

Five-Year Review Report

Third Five-Year Review Report
for the
Triangle Chemical Company Superfund Site
Bridge City, Orange County, Texas



PREPARED BY:

Region 6
United States Environmental Protection Agency
Dallas, Texas

April 2006

THIRD FIVE-YEAR REVIEW
Triangle Chemical Company Site
EPA ID# TXD055143705
Bridge City, Texas

This memorandum documents United States Environmental Protection Agency's (EPA's) performance, determinations, and approval of the Triangle Chemical Company Superfund Site (Site) Third Five-Year Review under Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) §9621(c), as provided in the attached Third Five-Year Review Report.

Summary of Five Year Review Findings

The third five-year review for this Site indicates that the remedial actions set forth in the decision document for this Site continue to be implemented as planned. The Site is secured by a fence, and Operations and Maintenance (O&M) activities, in the form of semi-annual ground water monitoring and mowing continue to be conducted by the Texas Commission on Environmental Quality (TCEQ). Based on the site inspection, data review, interview, and technical assessment, it appears the remedy is generally functioning as intended by the decision document.

To ensure continued protectiveness, however, three issues are identified in the third five-year review for this Site. These issues do not currently affect the protectiveness of the remedy, but need to be addressed to ensure continued protectiveness and performance. These issues include:

1. **Low levels of contamination below MCLs have been detected in deep aquifer monitor well MW-7.** Possible causes of the detections need to be investigated, including, but not limited to: changes of sampling contractors and sampling procedures; changes in detection limits and analysis procedures; and change in laboratory protocols. Because the deep ground water aquifer (30 to 80 feet below ground surface) has been deemed to be a usable ground water source, monitoring of MW-7 must continue.
2. **Warning signs are not present on most of the perimeter fence.** During the site inspection, only one warning sign was observed on the perimeter fence. Warning signs are necessary to notify potential trespassers that the Site is a Superfund Site and that contamination is present. Warning signs also make it possible to prosecute people who trespass onto the Site. Warning signs need to be posted at a maximum interval of one sign every 200 feet along the perimeter fence.
3. **Adjacent Property Owner (Broussard Property) to the south has discarded trash, and scrap metal pieces, on the dock driveway entrance site property** (see site inspection photographs in Attachment D). The debris affects aesthetics of the site and creates a deterrent to the re-sale and reuse of this site and its large structure, dock and facilities.

Actions Needed

To address the issues identified during the third five-year review, the following recommendations and follow-up actions have been identified for the Site:

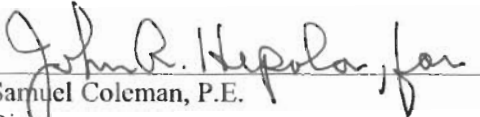
1. **Continue monitoring the ground water contaminant concentrations in MW-7, and evaluate possible causes of the low level detections.** If contaminant concentrations continue to increase

and/or approach the MCLs, evaluate measures to address potential contamination in the deeper aquifer. Consider incorporating adjacent private wells (neighboring residential wells) into the sampling program if contaminant concentrations continue to increase.

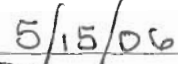
2. **Post additional warning signs at a maximum distance of 200 foot intervals along the Site fence.** Include on the warning signs notice that the Site is a Superfund Site, that contamination is present at the Site, and that trespassers will be prosecuted. Include contact information for both the TCEQ and EPA on the warning signs.
3. **Remove discarded trash and scrap metal debris from the property.** The debris impacts aesthetics of the site and creates a deterrent to the re-sale and reuse of this site and its large structure, dock and facilities.

Determinations

I have **determined** that the remedy for the Triangle Chemical Company Superfund Site is protective of human health and the environment in the short term, and will remain so provided the action items identified in the Five Year Review Report are addressed as described above.



