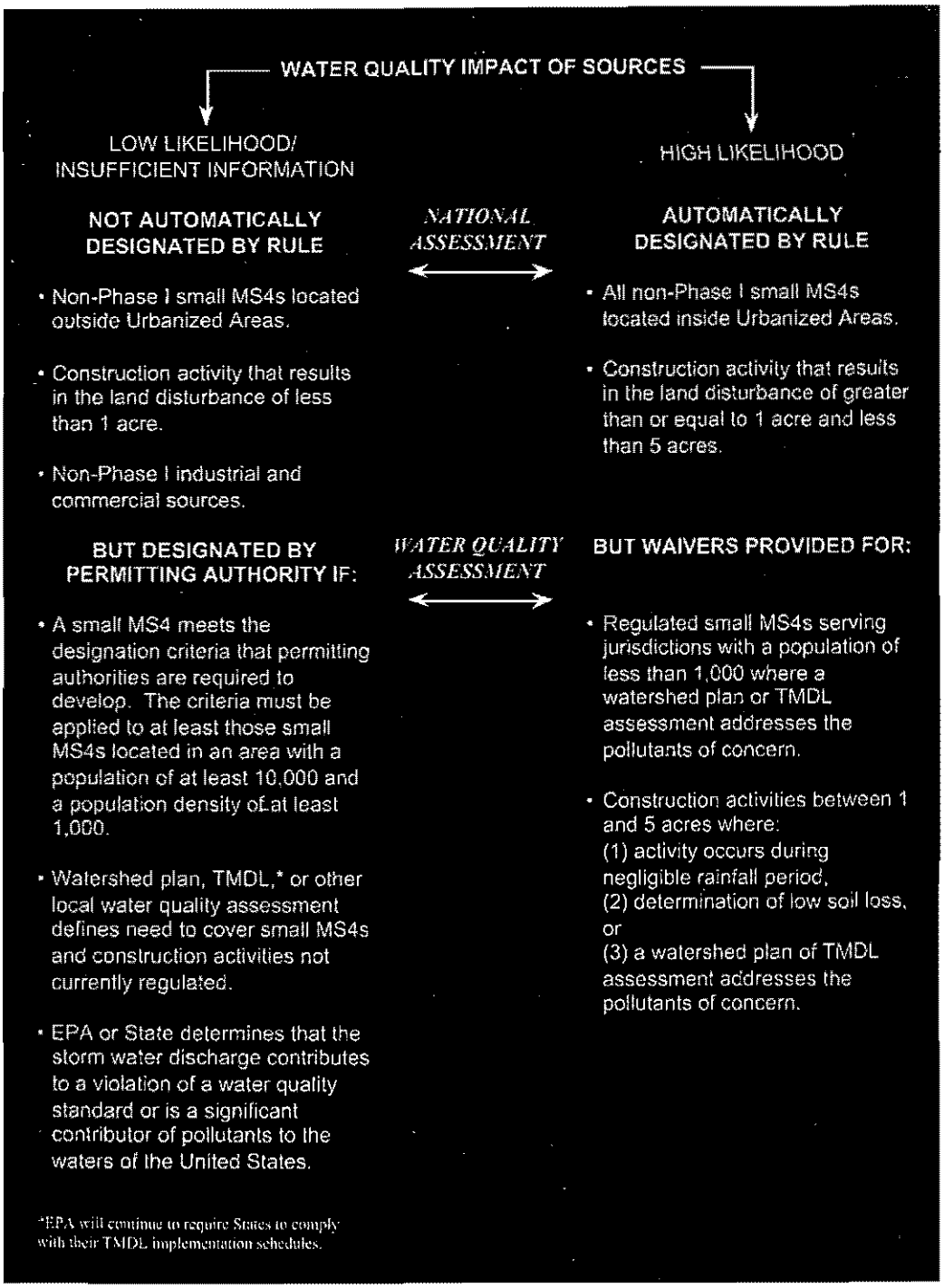
Proposed Control Measures

To satisfy the new Phase II regulations, regulated cities and counties will need to implement the following measures *at a minimum*:

- Adopt ordinances to regulate storm water discharges from construction sites disturbing 1 or more acres of land.
- Develop and enforce programs to address storm water runoff from new development and redevelopment, including: (a) ordinances limiting growth, (b) ordinances protecting sensitive areas, (c) ordinances minimizing impervious ground cover and (d) ordinances maintaining open spaces.
- Develop a system for detecting and eliminating illicit discharges, including

(continued on page 4 . . .)

