TNRCC Approval: October 2001

Implementation Plan for Clear Creek Volatile Organic Compound TMDLs

For Segments 1101 and 1102

Prepared by the:
Strategic Assessment Division, TMDL Team

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TEXAS NATURAL RESOURCE CONSERVATION COMMISSION

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Implementation Plan for Clear Creek Volatile Organic Compound TMDLs

Introduction

In keeping with the Texas commitment to restore and maintain water quality in impaired water bodies, the Commission recognized from the inception of the Total Maximum Daily Load (TMDL) Program that implementation plans would need to be established for each TMDL developed.

The TMDL is a technical analysis that:

1) determines the maximum loadings of the pollutant a water body can receive and still both attain and maintain its water quality standards, and
2) allocates this allowable loading to point and non-point source categories in the watershed.

Based on the TMDL, an implementation plan is then developed. An implementation plan is a detailed description of regulatory and voluntary management measures that can be effective and appropriate to achieve the pollutant reductions identified in the TMDL, and a schedule under which the commission anticipates TMDL implementation will proceed. The plan is a flexible tool that governmental and non-governmental agencies involved in TMDL implementation will use to guide their program management. Actual implementation will be accomplished by the participating entities by rule, order, guidance, or other appropriate formal or informal action, depending on the nature of the entity's program and the procedures the entity follows.

The implementation plan contained herein will provide the following components:

(1) a description of control actions and management measures[1] that generally will be implemented to achieve the water quality target;
(2) legal authority under which the participating agencies may require implementation of the control actions;
(3) the procedure TNRCC will use to develop a schedule for implementing activities to achieve TMDL objectives;
(4) a follow-up surface water quality monitoring plan to determine the effectiveness of the control actions and management measures undertaken;

[1] Control actions refer to point source pollutant reduction strategies, generally TPDES permits. Management measures refer to nonpoint source pollutant reduction strategies, generally voluntary best management practices.

(5) a statement of why TNRCC has concluded that the implementation of voluntary management measures will achieve the load allocations for nonpoint sources; and
(6) identification of measurable outcomes TNRCC will review to determine whether the implementation plan has been properly executed and whether water quality standards are being achieved.

This implementation plan is designed to guide the achievement of reductions in concentrations of volatile organic compounds in fish tissue in Clear Creek as defined in the adopted TMDLs.

This implementation plan was prepared by the TMDL Team in the Strategic Assessment Division of the Office of Environmental Policy, Analysis, and Assessment of the Texas Natural Resource Conservation Commission (TNRCC).

Technical assistance in the form of published reports and consultations was provided by:

- the municipalities of League City, Friendswood, Pearland, and Webster
- the Seafood Safety Division of the Texas Department of Health
- the Galveston County Health District, and
- the Harris County Flood Control District

This implementation plan was approved by the Texas Natural Resource Conservation Commission on October 12, 2001. This implementation plan, combined with the TMDL, establishes a Watershed Action Plan (WAP). A WAP provides local, regional, and state organizations a comprehensive strategy for restoring and maintaining water quality in an impaired water body. TNRCC has ultimate responsibility for ensuring that water quality standards are restored and maintained in impaired water bodies.

Summary of TMDLs

The water bodies addressed by the TMDL document *Four Total Maximum Daily Loads for Two Volatile Organic Compounds in Clear Creek* (TNRCC 2000) are portions of the tidal and above tidal segments of Clear Creek in the San Jacinto-Brazos Coastal Basin (see Figure 1). These water bodies were included on the State of Texas 1998 and 1999 §303(d) lists as a result of the issuance of a fish consumption advisory by the Texas Department of Health (TDH) on November 18, 1993. TDH advised against consuming fish from Clear Creek upstream and west of State Highway 3. The fish consumption advisory was issued following determinations of unacceptable human health risk due to elevated tissue concentrations of chlordane and volatile organic chemicals including 1,2-dichloroethane and 1,1,2-trichloroethane. The impacted portions of Clear Creek and their watersheds lie within Harris, Galveston, Fort Bend, and Brazoria counties (see Figure 1).