Samuel Coleman, P.E.
Director
Superfund Division
U.S. Environmental Protection Agency Region 6



Date

CONCURRENCES

FIVE-YEAR REVIEW
Triangle Chemical Company Superfund Site
EPA ID# TXD055143705

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- Attachment 1: Documents Reviewed
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- Attachment 3: Site Inspection Checklist/Inspection Roster/O&M Costs
- Attachment 4: Site Inspection Photographs
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List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CD	Consent Decree
CFR	Code of Federal Regulations
COC	Chemicals/Contaminants of Concern
EPA	United States Environmental Protection Agency
FR	Federal Register
HI	Hazard Index
LDR	Land Disposal Restrictions
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
MCLs	Maximum Contaminant Limits
O&M	Operation and Maintenance
OSWER	Office of Solid Waste and Emergency Response
OUs	Operable Units
ppb	parts per billion
PCE	Tetrachloroethene
RA	Remedial Action
RCRA	Resource Conservation and Recovery Act
RD/RA	Remedial Design/Remedial Action
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SH	State Highway
TAT	Technical Assistance Team
TBC	To Be Considered
TCEQ	Texas Commission on Environmental Quality
TDWR	Texas Department of Water Resources
TNRCC	Texas Natural Resources Conservation Commission
TWC	Texas Water Commission
VOCs	Volatile Organic Compounds

Executive Summary

Pursuant to Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA” or “Superfund”), 42 United States Code (USC) §9621(c), the third five-year review of the Triangle Chemical Company Superfund Site (the Site) located in Bridge City, Orange County, Texas was completed in April 2006. The results of this third five-year review indicate that the remedy is currently protective of human health and the environment in the short term. Overall, the remedial actions performed appear to be functioning as designed. No deficiencies were noted that currently impact the protectiveness of the remedy, although several issues were identified that require further action to ensure the continued protectiveness of the remedy.

The selected remedy was chosen to remove the principle threats to human health based on direct exposure to hazardous materials stored at the Site, to prevent further degradation of surface and ground water quality, and to mitigate future impacts to human health, the environment, and site development. To meet these objectives, the remedy for the Site included the offsite incineration and deep well injection of the contents of drums and tanks, the decontamination of onsite buildings, the offsite disposal of contaminated debris and trash, mechanical aeration of contaminated soils, and ground water monitoring. The ROD recommended that operations and maintenance (O&M) include landscaping, fence repair, and 5 years of ground water monitoring. Ground water monitoring was to end after five years if no significant contamination was detected, or corrective measures would be evaluated if significant contamination was detected. A supplemental ground water investigation conducted in late 1988 and early 1989 concluded that higher levels of contamination than previously thought existed in the shallow ground water at the Site, but that monitored natural attenuation would be an effective remedy.

Under the statutory requirements of Section 121(c) of CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), P. L. 99-499, and the subordinate provisions of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) 300.430(f)(4)(ii), performance of five-year reviews are required for sites where hazardous substances remain on-site above levels that allow for unrestricted use and unrestricted exposure. In addition, EPA policy, as stated in the current EPA five-year review guidance, states that five-year reviews will be conducted at sites where a pre-SARA remedial action leaves hazardous substances on-site above levels that allow for unrestricted use and unrestricted exposure, and five-year reviews will be conducted at pre or post-SARA sites where the remedial action, once completed, will not leave hazardous substances on-site above levels that allow for unrestricted use and unrestricted exposure but will require more than five years to complete. The remedy for the Triangle Chemical Company Superfund Site was selected prior to the enactment of SARA. As such,

five-year reviews are conducted for the Site as a matter of EPA policy. The first five-year review for the Site was completed in July 11, 1994, and the second five-year review was completed in June 1, 2001.

During the third five-year review period, O&M activities at the Site have continued. O&M activities include semi-annual ground water monitoring, site inspections of the fencing, warning signs, and monitor wells, and mowing as necessary. Site O&M is conducted by the Texas Commission on Environmental Quality (TCEQ).

