
CHAPTER THREE POINT SOURCE POLLUTION

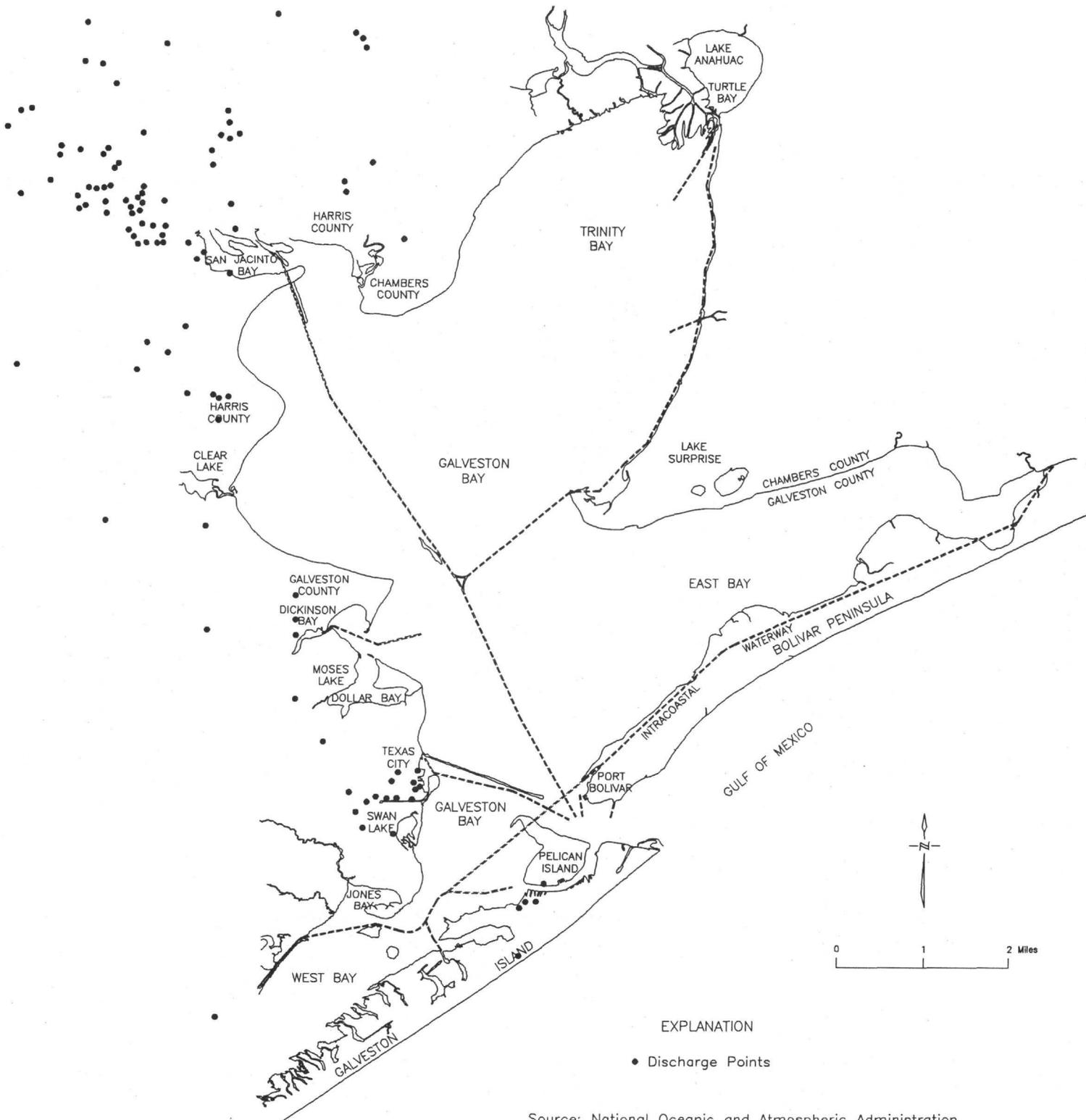
Point source pollution originates from a single defined source such as municipal or industrial wastewater treatment discharges. Galveston Bay is the final destination of over 60 percent of all Texas' permitted discharged waste (GBNEP, 1991). In the four county area nearest the bay, some 485 industrial and 617 municipal sources discharge 750 million permitted gallons per day into the bay or its adjacent bodies of water. These 1102 permits constitute one-third of all the water quality permits issued in Texas in 1990.¹ Figure 3-1 displays locations of many of the industrial point sources.

Point source pollution is regulated by the federal Environmental Protection Agency, the Texas Water Commission, the Railroad Commission, municipal governments, and other regulatory agencies. We begin with a brief review of the statutes governing water quality, then turn to the permitting processes of the two Texas agencies separately. We then review municipal wastewater treatment, focusing on local treatment facilities and the Gulf Coast Waste Disposal Authority. The final section evaluates our findings. We conclude that the system for managing point source pollution is among the more effective considered in this report, and that it generally succeeds in controlling what would otherwise be the single largest source of environmental stress on the bay.

In spite of the overall success of the system, several Galveston Bay segments continue to suffer poor water quality as shown in the segment rankings in Tables 3-1 and 3-2. These tables are based on findings published in the TWC Water Quality Inventory (1992) submitted annually to the EPA. The inventory includes a statewide ranking for all surface water segments in Texas. The rankings shown in Table 3-1 represent the 31 Galveston Bay segments included in a statewide ranking of estuarine water segments only. Each of 79 estuarine segments was tested for traditional water quality parameters (including eutrophication and fecal coliform count), assigned an overall water quality score, and a corresponding rank between 1 (worst) and 79 (best). The 31 Galveston Bay segments range from very bad (2,4,5, and 8) to fairly pristine (79, 75, 72). The actual water quality scores and fecal coliform scores are listed in columns 4 and 5 to highlight the wide divergence in score that sometimes occurs between two successive rankings. In addition, TWC compiled a toxicity score for each segment. While this score does not figure into the rankings in Table 3-1, it does figure into those of Table 3-2.

¹ These figures are from the 1990 Texas Water Quality Report. Figures in the 1991 report are quite different, apparently due to the upcoming requirement for repermitting under S.B. 818 that has delayed renewal of many permits. We will speak below of "about 1000" permits in order to avoid confusion or will use the 1990 figures.

Figure 3-1
 Industrial Point Source Discharge



Source: National Oceanic and Atmospheric Administration
 (Estuary-of-the-Month Series)

Table 3-1
Water Quality Indicators in Galveston Bay Segments

Segment Number	Segment Name	Water Quality Rank	Eutrophication Rank	Fecal Coliform Rank	Water Quality Score (Absolute Score)	Fecal Coliform Count (Absolute Count)	Toxic Score
1007	Houston Ship Channel	2	27	2	807.63	3869	600
1101	Clear Creek	4	14	5	791.00	400	100
1005	Ship Channel	5	23	22	**	65	400
1006	Ship Channel	**	30	3	788.30	580	600
1103	Dickinson Bayou	8	7	4	746.83	574	**
1113	Armand Bayou	10	3	17	737.83	80	**
2436	Barbours Cut	12	6	24	718.67	47	**
1013	Buffalo Bayou Abv Tidal	13	36	1	694.17	9061	300
2426	Tabbs Bay	14	5	25	691.33	43	**
2427	San Jacinto Bay	15	**	27	685.00	42	400
2425	Clear Lake	16	11	31	674.17	31	**
2430	Burnett Bay	19	8	9	662.00	185	**
1001	San Jacinto River Tidal	20	13	18	649.17	80	400
801	Trinity River Tidal	21	17	19	640.83	78	**
2429	Scott Bay	22	9	11	624.33	135	**
2428	Black Duck Bay	23	16	29	619.33	38	**
1105	Bastrop Bayou Tidal	24	31	20	607.17	75	**
2421	Upper Galveston Bay	28	20	44	589.67	15	200
1107	Chocolate Bayou Tidal	32	26	23	571.00	55	**
2438	Bayport Channel	37	33	36	545.67	23	200
2422	Trinity Bay	51	47	56	426.67	7	100
901	Cedar Bayou Tidal	52	38	37	416.83	22	300
2423	East Bay	57	53	48	382.83	11	**
2437	Texas City Channel	58	46	50	372.00	11	400
2432	Chocolate Bay	63	57	60	388.00	6	**
2439	Lower Galveston Bay	64	56	52	327.83	9	100
2424	West Bay	68	72	55	294.00	7	**
2435	Drum Bay	70	73	43	290.00	17	**
2431	Moses Bay	72	69	51	264.50	10	200
2433	Bastrop Bay	75	80	58	224.50	7	**
2434	Christmas Bay	79	79	62	156.67	5	**

**Indicates no score (i.e. this indicator not a problem in that segment)

Source: Texas Water Quality Inventory, Texas Water Commission, 1992, pp. 54-64.

Table 3-2
 Problem Water Quality Segments in Galveston Bay
 Identified by the Texas Water Commission

Segment Number	Segment Name	Water Quality Rank	Problem Indicators
1007	Houston Ship Channel/Buffalo Bayou	1	Toxics. Known NPS. High PS. Fish kills. Low DO. FC. Nutrients.
1006	Houston Ship Channel	10	Toxics. High PS. Known NPS. Fish kills. FC. Low DO. Nutrients.
1005	Houston Ship Channel/San Jacinto River	14	Toxics. High PS. Known NPS. Fish kills. FC. Nutrients.
2421	Upper Galveston Bay	34	Toxics. High PS. Potential NPS. High RV. DO range. FC.
1014	Buffalo Bayou Above Tidal	39	High PS. Known NPS. Minimal SMN data. FC. Some Toxics.
1101	Clear Creek	42	Moderate PS. Potential NPS. Low DO. Tidal eutrophication. FC.
1103	Dickinson Bayou Tidal	62	Moderate PS. DO range. Eutrophication. FC.
1104	Dickinson Bayou Above Tidal	64	Potential NPS. DO. Eutrophication. FC. Cl.
2422	Trinity Bay	69	Potential NPS. High RV. Some Toxics. Nutrients. FC.
2423	East Bay	94	Potential NPS. High RV. FC.
2424	West Bay	96	Potential NPS. High RV. FC.
2432	Chocolate Bay	102	DO range. FC.

Source: 1992 Texas Water Quality Inventory. Texas Water Commission, pp. 31-39.

Legend

Cl = Chlorine

DO = Dissolved Oxygen

FC = Fecal Coliform

NPS = Nonpoint Source

PS = Point Source

RV = Resource Value

SMN = Stream Monitoring Network

The rankings in Table 3-2 are particularly significant because they are extracted from a selection of 104 "problem segments" identified by TWC. Therefore, each of the twelve Galveston Bay segments listed suffers poor water quality. More importantly, of the 104 problem segments, the worst one (Houston Ship Channel/Buffalo Bayou) is in Galveston Bay, and six of the twelve are ranked below 50. Table 3-2 confirms the significant presence of toxics in the Houston Ship Channel. In addition, all segments but one have high point source and fecal coliform pollution.