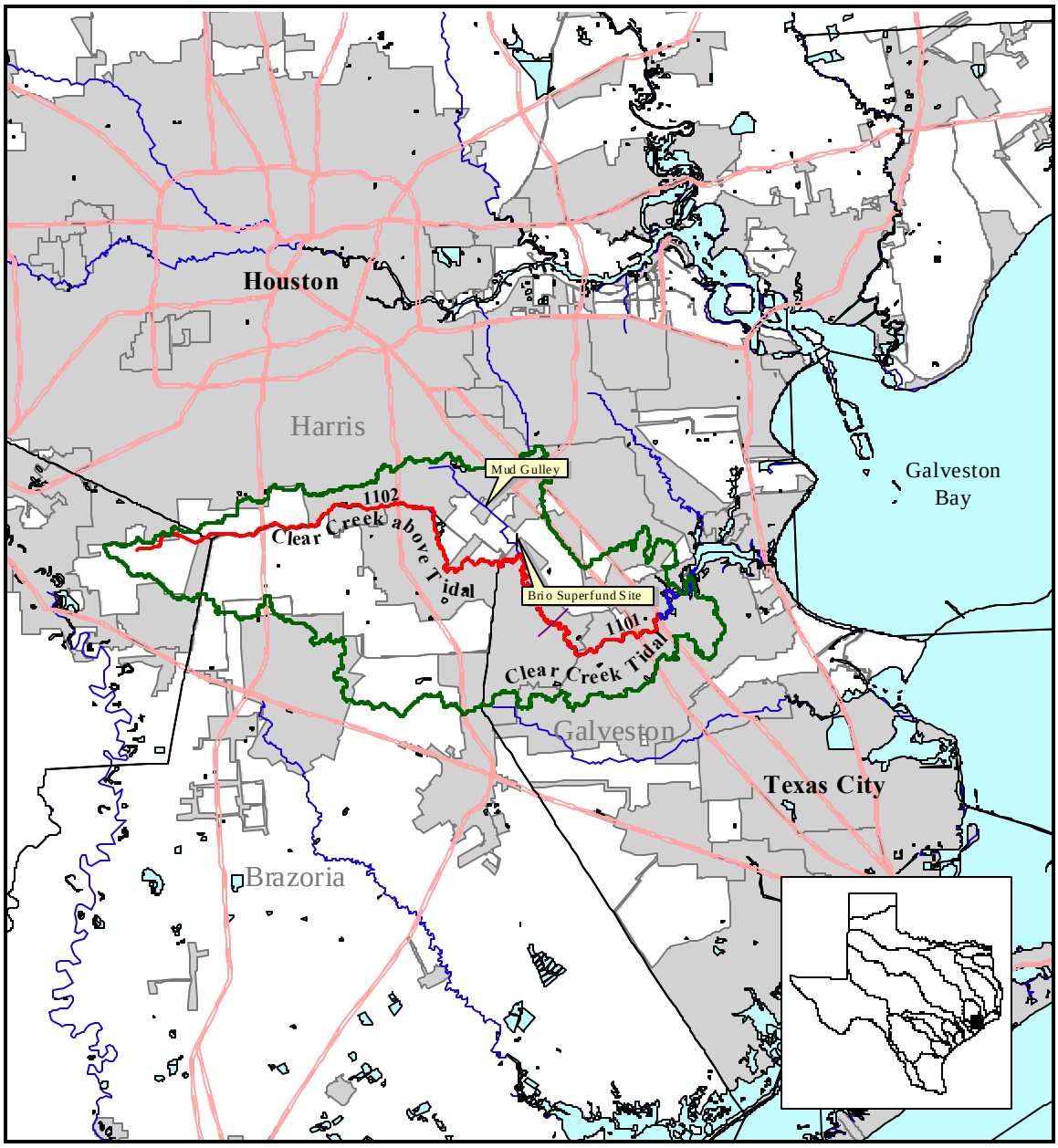


Figure 1. Study Area - Clear Creek Watershed

1,2-dichloroethane and 1,1,2-trichloroethane are associated primarily with chemical manufacturing. Twenty-six domestic sewage treatment plants and two industrial facilities are currently permitted to discharge wastewater to Clear Creek. These are not considered to be significant sources of these compounds. Nonpoint sources of these compounds are also thought to be minor contributors. All currently available evidence indicates that the principal sources of VOC contamination in Clear Creek are directly related to the Brio Refining site, a National Priority Listed (NPL) Superfund site located along Clear Creek near the tidal segment boundary.

The TMDLs adopted for Clear Creek describe allowable loads of 1,2-dichloroethane and 1,1,2-trichloroethane based on acceptable, risk-based fish tissue concentrations. EPA guidance (1997) and TDH assumptions concerning risk levels, consumer body weight, and fish consumption rates were used to develop endpoint targets for tissue contaminant levels that result in an acceptable risk level. The endpoint target of these TMDLs is the reduction of fish tissue contaminant concentrations to levels that constitute an acceptable risk to fish consumers, allowing TDH to remove the advisories on fish consumption (Table 1). Therefore, the ultimate endpoint goal for the affected water bodies is the complete removal of the fish consumption advisories.

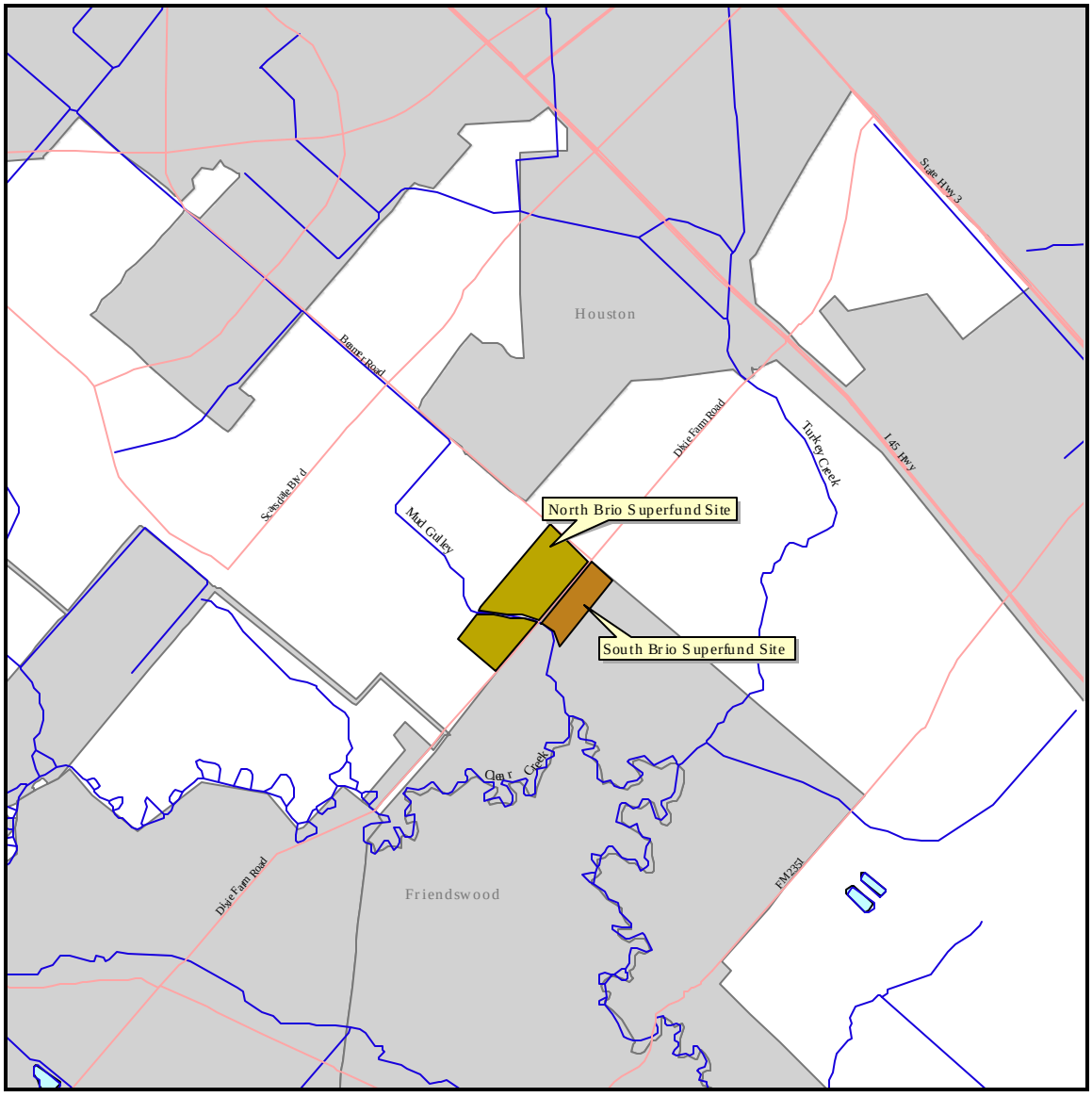
Table 1. Segments of Clear Creek listed on the 303(d) list due to VOC concentrations in fish tissue and fish consumption advisories by the Texas Department of Health, and endpoint targets necessary to meet the fish consumption use.