PHASE II DESIGNATION DECISION MATRIX



Source: EPA

Carter & Burgess Offers a Full Range of Environmental and Related Services, Including:

- *Storm Water Management*
- *Permitting/Regulatory Compliance*
- *BMP & Storm Water Ordinance Development*
- *Geographic Information Systems (GIS)*
- *Water/Wastewater Facilities & Systems Analysis/Modeling*
- *Environmental Impact Statements*
- *Environmental Site Assessments*
- *Wetlands Delineations*
- *Hazardous Materials Management*
- *Air Quality Analysis*
- *Emissions Inventory Analysis*
- *Public Involvement/Relations*

If TNRCC gets program delegation and develops the BMP menu for the state, don't be surprised if Texas ends up with one of the tougher storm water programs in the nation.

(. . . continued from page 2)

adopting ordinances prohibiting such discharges and implementing an inspection program.

- Develop an education and outreach program for their communities.
- Reduce pollutant runoff from municipal operations by imposing certain best management practices (BMPs).
- Comply with any state and local public notice requirements and public participation initiatives in the adoption, implementation and enforcement of storm water management programs.

"Ultimately, Phase II programs will be very similar to those adopted by Phase I cities," said Candace Watkins, senior storm water engineer at Carter & Burgess. "In Phase II, EPA places significant emphasis on development controls—controls that could become the focal point for heated political discussions in small, rapidly growing cities."

Permit Options

EPA anticipates developing a general permit for Phase II regulated MS4s. The general permit has not yet been proposed, and EPA has not indicated when such a permit will be available for review and comment. The proposed regulations do allow applicants the option to apply for an individual permit, if they choose not to be covered by the general permit.

Funding Compliance

As noted above, compliance costs for Phase II cities could be significant. Many Phase I cities, and some proactive Phase II cities, have implemented storm water utilities to fund compliance costs. Monthly storm water utility fees in those cities generally range from $1 to $10 for a typical residence.

Frequently Asked Questions About Phase II

How can a small city implement Phase II requirements without breaking the budget?

First, don't reinvent the wheel. Whenever possible, leverage Phase I resources and stick with a program that is responsive to EPA without overcommitting city resources. It is easy to get carried away with a general permit, so stick with programs and tasks absolutely required of you. Incorporate "wish list" items only if you have the political backing and resources to make them work.

When possible, shift compliance burdens back to EPA through their own industrial/construction general permit program. A small city inspection and enforcement staff can effectively put the private sector on notice and earn points with EPA.

When costs exceed general fund budgets, storm water utilities can be effective funding mechanisms. Cities can also make use of available technology for public involvement and reporting (the Internet) and self-reporting by industries and construction activities, as well as available regional resources.

Should small cities tag along with a large MS4's program, as allowed by the proposed regulations?

The answer is, it depends. Often a small city's politics are completely different than a large city's, so what works in, for example, Dallas may not work in Seagoville. A tough development and redevelopment program like Austin's might be a tough sell in a city like Leander that is

growing rapidly (and proud of it). So pick and choose programs that seem saleable in your city and make sense to consolidate from a cost-efficiency standpoint. Generally, it may not make sense for a small enclave city to have its own inspection staff when the surrounding Phase I city has an excellent, nationally renowned staff. Similar to restaurant inspections, storm water inspections can be contracted from a larger municipality.

What is the BMP menu going to look like if the TNRCC takes over the NPDES program for Texas?

Seven or eight years ago, when the NPDES program was just getting off the ground and the State of Texas claimed we would get NPDES delegation at any moment, most folks would probably have told you that state delegation was the way to go: Texas good ol' boys and gals would treat Texans a lot fairer than a bunch of Washington bureaucrats. Right?