REGULATORY FRAMEWORK

Federal Legislation

Point source pollution is regulated by a combination of state and federal laws. The controlling federal law is the 1972 Federal Water Pollution Control Act (FWPCA). This law has been amended many times and is now known as the Clean Water Act (CWA). The purpose of the law is to "restore and maintain the chemical, physical and biological integrity of the nations waters" (Section 101). The Act establishes the framework for monitoring and controlling industrial and municipal point source discharges through the National Pollutant Discharge Elimination System (NPDES) and authorizes federal assistance for the construction of municipal wastewater treatment facilities.

Under the act, all discharges of wastewater into navigable waters require an NPDES permit. Permits are required for any point source discharge and establish specific limits on the quantity and concentration of contaminants. The NPDES program requires industrial and municipal dischargers to meet technology-based effluent limitations and receiving water quality standards. The standards are classified according to industry type, and establish minimum water quality levels. The technology-based effluent limitations (set by federal rule) prescribe minimum performance standards to be attained by industrial dischargers and are automatically incorporated into a permit unless the state water quality standards for a given parameter are more strict than the EPA limits, in which case the latter will apply.

The standards are broken down by type of industry and are based on level obtainable through the use of pollution control technology such as Best Available Technology (BAT) and Best Conventional Pollutant Control Technology (BCT). For conventional pollutants such as suspended solids, oxygen and bacteria, BCT is used. BAT concerns toxic and non conventional pollutants. NPDES limits over 1,500 types of pollutants and contains an EPA "priority pollutant" list of 126 toxic chemicals. Permits also list the compliance requirements for monitoring, spill prevention, employee education, and other statutory and regulatory requirements.

The system relies on permitted dischargers to monitor their effluent and other requirements in the permit and report them regularly. Permits also require

periodic monitoring by a regulatory agency through inspections. If necessary, enforcement actions may be taken and can include civil and/or criminal penalties. Permit violations are discovered through self-reporting data and inspections. Required data collection varies according to the parameters of each permit but are reported on a monthly basis unless otherwise specified in the permit. In addition, when a facility discovers a non-compliance that is a threat to the environment or to human health, or that is 40 percent over the effluent limit specified in its permit, it must notify TWC within 24 hours. Written notification must be provided within five working days of the discovery, and should comment on the amount of time and actions necessary to correct the problem and mitigate any adverse effects.

The Clean Water Act provides for the delegation of NPDES duties from the federal government to each state, if the state meets minimum requirements. EPA has the right to revoke any state delegation not in compliance with federal standards. Currently, Texas does not have NPDES authority because it does not meet federal guidelines for certain of the administrative and legal arrangements regarding the program. NPDES delegation is discussed in more detail in the following section on dual permitting.

Section 303 of the Clean Water Act requires states to establish their own receiving water quality standards, subject to EPA approval. The two basic components of a water quality standard are:

- 1) *a designated use* - such as shellfish harvesting, drinking water or swimming, for which the water body is to be protected; and
- 2) *criteria* - which are numerical concentration limits of contaminants necessary to preserve or achieve the designated use.

The standards may exceed, but they must at least meet, EPA requirements. State water standards must be reviewed every three years by the TWC under section 303. The last review became effective on July 10, 1991.

Finally, the Water Quality Act of 1987 added a new management structure for permitting storm water discharges to the Clean Water Act (Section 402(p)). The 1987 Act also created State Revolving Loan Funds to help municipalities build wastewater treatment plants.

State Legislation and Regulations

The Texas Water Commission (TWC) sets water quality standards to prevent degradation of the state's waters and to comply with the federal Clean Water Act. The standards include parameters for radioactivity, nutrients (such as nitrogen and phosphorous), aesthetics (such as taste, odor, floating debris, and settleable solids), salinity, bacteria, and dissolved oxygen. The regulations also set out specific parameters for toxic materials that threaten water quality, including chromium, lead, arsenic, PCBs, and toxaphene, for which adequate toxicity information is available. The criteria differ for different categories of water,

including recreational waters, domestic water supply sources, and waters supporting aquatic life such as oyster waters in Galveston Bay.

TWC has established a three-tier antidegradation policy to protect the state's waters. The first tier maintains and protects the existing uses of a body of water. The second tier protects water quality in waters that exceed the typical range of fishable/swimmable criteria. The third tier provides special protection to high quality waters that are designated Outstanding National Resource Waters (ONRWs).

Data on sediment quality goes into an indicators database, but is not really considered when reviewing permit applications. TWC monitors sediment quality through routine monitoring in its Stream Monitoring Program, but the agency has no comprehensive criteria or standards for sediment and is not likely to until more extensive national criteria is developed. Currently, EPA makes recommendations that can be tailored to meet state needs. The Standards and Assessment Division at TWC is currently reviewing sediment standards, but available EPA criteria are narrow and focus primarily on toxic metals. TWC will continue to evaluate EPA recommendations for Texas' needs as they develop, but cautions that it will be difficult to relate the criteria to the source of pollution and to predict what a given sediment concentration should be. Overcoming these obstacles will require some innovative thinking.

New Watershed Approach. In 1991, the 72nd Texas Legislature passed Senate Bill 818, also known as the Texas Clean Rivers Act, which amended the Texas Water Code to require a regional assessment of water quality in each watershed or river basin of the state. It further requires that all permits within a single watershed or within the region of a single watershed contain the same expiration date. To this end, TWC is required to adopt and implement procedures for simultaneous review and renewal of all permits within a watershed or a region of a watershed.

The first set of proposed rules for implementing S.B. 818 were published in the *Federal Register* in February 1992. They established new expiration dates for existing permits, and included an amended permit schedule for each basin. The proposed rules met with protest by permittees who were unwilling to have the terms of their permits shortened at their own expense. Some facilities that were required to prepare an application within a short time period claimed financial hardship. (The average cost of preparing an application for renewal is \$2,000, but can vary significantly.) Also, a substantial number of man-hours are required for preparing the data and analysis that must be submitted to the TWC. Finally, the new rules and recently revised water quality standards are expected to strengthen effluent limits in almost all renewal cases. One TWC official indicated that all facilities on an unclassified segment will move to a more stringent level of treatment. Such changes not only require new information and testing from permit applicants, but possible expensive plant modifications in order to meet new permit conditions. The regulated community protested, claiming that it prepares budgets under the assumption that permits are good for five years without significant changes. In addition, the EPA informed TWC that the basin permit

renewal schedule in the proposed rules would preclude TWC from NPDES delegation which requires the state to use the same permit expiration dates as EPA. For these reasons, the Water Commission rejected the proposed rules.

It is not yet clear how S.B. 818 will be implemented, but it now appears that some permit terms will be lengthened instead of shortened in order to meet a simultaneous expiration date within each basin. TWC is in the process of designing a new basin schedule incorporating EPA expiration dates. Hopefully, TWC will retain the right to issue a permit for less than four years if necessary. It is also hoped that TWC will retain the order of renewal originally proposed since the San Jacinto River Basin was first in line for renewal. The Brazos and Trinity Rivers had the next earliest expiration dates under the former schedule which was to begin as early as January 1, 1993.

For the Bay and its more than 1000 permitted facilities, the regional expiration will have an immense impact on water quality management. The simultaneous review and renewal process will allow water quality modelers at the Commission to obtain, in the words of the law, a "comprehensive evaluation of the combined and cumulative effects of permitted discharges on water quality" within the Bay. It will thus provide a more accurate picture of the overall loadings in the Bay, and will accomplish acting on wasteload evaluations in a more timely manner since they will be done just prior to renewal in a particular basin. Because everything builds on in-stream river sampling, it should be noted that TWC will have to focus on data collection and on improving and expanding the wasteload evaluation program in order to implement S.B. 818 fully. There are at present very few wasteload evaluations compared to the number of water segments in Galveston Bay. Improvements may require additional resources for in-stream river sampling and for the actual evaluations since they are expensive and complex to perform. One source suggested that resources would be better spent on expanded and more frequent wasteload evaluations rather than on simultaneous renewal since this process will have to be staggered within each basin anyway.

Dual Permitting. As noted, Texas has not received NPDES delegation from EPA; as a result, facilities must obtain permits from both TWC and EPA. Texas has pursued delegation of the NPDES program for many years. However, in order to receive NPDES delegation, a state must meet certain federal guidelines. In February 1991, the Office of the Texas Attorney General informed TWC that it found two deficient areas in state law that would prevent federal delegation.

First, Texas law does not make adequate provisions for citizen participation in state enforcement. The federal Clean Water Act stipulates that citizens must be allowed under state law to intervene in civil and administrative actions, or the administrative agency must provide at least 30 days for citizen comment on proposed settlements of state enforcement actions. The administrative agency also must make certain assurances that it will allow and encourage citizen participation in the enforcement process.

Second, the Attorney General found that Texas violates the conflict-of-interest provision of the Clean Water Act. This provision prohibits persons who serve on

an NPDES permitting body from receiving a significant portion of their income from permit-holders or applicants. The Railroad Commission (RRC), which permits oil and gas discharges, violates this requirement because the Railroad Commissioners are elected officials. The State of Texas cannot ensure that the Commissioners will not have interests in the oil and gas discharges they regulate. To overcome this obstacle, TWC is applying for "partial assumption" of NPDES delegation. Negotiations with the EPA are ongoing, and TWC is drafting proposed statutory language to be presented for approval in the upcoming legislative session. TWC is aiming for partial NPDES delegation by October 1993.

Other problem areas include the lack of a state requirement for an Environmental Impact Statement for new permits and the low level of penalties assessed under state law. Some environmental organizations prefer dual permitting because it allows them to influence the permitting process on two fronts. These groups are troubled by TWC's legal inability to regulate federal discharges and to physically enter facilities for enforcement purposes.

From a regulatory standpoint, the dual permitting system is cumbersome for both the Texas Water Commission and the permitted facilities. For facilities, the dual NPDES permit process results in wasteful duplication of information and additional costs to produce two documents instead of one. Further confusion results when different expiration dates for the permits for the same effluent and facility require different renewal times and when state permits and federal permits have different compliance parameters and/or different limits for the same parameters. For TWC, the dual permitting system leads to additional paperwork because its staff is required to review and help draft selected NPDES permits for the EPA. The EPA generally selects larger facilities whose permits are due in the coming year for this program. Industrial as well as municipal facilities participate in the program which is funded under a 60/40 participatory grant from the EPA. In the past, the permittee sent the permit application to the TWC. The Commission then drafted the EPA permit for the facility. The TWC must use the EPA's system when the EPA permit requirements differ from the TWC's.