Segment	Primary Endpoint (Concentrations)
Clear Creek Tidal (1101)	$\leq$ 49.3 µg/L 1,2-dichloroethane in water (HH) $\leq$ 11,300 µg/L 1,2-dichloroethane in water (AL) $\leq$ 420 µg/L 1,1,2-trichloroethane in water (HH) $\leq$ 430 µg/L 1,1,2-trichloroethane in water (AL)
Clear Creek Above Tidal (1102)	$\leq$ 73.9 µg/L 1,2-dichloroethane in water (HH) $\leq$ 32,000 µg/L 1,2-dichloroethane in water (AL) $\leq$ 420 µg/L 1,1,2-trichloroethane in water (HH) $\leq$ 302 µg/L 1,1,2-trichloroethane in water (AL)

Control Actions and Management Measures

The Brio Refining, Inc. waste site is an abandoned refinery located on approximately fifty-eight acres along Mud Gully, a tributary to Clear Creek in Friendswood, Harris County (Figure 2). The Brio facility was operated from the late 1950s until 1982. Past operations at the site included copper catalyst regeneration, oil blending and refining, chemical by-product recycling, petroleum recovery, and hydrocarbon cracking. Chemical spills at this facility have entered Mud Gully and contaminated soils and groundwater. Additionally, raw and process chemical mixtures were stored on-site in unlined pits which continued to contaminate groundwater after operations ceased at the facility. Investigations revealed that soils and shallow groundwater were contaminated with high concentrations of 1,2-dichloroethane, 1,1,2-trichloroethane, vinyl chloride, fluorene, anthracene, phenanthrene, pyrene, and other hydrocarbons and copper. Contaminated groundwater from the Brio Refining site discharged to Mud Gully, which flows into Clear Creek.

Groundwater from the Brio site is pumped, treated, and discharged to Mud Gully under a U.S. EPA Record of Decision amended in 1997 (EPA/541/R-97/122). This discharge and the direct migration of groundwater to Mud Gully are believed to be the only significant continuing sources of 1,2-dichloroethane and 1,1,2-trichloroethane to Clear Creek. The Record of



Decision states that "recovered groundwater shall be treated to meet relevant standards within the receiving water."

Figure 2. Location of Brio Refining NPL Superfund Site

In 1989, the Brio Refining, Inc. Site was added to the National Priorities List under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA). Several measures were taken to reduce the contamination of Mud Gully and Clear Creek. Approximately 100,000 gallons of highly contaminated sludges and solids, and over 40,000 gallons of dense non-aqueous phase liquids have been removed from the site. Over 18 million gallons of ground water have been extracted and treated.

Following these remedial measures, the concentrations of contaminants in Mud Gully and Clear Creek declined by more than 97%. This demonstrates that the Brio Refining, Inc. site was the source for these contaminants in Clear Creek. Currently, 1,2-dichloroethane is seldom detected in surface water from either Mud Gully (Figure 3) or Clear Creek (Figure 4). 1,1,2-Trichloroethane concentrations in Mud Gully (Figure 5) and Clear Creek (Figure 6) are well below the water quality targets, averaging approximately 10 µg/L and 3 µg/L, respectively.

The TMDLs for 1,2-dichloroethane and 1,1,2-trichloroethane adopted for Clear Creek will result in compliance with water quality standards. All allowable loading is allocated to remedial actions at the Brio Refining Site. Because concentrations of 1,2-dichloroethane and 1,1,2-trichloroethane are now below the water quality targets for protection of the fish consumption use, no further reduction in their concentrations is required by the adopted TMDLs. Continuing natural attenuation of 1,2-dichloroethane and 1,1,2-trichloroethane is expected via volatilization from the creek to the atmosphere. Concentrations in fish tissue are expected to decline rapidly by metabolism and excretion following a decline in the concentrations in water. Thus, concentrations of these volatile organic compounds in fish tissue have likely declined (as they have in water) to safe levels.

Continued periodic monitoring will be required to confirm that concentrations of volatile organic compounds in Mud Gully and Clear Creek water do not exceed the water quality targets, and thus will be protective of the fish consumption use. Additional monitoring of 1,2-dichloroethane and 1,1,2-trichloroethane concentrations in fish tissue will be required to verify that fish are safe for consumption.

A U.S. EPA Record of Decision amended in 1997 (EPA/541/R-97/122) outlines several additional measures that will continue to reduce contamination of Clear Creek by the Brio Refining site. These include installing a sub-grade vertical barrier wall enclosing the site, capping the site with a liner and clay cover, and pumping and treating groundwater from fourteen recovery wells.

As the remedial actions at the Brio Refining Site curtail discharges of 1,2-dichloroethane and 1,1,2-trichloroethane to Clear Creek, the allowable loading may be re-allocated.

Legal Authority

Texas statutory provisions require the commission to establish the level of quality to be maintained in, and to control the quality of, water in the state (Texas Water Code (TWC) §26.011). Texas fulfills its obligations under Section 303(d) of the Clean Water Act to list impaired segments and create TMDLs through functions assigned by the legislature to TNRCC. The §303(d) list is prepared by TNRCC as part of its monitoring, planning and assessment duties (TWC §26.0135).

TMDLs are part of the state water quality management plans that TNRCC is charged by statute to prepare (TWC §26.036). As the state environmental regulatory body, the Commission has primary responsibility for implementation of water quality management functions within the State (TWC §26.0136 and §26.127). The Executive Director of the TNRCC must prepare and develop, and the Commission must approve, a comprehensive plan for control of water quality in the state (TWC § 26.012). The list of impaired segments and resulting TMDLs are tools for water quality planning.

Texas Surface Water Quality Standards are contained in Title 30, Chapter 307 of the Texas Administrative Code (30 TAC Chapter 307). TNRCC procedures for implementing the these standards are described in *Implementation of the Texas Natural Resource Conservation Commission Standards Via Permitting* (RG-194, August 1995).