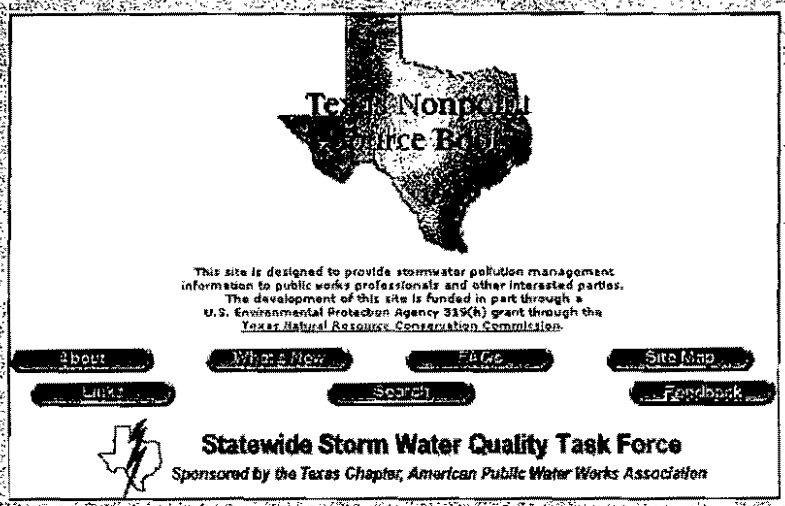
Not necessarily. Working in the middle of the City of Austin, with one of the most aggressive storm water control programs in the nation, the typical TNRCC staffer may be more inclined to think like an Austinite than a Dallasite or residents of smaller cities. Recent comments by TNRCC staff on wetland permit applications indicate that TNRCC staff members take a very aggressive approach in protecting our state waters, even toward highly disturbed urban streams where it may take extraordinary measures to save the stream corridor.

If TNRCC gets program delegation and develops the BMP menu for the state, don't be surprised if Texas ends up with one of the tougher storm water programs in the nation. TNRCC staff members are generally young and idealistic, and they often choose to live and work in Austin because of the city's perceived environmentally friendly (and, hence, development-tough) quality of life. They may be inclined to believe that what works in Austin should be the norm in Brownwood, too.

Surprisingly, over the past seven years EPA has demonstrated tolerance of Phase I cities regarding compliance issues. This is especially true if a Phase I city is making a reasonable effort to comply with the NPDES program. In other words, EPA's initial regulatory "bark" has been much worse than its enforcement "bite."

Visit us on our website:
http:\\www.c-b.com

Texas Nonpoint Source Book
www.txnpsbook.org



Carter & Burgess, in association with another engineering firm, developed a comprehensive information source for urban storm water runoff water quality management for Texas communities.

Our firm's unique responsibility was to develop natural and local resources sections of the Internet site called "Texas Nonpoint Source Book," sponsored by the Texas Chapter, American Public Water Works Association. The site can now be accessed by any city interested in storm water information in Texas. We created interactive hyper-linked menus and fully searchable databases, all integrated with the latest emerging multimedia technologies.

Texas Cities Potentially Designated Under Phase II*

Alice
Alvin
Andrews
Angleton
Bay City
Beeville
Big Spring
Borger
Brenham
Brownwood
Burkburnett
Canyon
Cleburne
Conroe
Coppell
Corsicana
Del Rio
Dumas
Eagle Pass
El Campo
Gainesville
Gatesville
Georgetown
Henderson
Hereford
Huntsville
Jacksonville
Kerrville
Kingsville
Lake Jackson
Lamesa
Levelland
Lufkin
Mercedes
Mount Pleasant
Nacogdoches
New Braunfels
Palestine
Pampa
Pecos
Plainview
Port Lavaca
Robstown
Rosenberg
Round Rock
San Marcos
Seguin
Snyder
Stephenville
Sweetwater
Taylor
The Colony
Uvalde
Vernon
Vidor

*According to 1990 Census of Population and Housing, U.S. Census Bureau. (List may change with the 2000 Census.)