Regional EPA offices will soon have to raise permit fees to make the NPDES permitting program pay for itself; rather than raise fees, it would be more efficient for both the agency and the permittees if the entire program could be delegated to Texas. Comprehensive delegation will require action by the Texas Legislature to remove at least some of the barriers, and the legislature is not likely to convene until January 1993. If EPA raises its fees too rapidly in the interim, there may be a backlash among legislators, who may then not pass the necessary amendments. In any case, the portion of the permitting process under the Railroad Commission may not be able to be delegated because of the federal conflict of interest provisions, and the oil and gas permitting process may have to remain a dual system.

TWC's Water Quality Permitting Process

Obtaining a water quality permit is a long and often complex process. From the time the permit application is first received to its final issuance or denial, anywhere from six months to several years may elapse.

The process (illustrated in figure 3.2) begins when the application for a permit is received by the Applications Unit, which checks to make sure the application is administratively complete. A new or amended permit application costs \$150.00. Notices of the permit application are then sent to affected land owners and other parties, and the application is given its technical review. The field office performs site and stream assessments to verify the information on the application.

TWC develops permit conditions and discharge limits under a process similar to EPA's. Water quality standards determine the appropriate pollutant levels for a particular water segment and a wasteload evaluation (for some segments) of the new discharge to see if it will allow the segment to stay within the specified limits. In the Galveston Bay area, proposed permits which discharge into the bay are screened against criteria in the standards which may include FDA criteria. The 1988 edition of the standards primarily addressed aquatic life protection with only two references to human health (i.e. drinking water protection and FDA toxic concentrations in fish). However, the revised standards, effective in July 1991 are more sophisticated with basically the same aquatic life criteria, but additional criteria for the protection of human health, only some of which are FDA-based. If the proposed permit exceeds the in-stream fish consumption criteria, the permittee will be required to conduct a Chemical Specific Reduction Study within twelve months of the effective date of the permit. This study evaluates the potential mechanisms to reduce the toxicants which are a potential threat to human health through consumption of fish or shellfish. The permit is re-evaluated based on the results of the study.

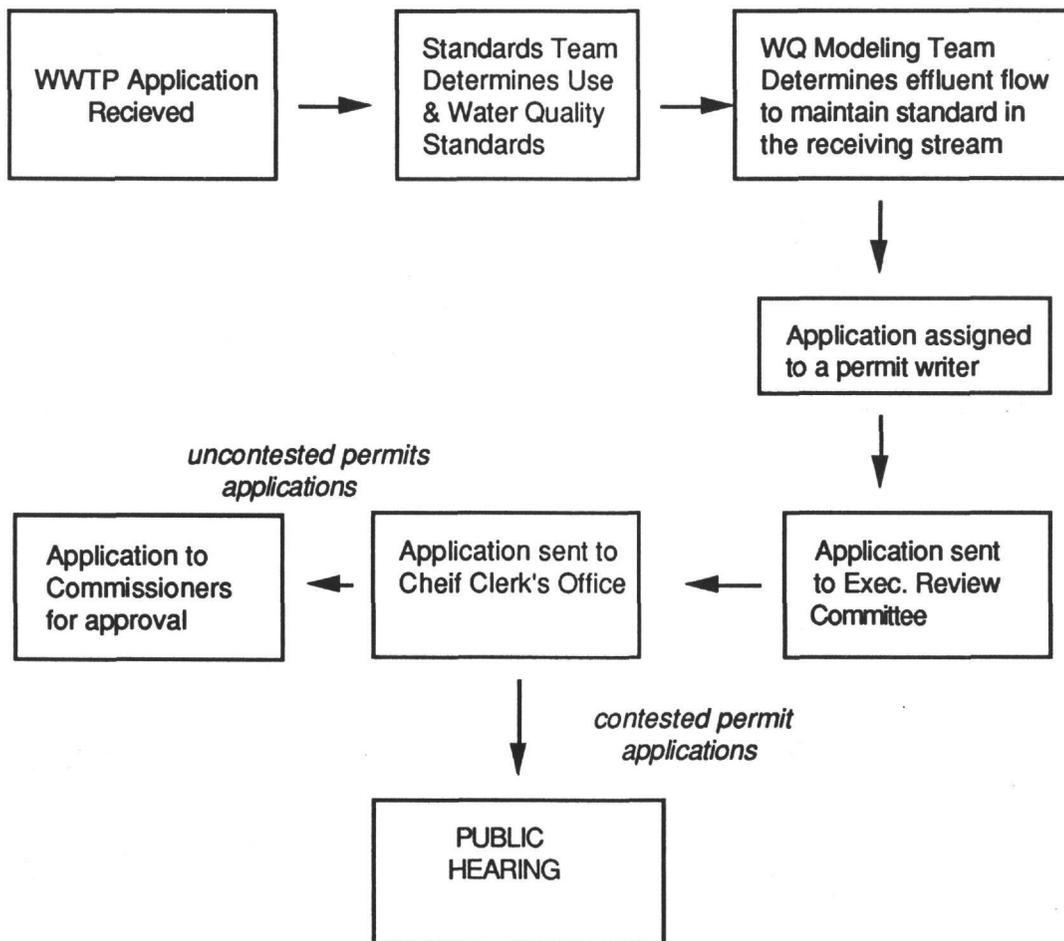
In addition to the conditions and discharge limits discussed above, TWC has begun developing Total Maximum Daily Load (TMDL) parameters for individual toxics, as required by The Clean Water Act. TMDL evaluations are to be done for all substances which are of concern for a given water body, and thus overlap with the wasteload evaluations conducted in certain segments. TWC recently received an EPA grant to develop TMDL parameters for five toxics, including nickel, in the Houston Ship Channel. The process of developing and enforcing parameters is complex because it requires tracing the substance back to its point source(s). For this reason, the current study is restricted to point source permitted discharges and dry weather flows. EPA is assisting in the study by sending out questionnaires that will generate information and data from appropriate sources.

Once the permit is technically complete, the engineer drafts a recommendation and sends it to the Executive Review Committee, where the recommendation is drafted in the form of a proposed permit. The application is then filed with the Chief Clerk. Up to this point, if no public hearing has been requested, the Chief Clerk sends instructions to the applicant on how to publish the permit in a local newspaper. Notice is also mailed to land owners, except in the case of permit

renewals. The applicant is required to submit proof of publication to the Chief Clerk. If a public hearing still has not been requested, the Commission sets the date for final consideration and the permit is published in the *Texas Register*. The Texas Water Commission then issues the permit as it was finally proposed.

If any of the affected parties writes to the Chief Clerk and requests a public hearing, the Commission will schedule one. The complex and expensive process is conducted under the Procedural Rules of the Texas Water Commission and the Texas Administrative Procedure Act. Most hearings are held in Austin, although some may take place in the affected area. In public hearings, testimony can only be accepted

Figure 3-2
Permitting Process at TWC



from parties directly affected, not including those with general environmental concerns, who may provide comments but not evidence to the hearing examiner.

Each permitted facility is required to self monitor based on the sampling frequency and parameters specified in the permit. Parameters may be measured on daily, weekly, bi-weekly, or a monthly basis. Permittees also are required to maintain monthly effluent reports showing the date, place, time of the sample, the location of the analysis, and the names of the people who collected the sample and performed the laboratory analysis; this information must be produced upon TWC request. In case of noncompliance, the permittee must notify TWC in writing within five days. In some cases, written communication concerning a non-compliance can be submitted with the Monthly Discharge Monitoring Report (DMR).

Biomonitoring was developed to test the effects of effluent as a whole on indicator organisms, and is required for some permitted facilities including EPA designated major facilities (this would include most of the petrochemical plants in the HSC), any domestic facility with an EPA pre-treatment program, and any facility with a history of toxicity problems. Effluent samples are taken at regular intervals, and submitted to commercial labs where technicians expose indicator organisms to the samples. If the effluent is found to be toxic, the facility must do a Toxic Reduction Evaluation (TRE) to identify the toxic source. If the facility fails to pinpoint a toxic source, TWC will issue a "wet limit" requiring continued, frequent biomonitoring. If a particular toxic is found, the facility will be given a permit limitation for that toxic. Critics of biomonitoring say that both the sampling and the TRE are extremely expensive while the test itself is unreliable and does not serve as a true indication of in-stream effluent effect. Policies concerning biomonitoring are still being developed.

Approximately seventy people work in the permitting section, and are specialized in the following areas: municipal, industrial, toxics, plans & specifications, applications, pretreatment, and water rights. The team reviews approximately 550 permits per year. Turnover is high; new permit writers are trained on the job by experienced staff people.

Enforcement

The central office of TWC as well as several field offices are responsible for enforcing permits. At the central office, the Office of Waste Management and Pollution Cleanup and the Office of Water Resource Management have the primary responsibility for enforcement actions detected through variations in the self reporting data. The field office in Houston is responsible for discovering violations not detected in the central office, often during routine on-site inspections at facilities. The Legal Division of the Commission assists both offices in pursuing enforcement cases. In addition to the self-reporting data and filed inspections, citizen complaints provide a means for detecting possible violations.

Central Office. Enforcement responsibilities at the central office are spread between the Industrial and Hazardous Waste Division, the Petroleum Storage Tank Division, and the Watershed Management Division. The Watershed

Management Division, with 12 employees, has the main responsibility for enforcing wastewater discharge violations.

Beginning in 1988, the Commission initiated a Mandatory Enforcement Hearing process (MEH). This process relies on self-reporting data from individual facilities to detect permit violations. If a facility exceeds its permitted discharge levels for four consecutive months at levels greater than 40 percent of its permitted amount, the Commission initiates enforcement actions. According to the Commission, this method is useful because it detects a pattern of violations and not just a few random exceedances. Because the MEH process relies on computer generated data, it frees the district and central enforcement teams to concentrate on other methods (such as field office referred cases) for catching violations not detected in the self-reporting system.

The Commission may take action against violators in three ways: administrative penalties, civil penalties, or law suits. Administrative proceedings are the preferred means of taking action because they keep the process inside the agency and may avoid lengthy court delays. Civil penalties may be assessed at a maximum of \$10,000 for each act of violation and for each day the violation occurs. In assessing penalties, the TWC considers a variety of factors, including the harm caused by the pollution and the violator's past record.