Figure 3. 1,2-Dichloroethane in Mud Gully at Brio Refining Site (Station SW-1)

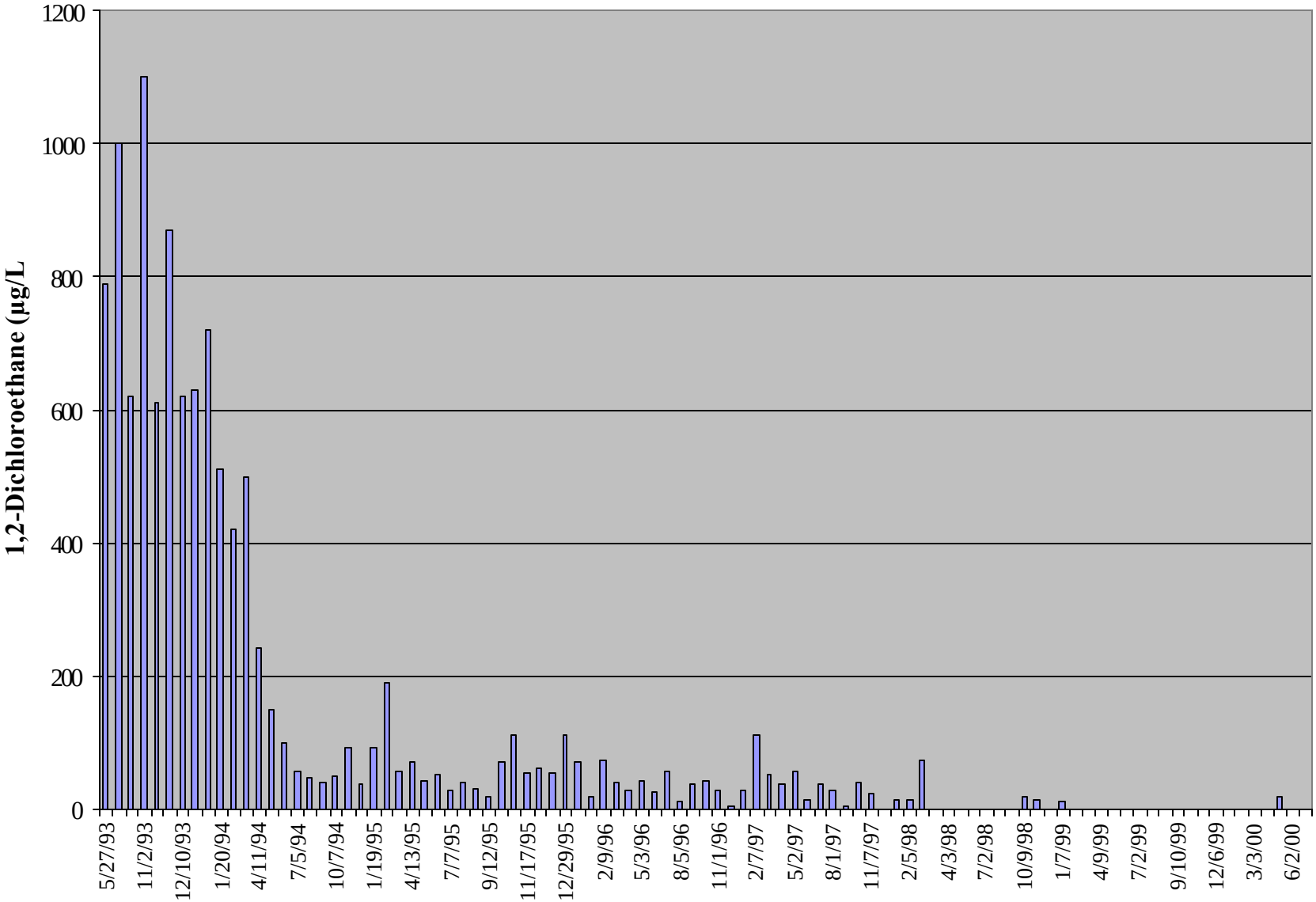


Figure 4. 1,2-Dichloroethane in Clear Creek below Mud Gully (Station SW-21)

