



*Improving Water Quality in Patrick Bayou*

# Four TMDLs for Copper, Temperature, Toxicity in Water, and Toxicity in Sediment

## Water Quality in Patrick Bayou

The state of Texas requires the water quality in Patrick Bayou (a portion of Segment 1006, the Houston Ship Channel) to be suitable for a healthy aquatic ecosystem. However, Patrick Bayou was placed on the Texas Clean Water Act Section 303(d) List of impaired waters. The reasons for listing the bayou were presented in the 1998 list and were modified somewhat in the 1999 list. They include:

- average dissolved copper concentrations above levels established to protect aquatic life
- water toxicity levels that sometimes exceed the screening levels established to protect aquatic life
- water temperatures that sometimes exceed the level established to safeguard general water quality uses
- sediment toxicity levels that sometimes exceed the screening levels established to protect aquatic life

Additional data further supported the existence of water quality concerns in Patrick Bayou. These included evidence of a degraded benthic macroinvertebrate community and levels of metals and organics that exceeded screening levels for estuarine sediments.

In response to these conditions, a total maximum daily load (TMDL) project was initiated. The goal of a TMDL is to determine the amount (or load) of a pollutant that a body of water can receive and still support its designated uses. This allowable load is then allocated among all the potential sources of pollution within the watershed, and measures to reduce pollutant loads are developed as necessary. Specific objectives of the Patrick Bayou project include:

- determining if water quality conditions have changed as a result of recent changes in wastewater discharges
- identifying specific pollutants that cause toxicity
- developing load allocations for appropriate pollutants

Learn more about water quality standards and monitoring by reading *Clean Water for Texas: Working Together for Water Quality*, available on the Web at [www.tceq.org/goto/tmdl/](http://www.tceq.org/goto/tmdl/).



## Description of Patrick Bayou

Patrick Bayou is a small tributary of the Houston Ship Channel. The bayou flows in a northerly direction and discharges into the south side of the Houston Ship Channel approximately 3.7 km upstream of its confluence with the San Jacinto River. A portion of Patrick Bayou lies south of SH 225, is largely concrete lined, and serves as drainage for the City of Deer Park. Immediately downstream of SH 225, the first 1.3 km of the bayou flows through either concrete culverts or a gunite-lined channel. The bayou downstream of this point has earthen banks and a soft mud bottom. A majority of the bayou north of SH 225 is tidally influenced to some degree. The bayou is affected by industrial and municipal wastewater discharges and by storm water runoff from industrial and urban areas.

The watershed includes portions of the following political jurisdictions:

**Counties:** Harris  
**Cities:** Deer Park

## Public Participation

Scientific studies to develop recommendations for this project were funded by a consortium of permittees, the Patrick Bayou Lead Organization (PBLO), that discharge to Patrick Bayou. The member entities were the City of Deer Park, Lubrizol, Oxy Vinyls, Praxair, Rohm and Haas Texas, and Shell Inc. Parsons Engineering Science, Inc. was contracted to perform technical work for the TMDL project, including work plan development, water and sediment sampling, data analyses, modeling, and report compilation.

Local watershed stakeholders participated in the TMDL development process. Public input was coordinated through the Patrick Bayou TMDL Public Participation Panel. The panel was composed of representatives of the consortium, community members serving either as individuals or as representatives of groups concerned about water quality, and the TCEQ project manager. Informal observers also participated. Meetings were arranged, conducted, and documented by a professional facilitator. Panel meetings informed community stakeholders of technical plans or progress,

and sought their comments or suggestions regarding the nature of future activities and interpretation of collected data or information.

Reports and recommendations were developed in conjunction with the Public Participation Panel and were submitted to the TCEQ to support its preparation of a draft TMDL report and the TMDL implementation plan.

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## TMDL Development Status

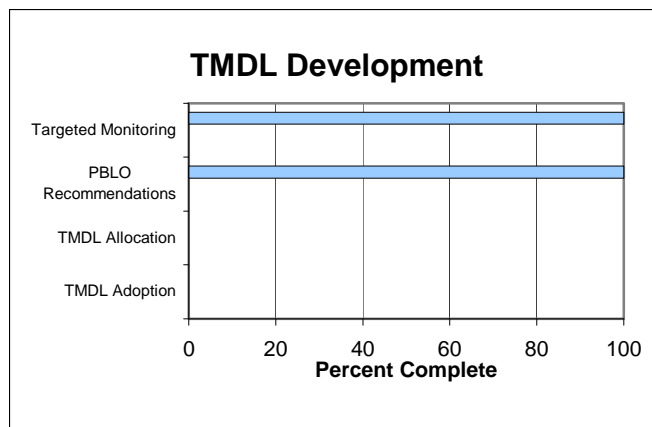
**Start Date:** June 2001

**Projected End Date:**

**TCEQ Adoption:**

**Submitted to EPA Region 6:**

**EPA Region 6 Approval:**



## TMDL Project Highlights

- Four major sampling events were conducted from August 2000 through April 2001.
- Analyses of data collected through April 2001 indicate that water toxicity and dissolved copper no longer exceed water quality standards due to control actions previously implemented by dischargers. Those controls will continue, so no TMDL allocations to address water toxicity or dissolved copper will be prepared.
- The last planned meeting of the Public Participation Panel occurred on August 29, 2002. The PBLO prepared formal documentation of data and analyses, with recommendations concerning water temperature and sediment toxicity, which were submitted to the TCEQ during the last quarter of 2002.
- As of September 2002, Patrick Bayou has been added to the Superfund National Priority List, based on sediment testing performed independently of this TMDL project.
- There are significant uncertainties and difficulties regarding future directions for the water temperature and sediment toxicity issues. Temperature effects may need to be addressed using a "balanced indigenous population" standard instead of a numeric water temperature criterion, based on some readings of the Clean Water Act. Current scientific techniques are unable to determine the cause(s) of sediment toxicity, and there are some indications that biological communities in Patrick Bayou are less affected than laboratory results suggest.
- The TCEQ has reviewed the PBLO's recommendations, and will continue to work towards resolution of water quality issues in Patrick Bayou. Temperature conditions will be monitored for some time to assess the effect of closure of a major heat discharge. The federal Superfund program has begun to plan for remediating sediment toxicity; the need for a TMDL will be addressed when Superfund information and plans are developed.

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