The law provides for a range of administrative procedures to protect the rights of the violator, including written notifications and opportunities for hearings. If a public hearing is held, the matter is usually remanded to the Office of Hearings Examiners to develop an evidentiary record and recommendations prior to the hearing. If the alleged violator requests judicial review, a petition is filed with a district court in Travis County. The alleged violator must place the amount of the assessed penalty in an escrow account at the TWC. Upon final decision by the court, the money will either be returned to the alleged violator or kept by the TWC. If the penalty money is not forwarded to the TWC, the right to judicial review is waived and the matter is sent to the Attorney General for enforcement.

Currently, there is a backlog of 111 enforcement cases in the Industrial and Hazardous Waste Division, and 28 cases in the Watershed Management Division (Comptroller's Office, 1992). The 1992 Performance Review by the Comptrollers Office identified a high turnover rate among enforcement personnel as one reason for the persistent backlog of enforcement cases.

The Four-Month/Forty-Percent Rule. When discussing enforcement and compliance it is important to note that permits vary considerably in the number of parameters they are required achieve. Historically, permit limits have been negotiated and agreed upon with the understanding that 100 percent compliance for all parameters 100 percent of the time is not realistic. Thus, when determining whether a given facility is in "significant non-compliance", the number of violations should be reviewed in relation to the total number of parameters listed in the permit. One industry representative commented that it is better to relate the term "significant non-compliance" to a pattern of non-compliance based on a decrease in percent compliance below an acceptable level.

This is essentially the method with which TWC currently measures permit violations, i.e. the four-month/forty-percent rule. The problem with this method is that facilities violating their permits by more than forty percent for one, two, or three months tend to go unchecked.

To evaluate central office enforcement, we obtained the 1990 self-reporting data from TWC. We then analyzed whether the 4-month/40-percent criterion for "significant noncompliance" was a sensible one; that is, whether large numbers of additional violations would emerge if the criterion were modified slightly to 3 months or 30 percent. Table 3-3 displays the number of violations reported in 37 Galveston Bay segments ranging from 2 to 5 months and from 20 to 60 percent noncompliance.² To create the table, we identified an exceedance on one parameter for one facility and characterized the percent by which it exceeded the permit. Once the exceedance was so characterized, it could not appear again in the same row, only in the same column. A different analysis could be done in which subsequent columns are subsets of the previous one (so that a 60 percent exceedance is also counted as a 50 percent exceedance), but that is not what we did. Therefore, comparisons across the row are not meaningful or valid.

Examining the table in columns rather than in rows, we find that 377 facilities violated their permits by 10 percent on at least one parameter for 2 months, but only 223 continued to violate on that parameter for another month. TWC does not want to waste its time enforcing against facilities that make an occasional mistake, and there does appear to be a large drop-off in exceedances between 2 months and 3 months (average of 54 percent) and again between 4 months and 5 months (average of 43 percent). In spite of the drop-off after four months, it seems rather excessive to allow facilities to violate without fear of punishment for four months. Three months of steady exceedances should trigger at least a warning letter.

Regarding percentage violations, the table shows that significantly more facilities are violating at 30 percent than at 40 percent. The figures in bold type (to the right and below the intersection of 4 months and 40 percent) represent facilities exceeding both of the "significant violation" criteria. Violations of 50 percent or more would seem to be very serious indeed. Violations over a period of five months or more suggest that TWC was not as vigilant in examining the self-reporting data as it should have been, or that it was slow in enforcing after the 4 month period had elapsed: about half of the facilities violating in the fourth month were still violating in the fifth. Moreover, the number of facilities exceeding parameters by 50 or 60 percent is not insignificant, especially when compared to the number of facilities meeting the lesser standard. These results evoke speculation as to whether the 4-month/40-percent criterion reflects more a scarcity of resources for enforcement than a reliable yardstick for measuring and

² It is noteworthy that in compiling the data for this table, we came across a number of 0s in the self-reported parameters. Given that facilities are required to monitor only those parameters that were found in their effluent during TWC screening, we find it puzzling that there would be so many 0s. Moreover, in several cases a minimum level of effluent (rather than a maximum) is specified in the permit. We have some difficulty understanding what a 40 percent violation of a minimum standard means and we cannot see why there are so many 0s.

correcting the most serious violations. The basis for the 4-month/4-percent criterion should at the least be formally re-examined.

Table 3-3
Numbers of Facilities Violating their Permits in 1990

Months of Exceedance	Percent of Exceedance					
	10 %	20%	30%	40%	50%	60%
2	377	450	239	186	157	146
3	223	214	117	88	63	53
4	149	171	64	48	50	33
5	127	98	44	24	20	15

Source: Calculated by authors from data supplied by TWC.

The Field Office. The District 7 Field Office of the Texas Water Commission is responsible for the four county region surrounding Galveston Bay. The office routinely inspects and monitors the 1102 permitted facilities in district 7. These inspections may uncover violations not identifiable through the self-reporting data.

Facilities are assigned to three categories: industrial majors (100 in district 7 in 1990), municipal majors (163), and minors (868). Criteria for distinguishing among them include but are not limited to size of discharge. The district office is committed to inspecting all major facilities and one-half of all minors annually. TWC charges an inspection fee determined by the parameters for which the facility is authorized and which cannot exceed \$11,000. In assessing a fee, TWC considers pollutant potential, flow volume, traditional pollutants, heat load, and whether the facility is designated as a major or a minor. An increase in the annual inspection fee for permitted facilities instituted in 1984 allowed the Water Quality Team in the district office to grow from six persons to its present staff of eighteen.

During compliance inspections, inspectors assess the conditions of the facility's current treatment processes and operations, evaluate operations and maintenance activities, check the completeness and accuracy of the records, and determine if water treatment units are being operated as efficiently as possible. If a problem is discovered during a routine annual inspection, the inspector sends a notice of violation to the permittee asking for a response. District 7 tries to negotiate with the facilities to achieve compliance at the district level. The facility is usually given one month to comply and correct the problem. During this time, the district office continues to take effluent samples from the non-compliant facility to serve as evidence in case of further enforcement action. Most enforcement letters result from record keeping violations rather than from serious non-compliance. For the period of September to December 1990, the

district office issued 238 notices of violation. Of this total 151 or 63 percent required further response. Generally 60 to 75 percent of the notices require further action. Table 3-4 summarizes District 7 enforcement activities for 1991.

Table 3-4
District 7 Enforcement and Compliance Activities in 1991

Annual Inspections	923
Complaints requiring trips to field and follow up	288
Enforcement Meetings	34
Enforcement Requests from Austin	10
Follow-up Inspections resulting in a report	164
Site and Stream Assessments	13

Source: Data Supplied by Field Office

Enforcement is slowed because field office staff cannot issue citations directly to violators but must go through the central office in Austin. The lack of a field citation program needlessly increases the central office's workload. TWC staff also identified problems with frequent and redundant monitoring of facilities that are consistently in compliance. Over monitoring is a drain on limited human resources that could be better spent monitoring and inspecting non-complying facilities. The process of enforcement is also complicated by the long time needed to process a case. Some violations may not be as significant as the TWC enforcement first thought, and other violations may be more significant. However, the TWC must stand by the initial accusation, even if it is from a year old pleading.

In the past, district inspections have been infrequent and announced in advance. Environmental groups believe that announced inspections do not provide an accurate picture of what waste generators are doing. In response to these complaints the TWC has initiated some surprise sampling.

Texas Watch, a citizen monitoring program initiated by TWC, may help solve some of the monitoring burden that District 7 now experiences. Citizens trained by TWC can monitor water quality in the Bay on a more frequent basis than District 7's limited resources allow. While the parameters for which citizens may test are somewhat limited, they can, nevertheless, alert the TWC to problem areas and help it become a more aggressive and accurate environmental watchdog. Texas Watch is currently underfunded and could benefit from being included in TWDB's State Water Plan and budget.

It is not surprising that some industrial facilities choose to take advantage of enforcement loopholes and discharge illicitly until they are reported by fellow industries or are otherwise discovered by the TWC. However, a more proactive stance towards limiting point source pollution would reduce the administrative

and legal burden of enforcement, freeing both industry and regulators to focus on improving performance. Planning for growth would make a particularly important contribution toward this goal, since unplanned growth often results in effluents that exceed the capacity of existing wastewater treatment facilities.

Evaluation of TWC Water Quality Activities

The program for permitting facilities that generate point source pollution is nearly thirty years old. There has been time to refine it and make sure it works. Indeed, the system works well enough that additional efforts at controlling point source pollution should not be the highest priority among the Action Plan Topics. Nevertheless, we have identified some problems that should be resolved.

From a procedural standpoint, the most obvious problem is that facilities must obtain permits from both TWC and EPA, a requirement which imposes a paperwork burden on both the federal and state agencies as well as on the facilities. The federal process appears to offer additional safeguards in the form of citizen participation, reduced conflict of interest, and an environmental assessment; state law will have to be amended to achieve these benefits.

Given that lack of procedures to ensure citizen participation is one of the impediments to NPDES delegation, it is particularly ironic that less than one-half of all hearings are held in Texas City and all procedural hearings are held in Austin. Recognizing that using the Austin site probably saves trips by many agency personnel, it may be possible to delegate enough authority to the field offices to hold certain of the hearings nearer to the permit site. Alternatively, the applicant could be required to pay for the travel costs of Austin-based agency personnel to attend the hearing. Delegation of other authorities, especially issuing of citations, to field offices would also streamline enforcement and reduce costs.

Another procedural problem is the extended time required to process a permit application. In an era of highly constrained resources, technical staff should not be conducting routine permit reviews that could be conducted by non technical staff, a self-certification program, an automated permit review, or a combination of all these. Expert systems, which embody some human expertise in the computer, often through hierarchies of rules, can allow non technical personnel to issue renewals by entering information about the particular permit contained in the application. If there is a problem or a difficult case, the permit would be referred to a specialist. Similarly, computer programs designed to identify compliance histories should be readily available to those reviewing permit renewals. There is a backlog of more than 220 water quality permit applications, and 97 wastewater plan applications (Comptroller of Public Accounts, 1992, p. 4).

While inspection fees do appear to meet the cost of inspection, the present permit processing fees—\$150 for a new and \$115 for a renewal—do not cover the cost of reviewing the permit, which may require at least eight hours of work by an engineer. A more complex application for a new or amended permit can take more than one hundred hours for a single engineer to process. If permit fees

were raised and even some portion of them dedicated to the permit program, additional staff could be hired to reduce processing time.