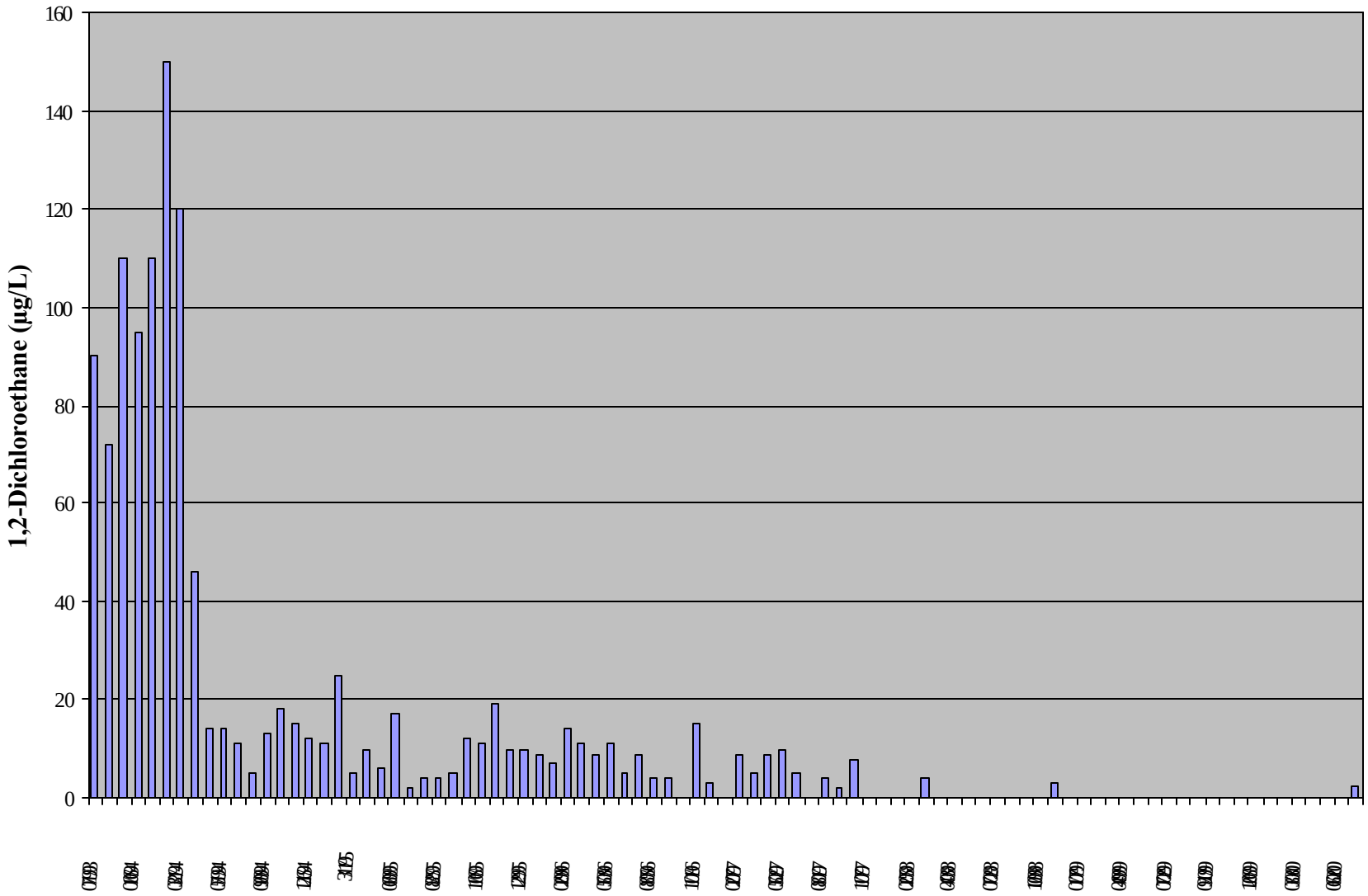


Figure 5. 1,1,2-Trichloroethane in Mud Gully at Brio Refining Site (Station SW-1)

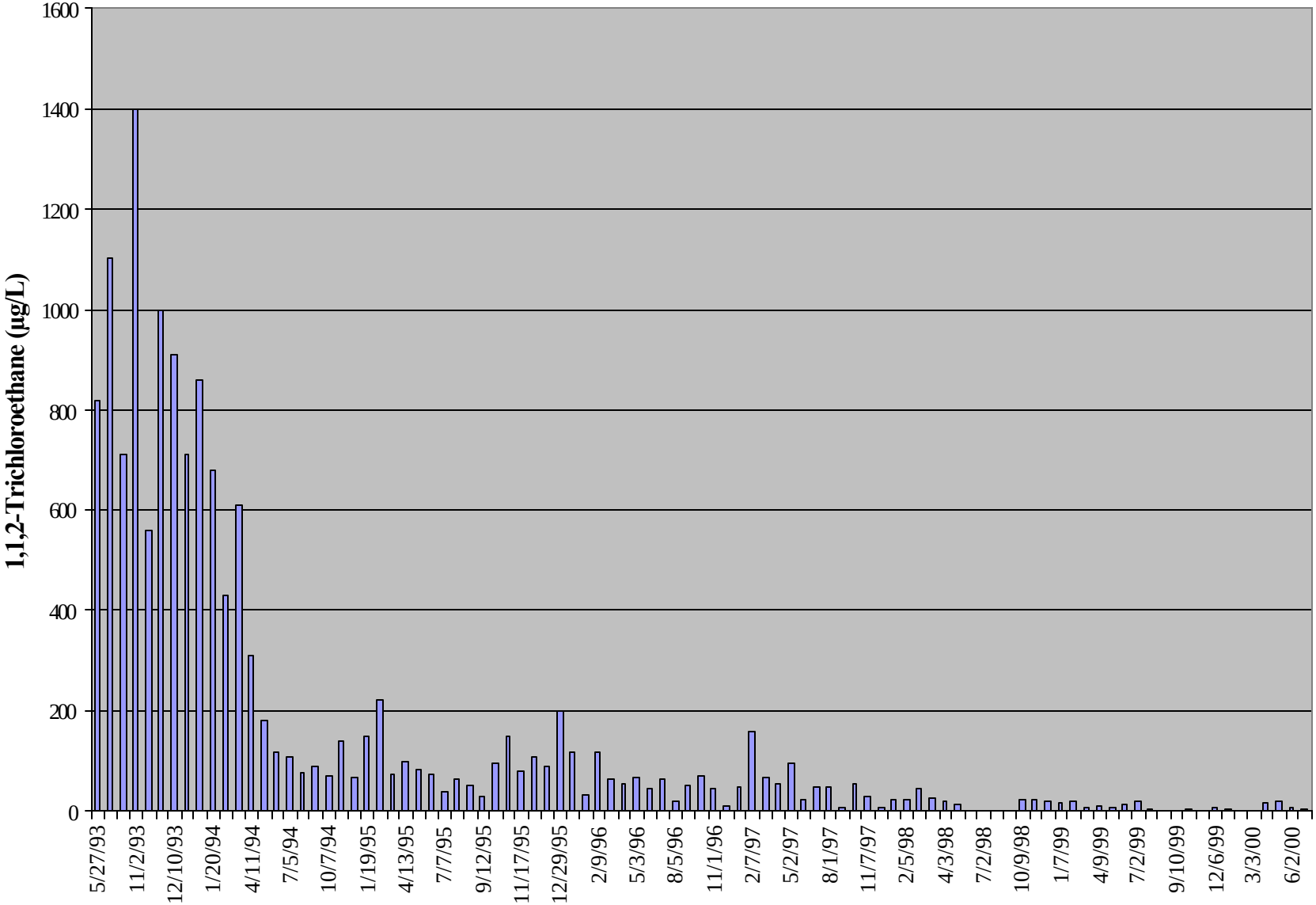
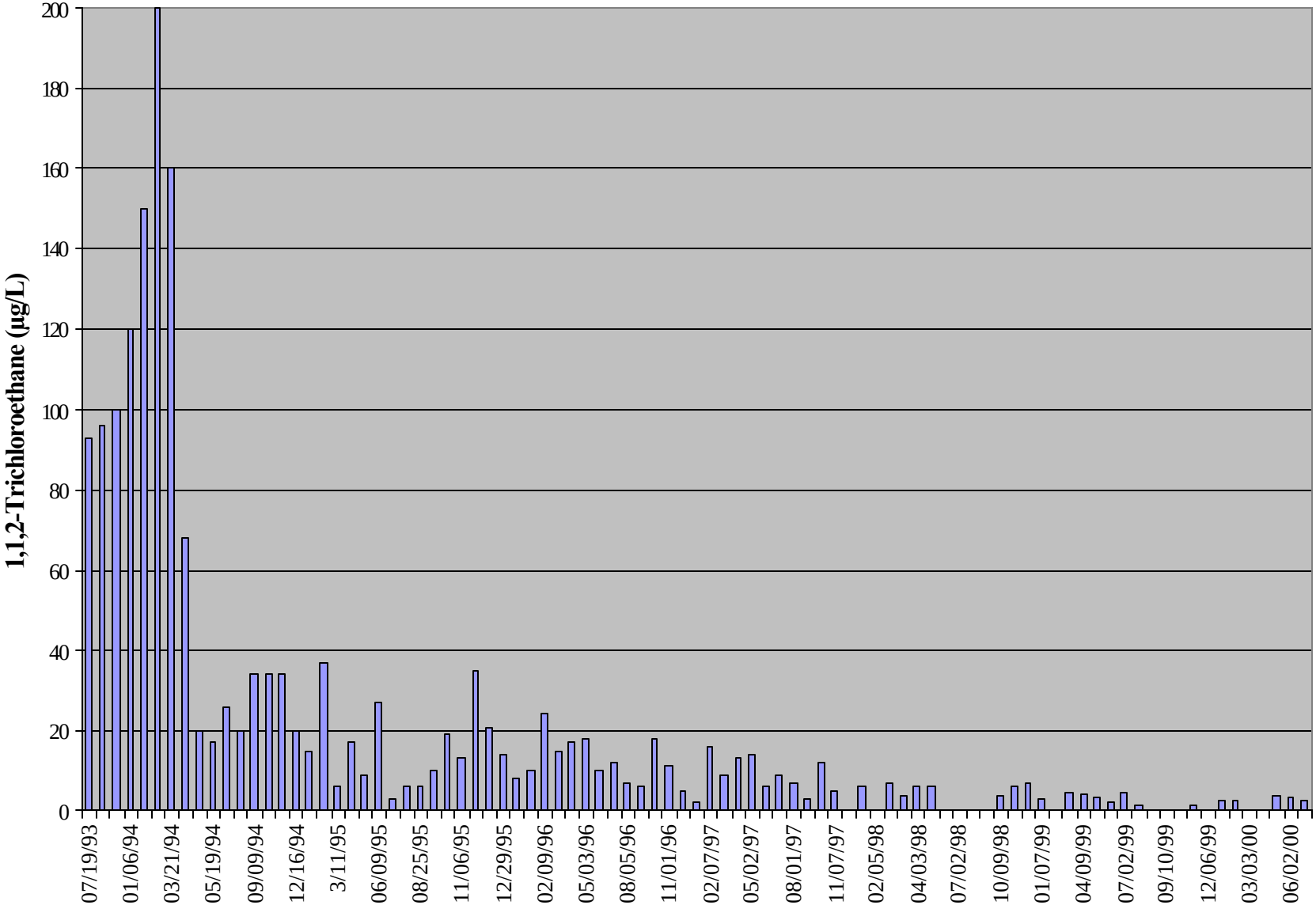