Texas Cities & Counties Proposed To Be Automatically Designated Under Phase II

Addison
Alamo
Alamo Heights
Allen
Azle
Balch Springs
Balcones Heights
Bayou Vista
Baytown
Bedford
Bell County
Bellaire
Belimead
Belton
Benbrook
Beverly Hills
Bexar County
Blue Mound
Bowie County
Brazoria County
Brazos County
Brookside Village
Brownsville
Bryan
Buckingham
Bunker Hill Village
Cameron County
Carrollton
Castle Hills
Cedar Hill
Cedar Park
Cibolo
Clear Lake Shores
Clint
Cockrell Hill
College Station
Colleyville
Collin County
Combes
Converse
Copperas Cove
Corinth
Coryell County
Crowley
Dallas County
Dalworthington Gardens
Deer Park
Denison
Denton
Denton County
DeSoto
Dickinson
Donna
Double Oak
Duncanville
Ector County
Edgecliff
Edinburg
El Lago
El Paso County
Euless
Everman
Farmers Branch
Flower Mound
Forest Hill
Fort Bend County
Friendswood
Galena Park
Galveston
Galveston County
Grand Prairie
Grapevine
Grayson County
Gregg County
Groves
Guadalupe County
Haltom City
Hardin County
Harker Heights
Harlingen
Hedwig Village
Hewitt
Hickory Creek
Hidalgo County
Highland Park
Highland Village
Hill Country Village
Hilshire Village
Hitchcock
Hollywood Park
Howe
Humble
Hunters Creek Village
Hurst
Hutchins
Impact
Jacinto City
Jefferson County
Jersey Village
Katy
Keller
Kemah
Kennedale
Killeen
Kirby
La Marque
La Porte
Lacy-Lakeview
Lake Dallas
Lake Worth
Lakeside
Lakeside City
Lancaster
League City
Leander
Leon Valley
Lewisville
Live Oak
Longview
Lubbock County
Lumberton
McAllen
McLennan County
Meadows
Midland
Midland County
Mission
Missouri City
Montgomery County
Morgan's Point
Nash
Nassau Bay
Nederland
Nolanville
North Richland Hills
Northcrest
Nueces County
Odessa
Olmos Park
Palm Valley
Palmview
Pantego
Pearland
Pflugerville
Pharr
Piney Point Village
Port Arthur
Port Neches
Portland
Potter County
Primera
Randall County
Richardson
Richland Hills
River Oaks
Robinson
Rockwall
Rockwall County
Rollingwood
Rose Hill Acres
Rowlett
Sachse
Saginaw
San Angelo
San Benito
San Juan
San Patricio County
Sansom Park
Santa Fe
Schertz
Seabrook
Seagoville
Selma
Shavano Park
Sherman
Shoreacres
Smith County
Socorro
South Houston
Southside Place
Spring Valley
Stafford
Sugar Land
Sunset Valley
Tarrant County
Taylor County
Taylor Lake Village
Temple
Terrell Hills
Texarkana
Texas City
Tom Green County
Travis County
Tye
Tyler
Universal City
University Park
Victoria
Victoria County
Wake Village
Watauga
Webb County
Webster
Weslaco
West Lake Hills
West University Place
Westover Hills
Westworth
White Oak
White Settlement
Wichita County
Wichita Falls
Williamson County
Wilmer
Windcrest
Woodway

Source: EPA 1998

Information regarding each designated Phase II city and county in Texas, and storm water best management practices (BMPs), is available on the Texas Public Works Association's new web site (see box on page 5):

www.txnpsbook.org

GIS & Storm Water Management

Completing an NPDES storm water permit application can be a sizable task involving:

- defining the storm water drainage system;
- characterizing discharges into the system, including illicit discharges;
- designing a monitoring program to track storm water pollutants; and
- proposing a package of measures to reduce storm water pollution.

It might not seem that geographic information systems (GIS), an application based on linking information to points on a map, would be a good choice for managing non-point source water pollution programs, but just the opposite turns out to be true.