More important than these procedural problems is whether the present system is protecting the water quality of Galveston Bay. According to a recent study by the Galveston Bay National Estuary Program, undocumented pollution discharges into Galveston Bay may exceed permitted discharges. The study, conducted in 1991, found a total of 117 unpermitted discharges on eight of Galveston Bay's shoreline segments. Of the unpermitted discharges, 40 appeared to be storm drains; in addition to many unknown sources, 15 were from lawn drainage, and 8 from oil and sewage (Fay, 1991). While these discharges are not necessarily illicit, they nevertheless constitute a serious problem by remaining largely unaccounted for in the regulatory process. TWC identifies some unpermitted discharges through regular field inspections and citizen complaints, and the Texas Watch program described above should add to this capacity. As with unpermitted discharges, there appears to be no effective system for detecting illicit discharges (i.e. facilities which should be permitted but are operating illegally). Again, the TWC appears to be largely dependent upon routine field sampling and anonymous complaints for detecting these discharges. Some thought should be given to developing a more reliable detection system for illicit dischargers, especially since small discharges that are difficult to detect are certainly not limited to insignificant pollutants. On the contrary, they may have a very serious impact on receiving waters. A cooperative program with other agencies, local officials, and the private sector that stimulates peer pressure may be in order.

One of the most common criticisms of water quality permitting throughout the United States is its focus on the individual permit rather than on the overall quality of larger bodies of water. The incremental way in which decisions are made makes it difficult to control the larger outcome. Recognizing this, the Environmental Protection Agency recently announced a watershed protection program. Similarly, Senate Bill 818 provides TWC an opportunity to develop an extensive watershed management plan for Galveston Bay through simultaneous permit renewal. In preparation for that repermitting, TWC should ensure that it has a valid, comprehensive model of the circulation and water needs of the bay as well as a clear understanding of current loadings. Some of the scientific studies being conducted for the Galveston Bay National Estuary Program can form the basis for this comprehensive repermitting program. TWC may also want to consider implementing a market-based tradable permit system for the bay or appropriate watersheds. Under such a system, analogous to the new one established under the federal Clean Air Act, TWC would issue tradable permits rather than traditional ones during the repermitting process. Such a system, which many people believe is inappropriate or unworkable, would limit the amount of new pollutants by setting a cap on the levels of pollutants allowed to be discharged to the bay.

Finally, the public is much concerned about one particular kind of point source discharge; namely, toxic substances. In 1987, TWC substantially revised water quality standards to include numerical criteria for several toxic substances and required whole effluent toxicity testing by most point source dischargers. In 1991,

TWC again revised the standards to regulate 30 toxics affecting aquatic life and 66 affecting human health either through drinking water or contaminated fish and shellfish; these criteria are imposed depending upon the designated use of the segment. Most observers are convinced that implementation of these standards will continue to reduce the amount of toxic substances discharged to water. However, absence of good baseline data and the cost of testing for so many toxics impede understanding of the effectiveness of the new standards. The pollution prevention programs for toxics reduction discussed in chapter 13 will also help water quality in the medium term.

One means for identifying some of the toxics emitted to the bay is to examine the data submitted to EPA under the Toxics Release Inventory program of the Emergency Planning and Community Right to Know Act of 1986. Table 3-5 shows the changes in emissions of the top five substances discharged to all water bodies in the counties near Galveston Bay (not necessarily reflecting discharges that affect the bay directly). Using 1988 data as the base, we examined the substances with the largest total discharges to water. Table 3-5 shows a reduction in some of these toxics discharges to water in the Galveston Bay area, but an increase in other discharges. Note that increases may be attributable to a single facility, and that the data are sometimes flawed due to the complex data entry procedures used by EPA. Use of these data, which cover more than 300 toxics, will provide all interested parties a means of monitoring new emissions to the bay.

Table 3-5 (a)
Decreases of Toxic Substances Discharged to Water in Galveston Bay Counties

Chemical (by County)	1988	1989	1990
<u>Brazoria</u>			
Ammonia	906,123	1,339,988	119,960
4,4'-isopropylidenediphenol	220,000		99
Chromium compounds	42,456	40,560	430
Phenol	28,750	2,030	580
Zinc compounds	22,310	18,914	5,750
<u>Chambers</u>			
4,4'-isopropylidenediphenol	3,000	1,577	1,073
Diaminotoluene (mixed isomers)	2,700	1,540	250
O-Toluidine	1,400	750	250
Dichloromethane	1,300	250	250
Toluene	1,300	250	250
<u>Galveston</u>			
Xylene (mixed isomers)	993	12,994	22
Naphthalene	890	400	235
Ethylbenzene	733	1,530	125
Benzene	697	4,184	140
Toluene	586	8,685	125
<u>Harris</u>			
Methanol	88,991	102,208	79,621
Sulfuric acid	37,437	123,950	1,571
Chlorine	23,196	29,381	14,410
Chloroform	9,343	9,260	3,900
Phosphoric acid	8,300	409,400	1,225

Source: Compiled from the Toxics Release Inventory

Table 3-5 (b)
Increases of Toxic Substances Discharged to Water in Galveston Bay Counties

Chemical (by County)	1988	1989	1990
<u>Brazoria</u>			
Diethanolamine	17,000	31,078	25,100
Styrene	213	1,496	2,400
Dimethyl phthalate		250	1,400
Xylene (mixed isomers)	310	482	904
Copper compounds	56	80	297
<u>Chambers</u>			
Ammonia	4,700	3,284	81,237
1,2-Dichlorobenzene	70	250	250
2,4-Dinitrotoluene	170	250	250
Chlorobenzene	50	250	250
Chloroform		250	250
<u>Galveston</u>			
Ammonia	63,446	52,146	117,631
Methanol			23,000
Chlorine	6,803	7,750	15,100
Phenol	557	1,488	960
Chromium	70	455	700
<u>Harris</u>			
Ammonia	99,924	803,799	1,367,295
Zinc compounds	14,965	18,881	25,195
Glycol ethers	782		24,375
Methyl tert-butyl ether	750	4,387	17,856
Naphthalene	549	9,535	17,276

Source: Compiled from the Toxics Release Inventory

MUNICIPAL WASTEWATER TREATMENT

Municipal wastewater treatment plants constitute a major source of water discharges to Galveston Bay and its tributaries: in 1990, 617 plants had permits in the 5-county area under consideration. Although these facilities must be permitted in a manner identical to other facilities, they present some additional problems for the bay's environment. Domestic wastewater contains very high levels of nutrients, incomplete treatment of which can seriously alter the ecology of the bay. In a region characterized by regular heavy rainstorms, provision must be made for catching and storing waste and stormwater that exceed treatment plant capacity until they can be treated.

In this section, we briefly review municipal wastewater permitting and then examine the systems belonging to the major municipal dischargers in the bay area and to the Gulf Coast Waste Disposal Authority, which operates both domestic and industrial facilities. We then turn to the financing of municipal treatment plants, because this is a critical element in ensuring that systems' discharges meet water quality standards.

Regulatory Framework

Municipal wastewater treatment plants are subject to the same water quality standards as other dischargers. In order to assist them in meeting these standards, the federal National Pretreatment Program established in 1981 requires industries that discharge into municipal wastewater treatment systems to pretreat their own wastes. Municipalities are responsible for enforcing the pretreatment program, which aims to prevent industries from releasing pollutants that might interfere with the treatment process or create a hazard. In addition, the program specifies standards for 26 industries. Those which are present in Galveston Bay include organic and inorganic chemicals, plastics, and seafood processing.

Municipalities with populations greater than 5000 people must comply with the Municipal Water Pollution Control and Abatement Program, regulations for which were developed by TWC. The program requires municipalities to maintain an inventory of all significant waste discharge to the water within the city and, optionally, the extraterritorial jurisdiction. Municipalities must also monitor significant waste discharges, inspect and test the waste discharges, and work with TWC to ensure compliance. The Texas Water Code requires facilities in the Clear Lake Watershed to meet especially high standards (311.21-22).

These additional standards placed burdens on localities to construct and maintain higher quality wastewater facilities. The Texas Water Development Board, which oversees water supply and water financing, provides 55 percent of funds needed for certain components of public wastewater collection and treatment facilities through the State Revolving Loan Fund (SRF). Municipalities obtain low interest loans, repayment of which is used to sponsor new projects.

The Water Development Fund, a similar revolving fund, emphasizes regional wastewater treatment programs, and can be used also for regional surface water facilities.

The Water Quality Act of 1987 further augmented the responsibilities of municipalities by requiring storm water discharges to meet water quality standards. Although storm water is permitted in the same way as other discharges, the components of stormwater runoff are primarily nonpoint sources; thus, the new provisions of the WQA are discussed in chapter 5 on nonpoint source pollution. Here we present information, provided by each city, about the capacity of the municipalities to treat water.

Municipal Wastewater Treatment Capacity

Table 3-6 summarizes the resources available to the eighteen cities in the Galveston Bay area for treating wastewater. Two cities that discharge the most water are described in more detail below:

Galveston. The City of Galveston currently operates four wastewater treatment plants which the city asserts do not have a problem with bypass. During heavy rain, excess storm water not immediately treated by the plant goes to storm water clarifiers. These clarifiers hold the storm water until the plant can treat it.

Galveston has occasional overflows at manholes during heavy rains. Other overflows are due to blockages in the sanitary sewer line, collapsed lines or failures at lift stations. However, overflows are infrequent and do not pose a severe problem for the city. During high flows, permitted criteria for BOD and TSS are sometimes exceeded. The city also has exceeded the criteria for chlorine, due to residual chlorine from the plant's cleaning process. At present the city has a new dechlorination system that has reduced the chlorine level to the permitted 0.1mg./liter.

The city is preparing to apply to the TWDB for money to install a collection system in the west section of the island where septic tanks are now in use.

Houston. The City of Houston operates 35 wastewater treatment facilities and 310 lift stations. The plants range in capacity from 1 to 200 million gallons per day. The wastewater discharges are currently well within permitted levels but the city is always looking for ways to improve the efficiency of the plants and is building larger regional facilities to reduce the number of small inefficient facilities. The city has already spent approximately \$2 billion on its treatment plants with money from both the EPA and the city. Of the 35 treatment plants, 17 are now equipped with dechlorination mechanisms and the remaining plants are scheduled for additions as their permits come up for renewal.