Figure 6. 1,1,2-Trichloroethane in Clear Creek below Mud Gully (Station SW-21)



The TNRCC received delegation of the NPDES program from EPA on September 14, 1998, and is authorized to implement the Texas Pollutant Discharge Elimination System (TPDES), the regulatory program to control discharges of pollutants to surface waters. The TPDES program covers all permitting, surveillance and inspection, public assistance, and enforcement regulatory processes associated with waste discharges into or adjacent to any water in the state. This includes discharges of waste from industry and municipal treatment works, and discharges of storm water associated with industrial activities, construction sites, and municipal separate storm sewer systems (MS4s).

No point source wastewater permits currently authorize the discharge of VOCs into any of the water bodies addressed by these TMDLs. Any necessary regulatory action concerning the discharge of VOCs will be addressed through the Texas Risk Reduction Standards and/or through the storm water requirements described below:

- TNRCC assumed jurisdiction and administration of the EPA Multi-Sector Storm Water General Permit for industrial activities on September 29, 2000. TNRCC is in the process of renewing that permit as TPDES General Permit No. TXRO5000.
- Discharges of storm water associated with construction projects covering five acres or more are currently regulated by EPA under the Phase I Construction Storm Water General Permit. TNRCC will assume jurisdiction and administration of the construction permit by July 7, 2003, and will develop a state permit for renewal.
- Discharges of storm water associated with construction projects one to five acres in size, or smaller than one acre if designated, will be regulated under Phase II of the storm water program. Phase II rules were published by EPA on December 8, 1999, and became effective on December 22, 1999. TNRCC must issue a Phase II Construction General Permit by December 9, 2002. Phase II construction sites must begin obtaining permit coverage within 90 days of permit issuance.
- Discharges of storm water associated with MS4s in cities and counties with populations greater than 100,000 are currently regulated by individual MS4 permits issued by EPA under Phase I of the storm water program. TNRCC will assume jurisdiction upon expiration of each MS4 permit. MS4 permittees will apply for renewal with the TNRCC.
- Cities and counties with populations less than 100,000 will be regulated under the Phase II storm water rules. TNRCC must designate additional small MS4s, and must issue a Phase II MS4 permit by December 9, 2002. Small MS4s must obtain permit coverage within 90 days of permit issuance. Phase II MS4s will be required to identify BMPs, along with associated measurable goals and implementation schedules, for efforts such as the identification and elimination of illicit discharges, construction site runoff control, and post-construction storm water management in new development and redevelopment areas.

The TNRCC also has the regulatory authority to oversee the cleanup of sites contaminated with industrial and municipal hazardous and solid wastes. In general, remediation and closures at solid and hazardous waste facilities must comply with the requirements of 30 TAC Chapter 335, which contains the Risk Reduction Standards, the state cleanup regulations that became effective in June 1993. Remediation and closures initially reported on or after May 1, 2000 must comply with the Texas Risk Reduction Program (TRRP) rules in 30 TAC Chapter 350.

Implementation Schedule

Several monitoring and remediation projects are planned or underway as part of this implementation plan (see Table 2). Additional details of the various monitoring efforts are described in the Monitoring Plan section of this document.

The TNRCC and the USEPA will further evaluate the need for, and effectiveness of, the various mitigation and remediation options, including the management measures specified in the Record of Decision and site-specific natural attenuation, based on periodic evaluation of monitoring results. Timetables for additional monitoring and/or the implementation of any BMPs, and estimates of the time necessary for restoration of the fish consumption uses, will be further developed as the results of the ongoing monitoring are known. Interim evaluations will be made as appropriate, with final evaluations to be performed following completion of all ongoing efforts, probably in mid- to late 2002. The following subsections outline a general approach (summarized in Table 3) to possible subsequent actions that will depend upon results of the efforts described above.