"Completing a storm water permit application involves many activities for which GIS is particularly useful," said Jeff Fitzgerald, Carter & Burgess GIS Manager. "For example, the first task is to define a city's storm drainage system. GIS is an excellent tool to organize the data resulting from such an inventory."

"Completing a storm water permit application involves many activities for which GIS is particularly useful."

GIS and Permit Compliance

For the City of Dallas' Phase I permit application, Carter & Burgess used ARC/INFO GIS to choose sample site locations, map industrial facilities and storm water outfalls, perform spatial analysis of pollutant loadings and produce map sheets for submission to EPA.

"Many cities got involved with GIS just to meet the information requirement in the storm water permit application, to inventory and map the storm drainage system and locate potential sources of pollution," said Steve Veal, head of Carter & Burgess' Environmental Division. "But there are important ways GIS can assist municipalities and other agencies in the ongoing job of storm water management."

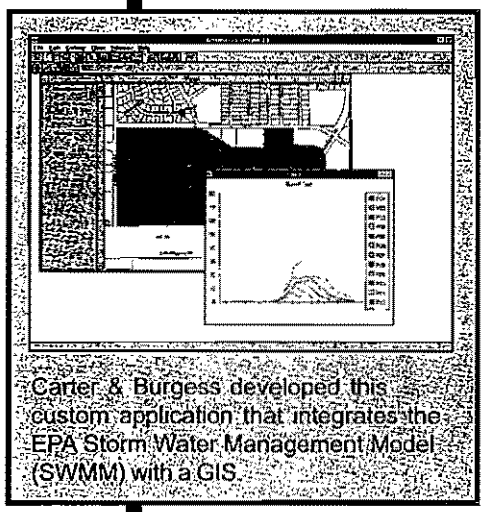
For example, the Florida Department of Transportation (FDOT) District Five has to closely monitor and manage its storm water management ponds, drainage connection permittees and outfalls as required by its NPDES Phase I permit.

"Carter & Burgess developed a GIS-based storm water permit compliance system for the District," said Veal. "By using GIS to correlate information about adjoining properties that discharge onto its roadway drainage system, the District will be able to readily identify the source of reported pollution problems."

Desktop GIS

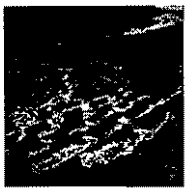
"Not so long ago, anyone who wanted to have GIS had to buy a big workstation, a $10,000 ARC/INFO license and have a full-time UNIX guru to run the system," said Veal. "Now a couple of thousand dollars will put functional GIS software on your desktop computer." Newer versions of GIS are designed to run on PCs in a Windows environment.

GIS data is easier to obtain, too. "Data is now available in digital format from a great number of sources, including the Internet, value-added reseller files, government agencies and commercial vendors, greatly reducing start-up costs," said Veal.



Carter & Burgess developed this custom application that integrates the EPA Storm Water Management Model (SWMM) with a GIS.

KEY CARTER & BURGESS STORM WATER PERSONNEL / PROJECTS



Key Carter & Burgess Storm Water Personnel

Our nationally recognized storm water experts have helped many Texas cities meet EPA's storm water requirements since the inception of the NPDES program. Storm water personnel are available throughout Texas to assist you with your storm water needs:

Area	Contact Person	Telephone No.
Austin	Hank Smith	(512) 314-3100
Dallas	Burt Weathersbee	(214) 920-8042
Fort Worth	Steve Veal	(817) 735-6161
	Candace Watkins	(817) 735-6108
Houston	Eric Hall	(713) 803-2119

Selected Carter & Burgess Storm Water and Related Projects

- City of Dallas NPDES Permit
- City of Laredo Ordinance/Manual
- City of Shreveport NPDES Compliance Program
- Florida DOT District 5 NDPES Compliance
- City of Austin Digital Mapping
- City of Plano Storm Water Utility
- White Rock Lake Dredging
- North Little Rock Storm Water Management Plan
- City of Irving Storm Water Utility
- City of Orange Flood Protection Study
- City of Pearland Storm Water Utility
- Texas Nonpoint Source Book Web Site

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Phoenix, AZ (602) 263-5309
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