In spite of the large amount of money already invested, the city still has a problem with wet weather overflows in the sewer system and infrequent plant bypasses because the sewer lines are old. The past year of heavy rains has increased the wet weather overflow problems in the sewer system. The overflow from heavy

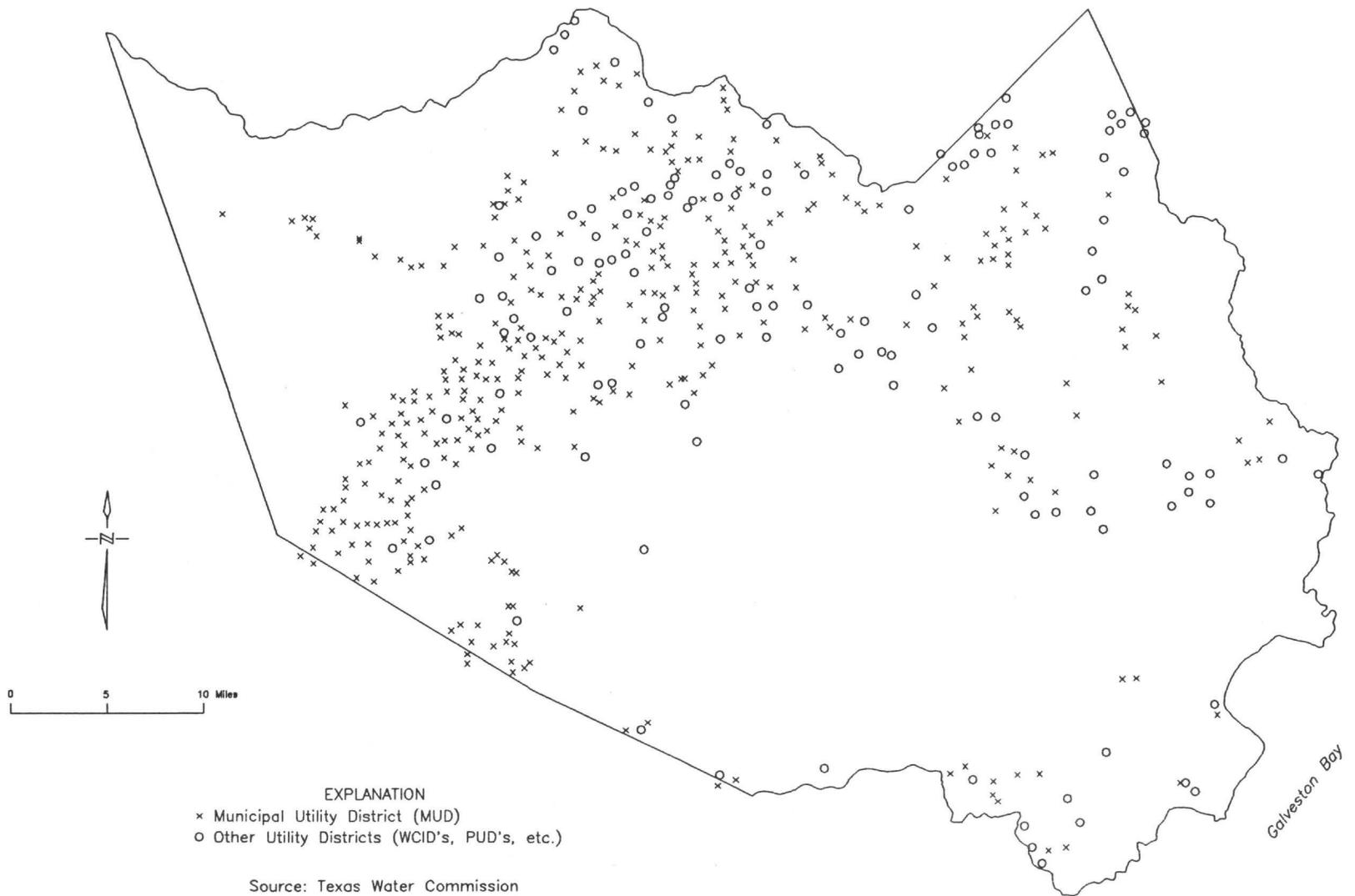
rains and power failures is highly diluted and not raw sewage. The city is under a mandate from the TWC and EPA to eliminate the problem of inflow and infiltration of the sewer lines. To accomplish the goals of the mandate, Houston has initiated a systematic program to repair, rehabilitate, and upgrade its treatment facilities and sewer lines through a five year capital program and sewer revenue bonds. Using a combination of SRF loans and bonds the city will spend approximately \$476 million on sewer rehabilitation and \$560 million on relief work. The city plans to spend an additional \$1.14 billion on the collection system.

Municipal Utility Districts (MUDs). There are hundreds of MUDs and other utility districts in the Galveston Bay area. These are independent districts created either by TWC or the Texas Legislature to provide certain services outside cities. Many of them operate package treatment plants for wastewater treatment. These small, pre-fabricated plants, although permitted, are usually operated by a contractor who provides a registered sanitarian periodically. These operators are seldom present throughout the day; if an emergency arises, it may not be identified for hours or days. To give the reader a feeling for the number of districts that must be considered, Figure 3-3 shows the approximate center of the utility districts in Harris County.

It is widely believed that package treatment plants are operated sloppily and are responsible for many unpermitted discharges, although the extent of the problem is not clear. In an effort to identify problems associated with MUDs, we surveyed the MUDs that lie within 1.5 miles of Galveston Bay or bodies of water feeding immediately into it. Of the 44 utility districts that were surveyed, 15 responded. Several others replied that they were "not MUDs" and didn't complete the surveys. The size of the responding MUDs ranges from 1 to 27,000 acres, and the level of developed real estate in the areas they serve ranges from 20 percent to 98 percent. Five of the responding MUDs operate their own package treatment plants, and treat between 150,000 and 3.5 million gallons per day. The average age of the treatment plants is 16 years, with a range from 3 to 30 years. Four respondents reported bypasses in their collection systems, while 7 said they had never experienced any bypass. Two plant operators reported bypasses to their treatment systems and 9 have not. Few respondents provided specific comments on water quality problems in their area. Those who did mostly cited rural septic systems as the primary pollution source.

Our survey was flawed and does not provide much insight into GBNEP's concerns about MUDs as a point source of water quality problems. However, we think that we have learned that conducting a follow-up survey would not be very useful. We found respondents generally uninterested and/or uninformed. We suggest working with nearby cities and Texas Watch to monitor near MUD outfalls; if fecal coliform appears elevated, perhaps TWC could take additional action. This is the first of many cases we will encounter in this report where the dispersed nature of the problem and the relatively small contribution made by each unit combine to increase the costs of strong regulation beyond what is appropriate. In such cases, it is usually better to develop economic incentives to ensure that

Figure 3-3
Water Utility Districts in Harris County



entities behave in the desired way. We have not yet thought of such an incentive for MUDs.

Summary. Wastewater treatment in the bay area, as in much of the United States, reflects a long history in which concern focused more on human health than on the environment. For example, when activities now conducted by the Texas Water Commission were still under the auspices of the Texas Department of Health, cities were encouraged to provide for bypass to prevent water from backing up and causing a health problem during periods of heavy rain. While this concern remains, we now recognize that it is equally important to construct systems that will store water until it can be treated properly and discharged at environmentally acceptable levels.

Most cities' population in the bay area grew rapidly in the 1980s. Although many cities have now caught up in wastewater treatment capacity, most are still plagued with problems during the area's seasonal heavy rains. Older sewer systems, in particular, require upgrading. To discover problems before they occur, many cities regularly test sewer lines for inflow and infiltration using smoke, video and dye tests.

Tests and repairs are expensive and often funded through municipal bonds or loans from the Texas Water Development Board. Currently, the interest rates available on the market are better and, as Table 3-6 shows, many cities are issuing bonds rather than using loans from TWDB. The Houston-Galveston Area Council provides technical assistance to smaller cities that might otherwise find difficulty in designing systems or presenting proposals to TWDB.

In our survey of the bay's cities, all stated they have alternative means for holding water until it can be properly treated. The extent of the problem created by municipal wastewater discharges, often thought to be a serious threat to the bay, is not clear.

Gulf Coast Waste Disposal Authority (GCA)

The 61st Legislature created the Gulf Coast Waste Disposal Authority (GCA) in 1969 to act as a special conservation and reclamation district for waste management activities. It is a self-supporting governmental unit that builds, owns, and finances water pollution control facilities. The GCA currently employs approximately 200 staff who work in laboratories or treatment facilities as chemists, biologists, and engineers. Approximately 30 people work in management or support positions. The statute which created GCA gave it planning, regulatory, and operational authorities, but did not provide funding. Initially GCA had taxing authority in Chambers, Harris, and Galveston counties but taxpayers in the three-county district overwhelmingly rejected this provision in 1970. Left without a funding source, the GCA decided to provide waste treatment services to municipalities and industries for fees. Industrial and municipal users pay for the cost of treatment at the facilities based on their use. The Authority has assisted in financing pollution control by issuing over \$800 million in bonds that have been used by the cities of Columbus,

**Table 3-6
Municipal Wastewater Treatment**

City	Plants	Capacity (in mgd)	Funding	Comments and Problems
Alvin	1		SRF. TWDB	Minor permit violations. Built 1985.
Angleton	2		EPA. City	Overflow in old lines; upgrade in process
Baytown	West East	1.3/4.0* 3.0/4.5*	\$26m bonds \$5m for repairs	In heavy rain, manholes overflow, minor permit violations. Pretreatment ordinance; industrial discharge=domestic standards
Deer Park	1			Replacing combined sewers.
Dickinson	0			
Friendswood	1		City	10 percent treated; rest to GCA plant. Overflow in heavy rain. Upgrade in 4 years.
Galveston	4	8 (actual=3)	TWDB 1986	Overflow in heavy rain. <i>See text.</i>
Hitchcock	1	**	\$350k Community Development Board	Overflow in heavy rain. Old sewers leak. New sewer lines being installed.
Houston	35	1-200	\$1b SRF Bonds	Overflow in heavy rain. Old sewers. <i>See text.</i>
Kemah	0		**	
LaMarque	2	.8/2	Bonds in 1996	Overflow in heavy rain. New stormwater clarifiers. New plant in 1996.
Pasadena	3		\$2.00 Sewer Connection User Fee	Overflow in heavy rain. Minor permit violations in heavy rain. Sewer rehabilitation with fee for sewer repair, lift station.
Texas City	1		\$1.3m City	Overflow in heavy rain. Last bypass, 1988. Bio- and chemical monitoring.

*present/upgraded capacity

Legend

mgd = millions of gallons per day

SRF = State Revolving Fund

TWDB = Texas Water Development Board

GCA = Gulf Coast Waste Disposal Authority

Source: Interviews with municipal officials

Table 3-7
Gulf Coast Waste Disposal Authority Water Treatment Facilities

Plant	Capacity (in mgd*)	Use	Source of Water/Comments
<u>Industrial</u>			
Washburn Tunnel	55.0	44.5	90% industrial. Pulp/paper; petroleum, organic chemicals synthetic rubber. 10% from Pasadena. Wet/cold weather permit problems.
Bayport Facility	17.0	12.1	95% industrial. Organic, inorganic chemicals. 5% from La Port and Shore Acres. Cold weather permit problems. Expansion of organic removal capacity planned.
40 Acres Facility	16.0	13.3	All industrial. Organic chemicals. Cold weather problems.
<u>Municipal</u>			
Alief	3.55	1.3	Houston and Braes; no pretreated industrial wastes. Odors in adjacent collection system. Has exceeded dechlorination.
Blackhawk	9.25	3.9	Friendswood, Houston, MUD55, Webster, and Harris County Tertiary treatment and activated sludge.