Table 2. Implementation schedule for monitoring and evaluation of management measures.

Entity	Activity	Implementation Schedule
Brio Task Force	(1) Ambient water quality monitoring in Mud Gully and Clear Creek	(1) Quarterly for a minimum of five years
	(2) Groundwater monitoring	(2) Semiannually for a minimum of five years
	(3) Groundwater recovery and treatment	(3) Continuous operation; evaluated every five years
	(4) Plume delineation	(4) Ongoing
	(5) Vertical barrier wall and cover system	(5) cover system is in-place; barrier wall construction will be completed by June, 2001
Texas Department of Health (TDH)	(1) Collection and analysis of fish tissue	(1) Completed September of 2000
	(2) Additional collection and analysis of fish tissue	(2) Every five years
	(3) Reassessment of tissue contaminant risk	(3) Expected in October of 2001 and (if warranted) every five years
Texas Natural Resource Conservation Commission (TNRCC)	(1) Ambient water quality and sediment quality monitoring in Clear Creek	(1) Quarterly; monitoring schedule is reviewed and evaluated on a yearly basis.

Analysis of historical data

If historical trends determined from ambient water and fish tissue concentrations indicate recent or continuing contaminant input into Clear Creek, current and on-going mitigation/remediation measures will be re-evaluated and/or additional investigation may be needed to isolate sources. Water quality and fish tissue monitoring results will be evaluated to identify persistent source areas. Additional monitoring will be performed, if necessary, to further isolate the source(s). If the evaluations indicate the source of VOCs continues to be the Brio Refining NPL Superfund site, remedial actions at the site will be re-evaluated and appropriate measures will be taken to mitigate contaminant releases into Clear Creek.

Table 3. Evaluation outline for any subsequent actions found to be necessary based on the results of ongoing monitoring.
Any subsequent activities will be coordinated by TNRCC, TDH, USEPA, and the Brio Task Force. See text for additional details.

Activity	Results	Subsequent Action
(1) Historical pollutant trends determined from monitoring data	(a) No substantial recent input; any existing pollutants are confined to Brio site.	(a) No additional action is likely to be necessary
	(b) Pollutant concentration in water suggests recent or continuing input	(b) Evaluate monitoring data from Brio site (i) Use site monitoring data and ambient monitoring data to pinpoint source; evaluate need for modification of remedial actions and/or additional investigation (ii) Modify remedial actions at Brio site (iii) Conduct additional investigation
(2) Fish tissue contaminant concentrations (TDH)	(a) Removal of consumption advisories by TDH due to reduction of tissue contaminant concentrations	(a) No action necessary other than follow-up tissue sampling five years after removal of the advisory
	(b) Consumption advisories remain in effect, but trend in reduction of tissue contaminant concentrations is evident	(b) (i) Continue tissue monitoring every five years to verify continuing contaminant reductions (ii) Conduct follow-up tissue monitoring five years after endpoint targets are achieved and advisories are removed
	(c) No evidence of reduction in tissue contaminant concentrations based on samples collected in 2000-2005	(c) (i) Continue addressing pollutant sources and monitoring fish tissue (ii) Reevaluate TMDL time frames and need for additional approaches

Current Pollutant Loading

Concentrations of VOCs in surface water samples from Clear Creek have declined sharply since January, 1994 (Figures 4 and 6) and individual concentrations of 1,2-dichloroethane and 1,1,2-trichloroethane in Clear Creek have been below 10 ug/L since 1998 (TNRCC 2000). These results suggest that there has been a significant reduction of contaminant loadings into Clear Creek and that any remaining contaminant contributions to Clear Creek are below the amounts allocated under the adopted TMDLs. Although loading of 1,2-dichloroethane and 1,1,2-trichloroethane will continue to persist from diffusion and advection from shallow groundwater, these contributions are expected to decline to below detectable levels in surface water within a period of five to ten years.

Fish Tissue Contaminant Concentrations

A large number of factors associated with fish physiology, environmental conditions, and the form of the contaminant have been found to influence contaminant elimination from fish tissue. The time necessary for elimination can be both long and variable. Long-term field studies have generally found that elimination rates are considerably longer than in those measured in laboratory studies.

The endpoint target of these TMDLs is the reduction of fish tissue contaminant concentrations to levels that constitute an acceptable risk to fish consumers, allowing the TDH to remove the advisories on fish consumption. If fish tissue data collected in 2000-2005 indicate that endpoint targets have been reached in a given water body, follow-up sampling will be conducted to verify that tissue contaminants remain at acceptable levels. The TDH may choose to conduct additional monitoring in any of the water bodies at any time.

If fish tissue data collected in 2000-2005 indicate that endpoint targets have not yet been reached in a water body, it will be necessary to continue tissue monitoring. Additional tissue sampling may be the only step necessary if the tissue data indicate a clear trend in the reduction of tissue contamination. Because the natural attenuation of contaminants in fish tissue occurs gradually, collection and analysis of fish tissue on a five-year cycle beginning in 2000 should be adequate to track continuing declines and allow for periodic reassessment of consumption risk by the TDH. Tissue sampling will be performed by the TDH, or by another entity through an arrangement with the TDH. Sampling will continue until endpoint targets have been reached and the consumption advisories are removed. Follow-up sampling will be conducted approximately five years later to verify that tissue contaminants remain at acceptable levels.

Subsequent to the fish tissue collection and analysis conducted by TDH in 1993, only one other fish tissue collection event has been conducted in Clear Creek. This event was completed in September of 2000; the analytical results of this event are expected to be released in June, 2001. Because of the volatile nature of chlorinated solvents, decreases in fish tissue concentrations of VOCs are expected to occur more rapidly than fat soluble pesticides and PAHs. Reductions in the concentrations of 1,2-dichloroethane and 1,1,2-trichloroethane in fish tissue commensurate with the observed decline in VOCs concentrations in surface water are likely. If tissue samples collected in 2000-2005 indicate no reduction of contaminants in Clear Creek, reevaluation of the TMDL approach may be required.

Restoration of Fish Consumption Use

The results of fish tissue monitoring efforts, and any subsequent need to implement one or more additional activities, will likely affect any estimates of the time necessary for restoration of the fish consumption use to these water bodies. Given the current knowledge of the metabolism of fish tissue contaminant concentrations and existing site-specific sources of VOCs, restoration of the fish consumption use in these water bodies is expected within the next five to ten years.