*mgd= million gallons per day

Source: GCA Officials

Galveston, Houston, La Marque, and League City as well as by many local companies.

Currently, GCA owns and operates three industrial wastewater treatment plants. These plants process liquid wastes from over 45 facilities located in Baytown, Texas City, and the area near the Houston Ship Channel. It also operates 11 municipal plants, serving approximately 24 water districts and cities. Five of these plants are large regional facilities. Data about some of the major facilities are presented in Table 3-7.

GCA facilities do not have primary treatment capabilities. Many industrial dischargers pretreat wastes at their plants if it is economically feasible and/or they are required to do so. GCA requires pretreatment of certain substances like dissolved metals, and analyzes wastes from each industrial and municipal source before it is mixed with other waste streams at the treatment plant. Industrial dischargers are expected to report any discovered leaks to GCA, but GCA often catches leaks at industrial or municipal facilities through its analysis before the dischargers realize that a problem has occurred.

As the largest industrial waste treatment complex in the Galveston Bay area, GCA is also the largest discharger of effluent into the bay system. In the past, it has been accused of illegally discharging such contaminants as ammonia, cyanide, oil, and grease into the bay. In 1990, the EPA listed the Houston Ship Channel as a "toxic hot spot" because of its excessive levels of dioxin and nickel, and cited a GCA treatment plant as one of the two known sources of the dioxin.³ GCA has been requested in the past to conduct a study of the impact of its effluent on Galveston Bay but has thus far not initiated such a study. GCA argues that its facilities function as POTWs that must be permitted and monitored by the TWC, and should therefore not be subject to harsher scrutiny than any other wastewater treatment facility. Attempts to review the compliance history for GCA effluent were unsuccessful, although one TWC source said that GCA's effluent is compliant with its permit conditions.

GCA is nevertheless a target for public criticism, and some sources believe the facility has contributed more to the deterioration of Galveston Bay than to its improvement. At least one state representative is planning to introduce legislation in the 1993 session that will force GCA to do an Environmental Impact Assessment of its discharges into the bay system. Recent criticism has centered primarily on a dispute involving the McGuinness Disposal Pits which treat sludge from GCA's Washburn Tunnel Facility which in turn service primarily paper mills. McGuinness has 22 open pits located in the heart of some of the most valuable, and floodprone, wetlands in Galveston Bay, and are directly adjacent to West Bay. Although the pits are surrounded by a 17 ft. levee, critics argue that they still represent a hazard in the event of a serious storm or hurricane. Apparently there was one incident recently when waste did escape into a canal and into the bay during a severe storm.

³ Houston Post. Houston, Texas, 1990, p. A-11

McGuinness operates under a wastewater permit that expired in 1989 and for which renewal is still pending. While this situation logically implies that McGuinness is not operating under the new, stricter water quality standards, TWC has said that McGuinness is already compliant with some of the stricter conditions of the new, pending permit. For example, McGuinness has agreed not to construct anymore sludge ponds without a solid waste permit, and has agreed on securing an alternative disposal method by 1994. Some environmentalists perceive these conditions to be unacceptable. They feel that, at the very least, McGuinness should be forced to operate under a solid waste permit and to dewater its sludge rather than risk contaminating groundwater and surface water. The EPA does not require a solid waste permit from a POTW such as GCA.

Nevertheless, TWC attempted to secure a solid waste application from McGuinness, but was unsuccessful. According to TWC staff, a solid waste permit will allow for safer closure of the pits in 1994 because the requirements for closing a solid waste plant are stricter than those for a wastewater plant. Secondly, the state cannot require financial assurance from wastewater permit holders, but it can from solid waste permit holders. Should McGuinness declare bankruptcy prior to full closure of the facility in 1994, cleanup operations could be very costly to the state. GCA is McGuinness' only client.

Any agency faced with the kind of public distrust elicited by GCA must take proactive steps to change people's perceptions. We find it very difficult to evaluate the competing arguments or to determine whether GCA constitutes a threat or an asset for the environmental protection of the bay. However, establishing a citizens' advisory panel, analogous to those established by many private companies which discharge toxics to the environment, and being open with the public about problems and projects, could serve both the agency and the environment well.

Financing Municipal Wastewater Treatment

Financing is a very important component of the battle to ensure that municipalities can meet wastewater treatment standards. Upgrading sewer systems and expanding or improving treatment plants are necessary if cities are not to commit permit violations or discharge environmentally harmful waters.

Although the primary funding source is state agencies (many of which rely on federal monies) some federal grants are still available directly. In the first half of 1991, for example, EPA's Construction Grants Program for Wastewater Treatment Works (which is being phased out) appropriated the following sums in the Galveston Bay area: Brazoria County (Danbury) \$105,000; Harris County: Houston (\$80,000) a MUD (\$9000), Memorial Villages (\$50,000), LaPorte (\$118,000), Pasadena (\$221,000). All these grants were intended to allow recipients to reduce the quantities of effluents.

The Texas Water Development Board (TWDB) is responsible for administering federal and state water finance programs as well as long-term water planning initiatives reflected in the State Water Plan. The six member board meets

monthly to consider financial requests from municipalities in Texas for water supply, waste water treatment, flood control, municipal solid waste disposal, and agricultural projects. The TWDB issues Texas Water Developments Bonds to fund the projects. Since 1957, the Texas Legislature has authorized the issuance of up to \$2,680,000,000 in bonds. As of July 1, 1991, the Board had \$454.42 million available to fund wastewater projects. In the Galveston Bay area, the Board has helped fund several large projects including a \$30 million loan to the City of Houston for sewer line repair and a sewer line overflow project to Bellaire. The TWDB considers Harris County to be a high priority area. Of a total \$490 million committed through State Revolving Fund since it began in 1989, \$234 million (48 percent) went to Harris County.

Although the Board tries to encourage the regionalization of wastewater treatment facilities, in accordance with federal and state policies, regionalization is difficult because it requires cooperation between municipalities with different needs and financial capabilities. Often one potential partner needs a new treatment plant immediately while its neighbor will not need a new facility for ten years. The latter has few incentives to spend money before the capacity is required.

Applicants for loans must be political subdivisions or non-profit water supply corporations. To speed the process, applicants either should have permits from the Texas Water Commission or be in the process of obtaining the necessary permits when they schedule a pre-application conference with TWDB to discuss the project's eligibility. The application, containing fiscal, legal, engineering and environmental information, is then submitted to the Development Fund Manager for staff review. Upon approval by the Board, a commitment period is extended to the applicant. During this period, the applicant's plans and specifications are reviewed by the TWDB engineering staff and upon approval the loan is issued to the applicant. The Board continues to monitor the loan for the life of the project. The Board does not design sewer systems or treatment plants for municipalities.

Water Development Fund. Financed with TWDB Bonds, the Water Development Fund provides loans for construction of water supply, wastewater treatment, municipal solid waste disposal and regional water supply and wastewater treatment facilities. Through the Water Quality Enhancement Account and the State Participation Account, the Fund supports wastewater treatment projects. The State Participation Account allows the state to purchase an interest in a reservoir, regional water supply or regional wastewater treatment plant. Through the Account the board tries to optimize the size of the project, including oversizing lines to encourage regionalization of plants.

State Revolving Fund (SRF). The State Revolving Fund, established by the federal Water Quality Act of 1987, provides low interest loans to political subdivisions for the construction, improvement or expansion of sewage treatment and collection facilities and nonpoint source pollution control projects. The interest rate on these loans is set at 1/2 percent below the TWDB's borrowing cost. Congress designed the Fund to phase out Title II Construction Grants under the Clean Water Act because Title II grants were not cost effective. Federal grants provide

the initial basis for SRFs, with the expectation that the funds will become self supporting. Under the SRF program, states must deposit at least 20 percent of the federal capitalization grant into the fund. Monies from the fund may then be loaned to communities to finance wastewater projects. Loan recipients must repay the SRF loans to replenish the fund for future projects. Federal capitalization grants are authorized through 1994, when financing wastewater treatment facilities will become solely a state responsibility.

Water Assistance Fund. The Texas Legislature funds the Water Assistance Fund through appropriations. The Water Loan Assistance Fund provides loans to political entities for water supply and treatment projects and wastewater treatment. The Research and Planning Fund supports water research, flood protection and regional water supply and wastewater treatment plans. This fund provides 50-50 matching grants to research projects involving more than one political entity. The fund is essential because it allows communities to work together to research and develop plans. Historically, the fund has been a popular target for cuts by the Legislature and is now dwindling in size.

Evaluation

Municipal treatment plants account for 62 percent of waste discharged to Galveston Bay. Municipal water can be a serious source of fecal coliform and oxygen depleting agents; if cities are not careful to enforce pretreatment requirements, discharges may also include inappropriate levels of industrial wastes and toxic substances. Yet municipalities are very hard pressed to meet their obligations to maintain sewers that do not leak and treatment plants that are adequate for growing populations—problems exacerbated by the many heavy rainstorms that characterize the area around Galveston Bay. The legislative mandate to Houston to upgrade its wastewater collection and treatment facilities is costing the city well over \$1 billion. The most important means to ensure that municipal discharges are not a continuing source of problems for the bay is to make low-cost loans available to cities for upgrading their wastewater collection and treatment systems. Because regionalization is often an effective means for improving the quality of waste treatment, Texas should also develop incentives to encourage cities to work together. As long as interest rates on the open market are below those offered by the state, however, such incentives cannot work. Some means for altering the borrowing rate must be identified.

OIL AND GAS ACTIVITIES: THE TEXAS RAILROAD COMMISSION

The Texas Railroad Commission (RRC) is a three-member elected body which is responsible for the prevention of pollution of surface and subsurface water caused by the activities related to the exploration, development and production of natural gas. The Commission has organized its activities into twelve districts; District 3 is responsible for Galveston Bay and the surrounding counties.

The Oil and Gas Division of the RRC regulates nearly all phases of the oil and gas production process, and handles all permitting and enforcement duties for discharges of wastes associated with these operations. Statewide Rule 8, which

includes a provision expressly prohibiting pollution of offshore waters and adjacent estuarine zones, is the basis for RRC actions concerning water pollution.

Permits

In Galveston Bay, the RRC's primary activity is overseeing water discharges from oil wells. There are approximately fifty RRC-permitted discharges in the bay. To obtain a permit for a discharge, applicants must provide the RRC with an analysis of the discharged water. In addition to the standard concerns including temperature, pH, dissolved oxygen, and suspended solids, the RRC analyzes some thirty additional components, including heavy metals and other substances often associated with oil and gas activities. The RRC is under a statutory mandate to follow TWC water quality standards (Texas Water Code 26.131(b)) and must ensure discharges will not violate the numerical criteria of these standards, the toxicity included in the criteria, or contribute to any historical problems with the receiving waters. The RRC has recently been accused of interpreting and applying the WQS improperly in Nueces Bay and has been meeting with TWC on this issue.

Permit applicants must notify any surface owners of water front tracts between the discharge point and 1/2 mile downstream from the discharge point. If an affected party protests to the RRC within 15 days of notification, the Director may initiate a hearing. The outcome of the hearing will be decided by the Hearings Examiner. Violations are discovered through citizen complaints, routine inspections, and variations in the self reporting data. Permit violations are discovered through citizen complaints (RRC receives nearly 2000 per year), routine inspections from the District, and variations in the self reporting data which are recorded monthly but filed only on a quarterly basis. The number of inspections is dependent upon the location of the site. Sites in water are usually inspected annually while land sites are subject to more frequent inspections. Inspectors look for an obvious sheen on the water, which often signifies an exceedance of the permit.

Permittees are required to take monthly samples and report their findings to the RRC. For oil and grease, the contamination parameter is 25 parts per million (ppm). If the permittee reports a level between 26 and 100 ppm, the RRC will look for a pattern of exceedances in prior months. If a pattern is discovered, RRC staff send a letter of inquiry. District 3 then inspects the site to see what steps are being taken to remediate the problem. If nothing is being done, the district office can issue pipeline severance and stop the sale and purchase of oil from the pipe. Generally, the threat of severance brings about compliance.

If all these options fail, the district can send the case to Austin for an enforcement hearing. The Austin staff send a letter to the violator offering to settle the case for a certain amount of money and compliance. If the operator agrees, the RRC issues an Agreed Order stating the violation has been corrected and the penalty agreed upon. Penalties may be assessed for up to \$10,000 a day per violation. Usually the maximum penalty is not assessed. Most fines range between \$3 and \$20,000 and the average fine is \$5,000 to \$6,000. If the operator cleans up the

problem quickly, the penalty amount may be reduced. Although the Commissioners review the proposed order along with the permittee's record and have the right to raise or lower penalties, they seldom alter the staff's recommendation. Often, by the time the case reaches the Commissioners, the operator has already paid the necessary fines.

Small Producers and the Well Plugging Fund

It is common practice in the oil industry for large companies to sell wells to smaller operators when production begins to slow; that is, when perhaps 60 percent of the oil and gas have been removed. As the well becomes less and less productive, it is sold several times. The final owners are often very small "mom-and-pop" operations who cannot operate the well according to its permit and who abandon the well because they cannot afford to cap it to ensure that it does not pollute the environment after all production has ceased.

As a result, many of the cases brought by the RRC for noncompliance with the permit affect small companies and well owners rather than the large oil companies. A five year study of RRC cases at the Attorney General's Office found that cases from the RRC tend to be sent to the Attorney General only when the defendant is non-existent (i.e. has abandoned the well or is deceased). Although the AG's office may get a huge judgment against the defendant because the fines for violations accumulate over time, the state rarely receives any of the money. Many RRC suits result in default judgments where a suit is filed but the defendant does not respond.

A similar problem arises in plugging wells when they have ceased producing. Even though the original large owner has received approximately 95 percent of the profits from the oil well, the small owner is liable for plugging the well. If the small owner cannot be found or cannot pay, the state is forced to plug the well, spreading the costs to the citizens of Texas instead of passing the costs to the company that made most of the money off the well. The average cost is \$3,000 to \$4,000. RRC claims that typically people plug their own wells, but in 1991 the state established a Well Plugging Fund for capping abandoned wells and cleanup operations. The fund is supplied by fees, penalties, and a per barrel regulatory fee for produced oil and gas. As of June 30, 1992 \$7,232,486 had been credited to the fund. Since September 1, 1991, 900 wells have been plugged at a total cost of \$3,200,000. However, approximately 7,000 wells statewide have been identified as environmental threats in need of plugging, and tens of thousands may need plugging in the near future. Policy makers should consider implementing strong incentive mechanisms for preventing abandonment before plugging, especially since RRC staff resources are already inadequate for monitoring plugging operations and were only present at 40 percent of pluggings in 1991.

Plugging oil wells with state funds is problematic. The equipment on the site of the abandoned well does not belong to the RRC. The RRC leaves the equipment at the site and ownership reverts to the surface owner after six months to one year. If there are legal questions about ownership, a judge, not the RRC, decides. If a well in the water needs to be plugged, the equipment is hauled to the shore. The

equipment does not belong to the RRC, but is the responsibility of the General Land Office (GLO). The GLO and the RRC work together to decide what to do with the salvaged equipment. Although no wells in the water have yet been discovered to be leaking yet, they present a potential problem.

Evaluation

Assuming first that it is reasonable to treat discharges into the water from oil and gas activities differently from other discharges, we may evaluate the RRC's water quality program on its own merits. Applications are reviewed on a case-by-case basis, including proximity to ecologically sensitive areas among the review criteria. The Commissioners could impose a moratorium on further discharges within a particular segment, but have never done so. New applications are sent to the Texas Parks and Wildlife Department for comment, but that overtaxed agency rarely protests these permits. The RRC does not keep data on its permits in a form allowing us to analyze patterns and trends. Enforcement is based on self-reporting data, inspections, and complaints; few enforcement actions are taken each year. In short, the permitting process appears to be largely a paperwork process that serves to keep track of the number of dischargers but does little to constrain them.

Any evaluation of the RRC's water quality program must note forcefully the lack of coordination between the RRC and the TWC. Because their data bases are not compatible, the two agencies do not share permit and enforcement data. The RRC does send permits to the Texas Parks and Wildlife Department for comment, and the RRC is contributing discharge data to the COMPAS program, making it available to all participating agencies. However, it appears that neither agency considers existing discharges monitored by the other when issuing new permits. Monitoring data differ in both form and content, further confounding coordination.

The RRC's procedures are an important element in Texas' inability to be delegated the federal NPDES program. The Railroad Commissioners are elected officials who are allowed to own and operate oil and gas businesses, creating a potential conflict of interest which EPA believes conflicts with the requirements of the Clean Water Act. The Clean Water Act could be amended to allow an exception for the RRC, Texas could amend its constitution to provide a no conflict of interest provision in Texas, or EPA might delegate the NPDES program only to the TWC and its successor Natural Resources Commission, simply excluding permits issued by the Railroad Commission.

SUMMARY EVALUATION: POINT SOURCE

1. Problem. Industrial facilities and municipal wastewater treatment plants emit pollutants into water, making it unsuitable for various uses and unable to support plants and animals. Galveston Bay receives wastewater discharges from more than 500 domestic sources and 500 industrial sources as well as from oil and gas wells in the bay.

2. Authority. The regulatory framework for controlling point source water pollution is well established under the federal Clean Water Act. In Texas, permits are issued by both EPA and TWC, based on a designated use for each water quality segment and criteria, or concentrations of effluents that will maintain these designated uses. There is no limit on the number of permits in a segment, but there is a limit to the wasteload. The RRC issues permits for point source discharges from oil and gas activities. A new state law echoes a new EPA initiative in attempting to reduce reliance on permit-by-permit review and introduce watershed-wide review.

3. Capacity. Sufficient staff at TWC for permitting; inadequate for enforcement. Over-review of facilities consistently in compliance reduces resources for identifying violators. High staff turnover. Merging of municipal group from Texas Department of Health will take some time to smooth out. RRC has smaller staff and conducts no post-permit review.

4. Policy. RRC not very concerned about environmental impacts of oil and gas activities. TWC technical review of permits is routine, with limited attention to ambient monitoring nearby. TWC puts low priority on enforcement.

5. Environmental results. Water quality improved over several years ago; new watershed approach may improve more. Inadequate information to evaluate adequacy of present water quality.

6. Barriers and problems.

a) Dual permitting by federal and state levels wastes regulatory resources but may provide some additional environmental protection. Delegation of federal NPDES program will require legislative action.

b) Poor coordination between RRC and TWC; neither knows of presence of other's permittees when issuing a permit.

c) RRC mandate to promote oil and gas, only secondarily to regulate its environmental effects.

d) TWC policies limiting delegation to field offices slows permitting and enforcement.

e) Staff turnover high, wages low, especially relative to comparable private sector jobs. Government incurs training costs but loses experienced people.

7. Recommendations. Implement CZM; remove dual permitting to the extent possible; TWC coordinate with RRC better; TWC delegate to field offices. Consider market in water pollution rights analogous to new markets in air pollution rights. Enforcement. Study of illicit discharges in the area.

REFERENCES

- Cantrell, Greg. "The Regional Concept: How the Experts See It." Galveston Daily News. December 9, 1980.
- Comptroller of Public Accounts. Texas Water Commission, Management Advisory. Texas Performance Review. Austin, Texas, March 10, 1992.
- Fay, R., Sweet, S., and Wilson, R.J.. Shoreline Survey for Unpermitted Discharges to Galveston Bay. Galveston Bay National Estuary Program. Houston, Texas, August 1991.
- Galveston Bay Foundation, Toxic Discharges in the Houston Ship Channel During 1988. January, 1992.
- Galveston Bay National Estuary Foundation. Galveston Bay Area Residents Handbook. 1991.
- Galveston Bay National Estuary Program. Minutes of the Point Source Task Force Meeting. Clear Lake, Texas, February 7, 1992.
- Gulf Coast Waste Disposal Authority Resources and Capabilities. February, 1991.
- Mathews, Lloyd. "Taxing Power Sought by Antipollution Agency" Houston Chronicle. September 4, 1970.
- Texas Railroad Commission, Water Protection Manual. Austin, Texas, April 1991.
- Texas Water Commission. Wastewater Inspection Manual Volume I. Austin, Texas, August, 1989.
- Texas Water Commission. Implementation of the Texas Water Commission Standards Via Permitting. Austin, Texas, August 16, 1990.
- Texas Water Commission. Needs Assessment for Hazardous Waste Commercial Management Capacity in Texas. Austin, Texas, February 28, 1992.
- Texas Water Commission. Public Hearings: What to Expect. Austin, Texas.
- Texas Water Commission. Water Quality Inspector Training Requirements. Austin, Texas.
- Texas Water Commission. What Citizens Think About Citizens' Monitoring. A Texas Watch Survey of Citizen Leaders. Austin, Texas, February 20, 1992.

Texas Water Development Board. Water for Texas: Today and Tomorrow. Austin, Texas, December, 1990.

Toxics in the Community, National and Local Perspectives. U.S. Environmental Protection Agency. U.S. Government Printing Office, Washington, D.C., 1990.