Findings of the ongoing monitoring efforts and reassessment of tissue contaminant risk by the TDH may require revision of this estimate.

Monitoring Plan

The TNRCC, the TDH, and the Brio Task Force are continuing a variety of efforts to (1) monitor VOC concentrations currently in Mud Gully and Clear Creek (2) verify the effectiveness of current management measures at the suspected source (the Brio Refining NPL Site), and (3) verify decreasing pollutant loadings and fish tissue concentration trends.

- The TNRCC will continue to monitor surface water in the non-tidal and tidal segments of Clear Creek below Mud Gully on a quarterly basis.
- The Brio Task force will continue to monitor groundwater at fourteen wells located within the Brio Refining NPL Superfund Site on a semi-annual basis and will also monitor surface water at Mud Gully and Clear Creek on a quarterly basis indefinitely. Brio's monitoring program will be evaluated for modifications and discontinuation every five years.
- The TDH will collect and analyze fish tissue samples in Clear Creek and risk from ingestion will be re-assessed

The TNRCC will evaluate historical trends in the occurrence of VOCs in surface water from monitoring data and will also continue to monitor the non-tidal and tidal segments of Clear Creek indefinitely as part of its Surface Water Quality Monitoring Program.

The TDH received funding from the TNRCC to conduct fish tissue sampling on a number of water bodies throughout the state for a two-year period that began in mid-2000 including Clear Creek. The TDH will reassess tissue contaminant levels in these water bodies when sampling is complete. Similarly, the TNRCC will cooperate with the TDH to conduct additional fish tissue collection and analysis efforts in Clear Creek on five year time intervals. The results of this effort will be used to re-assess the current risk to the local population from fish consumption. Fish tissue monitoring will continue in order to verify acceptable risk levels, establish spatial and/or temporal trends in fish tissue contamination, and to better define the extent and severity of the impairment.

The TNRCC will further evaluate the need for additional monitoring activities based on the results of the various ongoing efforts. The necessary extent of any additional monitoring will be developed as the results of the TNRCC/ TDH and Brio Task Force monitoring projects are known (see "Implementation Schedule" section of this document). The TDH may also choose to conduct additional fish tissue monitoring in any of the water bodies at any time.

Additional monitoring may also be necessary to assess the effectiveness of mitigation/ remediation activities at the Brio Refining NPL Superfund Site.

Reasonable Assurance of Success

Continuing decreases in VOC levels in surface water and fish tissue in Clear Creek are expected, although the time frame necessary to achieve acceptable VOC concentrations in fish tissue is subject to debate.

Available surface water data from Mud Gully and Clear Creek and shallow ground water data from the Brio Refining NPL Superfund Site indicate that VOC concentrations have decreased dramatically and are continuing to decrease as a result of remedial and mitigative actions conducted at the Brio site. These actions have effectively reduced contaminant loadings into Mud Gully and Clear Creek to levels that are below those specified in the adopted TMDLs. Continuing natural attenuation of these pollutants in fish tissue is expected via volatilization, continuing degradation and metabolism of the contaminants.

The most recent data on fish tissue in Clear Creek was collected in September, 2000. The results of this (September 2000) sampling event are expected to be released in June, 2000. Additional fish tissue collection efforts and a more current fish consumption risk assessment is planned for this water body. If the results of the risk assessment show acceptable human health risk levels, the TDH will remove the consumption advisories for the affected water bodies and follow-up monitoring will be conducted every five years subsequent to removal of the advisories.

If the results of the updated risk assessment show risk levels continue to exceed acceptable limits for human health, but the concentrations are lower than previously observed, fish tissue collection will continue to verify a downward trend in fish tissue voc concentration with time. Fish tissue monitoring will be conducted every five years until target concentrations are achieved and the consumption advisories are removed.

If the results of the updated risk assessment show risk levels continue to exceed acceptable limits established for the protection of human health, and if fish tissue voc concentrations do not show evidence of a downward trend with time, TMDL loading estimates may be revisited and efforts to identify additional sources of contamination will be instituted. The time frames necessary for achieving the specified target concentrations will also be revised accordingly. Regardless of any renewed efforts associated with revision of established TMDL loading limits, additional source identification, and/or problem re-definition, fish tissue monitoring will be conducted every five years until target concentrations are achieved and the consumption ban is removed.

Because of the apparent historical link between VOC contamination in Clear Creek and the Brio Refining NPL Superfund site, pollution control efforts in Clear Creek will focus first on the evaluation and improvement of mitigative and remedial activities at this Brio site. Efforts to identify additional sources of contamination will be conducted only after clear evidence is shown that the impact to Clear Creek is in excess of the contributions from the Brio site.

Measurable Outcomes

The following outcomes will denote the attainment of various implementation steps:

(1) Completion of the mitigative/remedial measures at the Brio Refining NPL Superfund Site

(2) Completion of reassessment of fish tissue risk by TDH (of September 2000 sampling event)

(3) Completion of a five year decision of record evaluation for the Brio Refining NPL Superfund Site

(4) Completion of additional fish tissue sampling at five-year intervals

(a) sampling events and laboratory analyses

(b) reassessment of fish tissue risk by TDH

(5) Data analysis and re-evaluation of established TMDL loading limits

(6) Evaluation of mitigation/remediation measures and planning and implementation of additional mitigation/remediation strategies

(7) Data analysis and re-evaluation of source areas

The most significant outcome for determining the success of the TMDLs and the implementation plan will be the removal of the fish consumption bans by the TDH. Interim outcomes that indicate progress towards this goal are:

- Continued reductions in fish tissue contaminant concentrations
- Reduction of fish tissue contaminant concentrations to a level that allows the TDH to modify a consumption advisory by removing one or more contaminants, or by shifting to an advisory for certain groups at greater risk, and
- Reduction of fish tissue pollutant concentrations to levels that meet the endpoint target concentrations and acceptable risk levels, but where the TDH has not yet removed the consumption advisory.

The TDH has the authority and jurisdiction for the decision to issue, or to modify or remove, fish consumption bans and advisories. Subsequent risk assessments by the TDH may result in one or more of these options for the various water bodies addressed by this implementation plan. The ultimate endpoint goal for the affected water bodies is the protection of all groups and complete removal of the fish consumption advisories.

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