To ensure continued protectiveness, three issues are identified in the third five-year review for this Site. These issues do not currently affect the protectiveness of the remedy, but need to be addressed to ensure continued protectiveness and performance. These issues include:

1. Low levels of contamination below MCLs have been detected in deep aquifer monitor well MW-7.

Possible causes of the detections need to be investigated, including, but not limited to: changes of sampling contractors and sampling procedures; changes in detection limits and analysis procedures; and change in laboratory protocols. Because the deep ground water aquifer (30 to 80 feet below ground surface) has been deemed to be a usable ground water source, monitoring of MW-7 must continue. If contaminant concentrations continue to increase and/or approach the MCLs, evaluate measures to address potential contamination in the deeper aquifer. Consider incorporating adjacent private wells (neighboring residential wells) into the sampling program if contaminant concentrations continue to increase.

2. Warning signs are not present on most of the perimeter fence. During the site inspection, only one warning sign was observed on the perimeter fence. Warning signs are necessary to notify potential trespassers that the Site is a Superfund Site and that contamination is present. Warning signs also make it possible to prosecute people who trespass onto the Site. Warning signs need to be posted at a maximum interval of one sign every 200 feet along the perimeter fence. Include on the warning signs notice that the Site is a Superfund Site, that contamination is present at the Site, and that trespassers will be prosecuted. Include contact information for both the TCEQ and EPA on the warning signs.

3. Adjacent Property Owner (Broussard Property) to the south has discarded trash, and scrap metal pieces, on the dock driveway entrance site property (see site inspection photographs in Attachment D).

The debris affects aesthetics of the site and creates a deterrent to the re-sale and reuse of this site and its large structure, dock and facilities.

Five Year Review Summary Form

SITE IDENTIFICATION

Site name (from WasteLAN): Triangle Chemical Company

EPA ID (from WasteLAN): TXD055143705

Region: EPA Region 6	State: TX	City/County: Bridge City/Orange
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SITE STATUS

NPL Status: Final Deleted Other (specify):

Remediation status (choose all that apply): Under Construction Operating Complete

Multiple OUs? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	Construction completion date: March 12, 1987
--	---

Has site been put into reuse? Yes No Site is abandoned.

REVIEW STATUS

Reviewing agency: EPA State Tribe Other Federal Agency:

Author: EPA Region 6

Review period: June 2001 through April 2006

Date(s) of site inspection: March 29, 2006

<p>Type of review:</p> <input type="checkbox"/> Statutory <input checked="" type="checkbox"/> Policy <input type="checkbox"/> Post-SARA <input type="checkbox"/> Non-NPL Remedial Action Site <input type="checkbox"/> Regional Discretion	<input checked="" type="checkbox"/> Pre-SARA <input type="checkbox"/> NPL-Removal only <input type="checkbox"/> NPL State/Tribe-lead
---	--

Review number: 1 (first) 2 (second) 3 (third) Other (specify):

Triggering action:

<input type="checkbox"/> Actual RA Onsite Construction <input type="checkbox"/> Construction Completion <input type="checkbox"/> Other (specify):	<input type="checkbox"/> Actual RA Start <input checked="" type="checkbox"/> Recommendation of Previous Five Year Review Report
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Triggering action date (from WasteLAN): June 1, 2001

Due date (five years after triggering action date): June 1, 2006

Five Year Review Summary Form

Issues: Operations and Maintenance (O&M) and long-term monitoring (LTM) is ongoing at the Site, and based on the data review, site inspection, interviews, and technical assessment, it appears the remedy is functioning as intended by the decision documents in the short-term. To ensure continued protectiveness, three issues were identified in the second five-year review for this site, as described in the following paragraphs. These issues do not currently affect the protectiveness of the remedy, although they need to be addressed to ensure continued protectiveness.

1. Low levels of contamination below MCLs have been detected in deep aquifer monitor well MW-7. Possible causes of the detections need to be investigated, including, but not limited to: changes of sampling contractors and sampling procedures; changes in detection limits and analysis procedures; and change in laboratory protocols. Because the deep ground water aquifer (30 to 80 feet below ground surface) has been deemed to be a usable ground water source, monitoring of MW-7 must continue.
2. Warning signs are not present on most of the perimeter fence. During the site inspection, only one warning sign was observed on the perimeter fence. Warning signs are necessary to notify potential trespassers that the Site is a Superfund Site and that contamination is present. Warning signs also make it possible to prosecute people who trespass onto the Site. Warning signs need to be posted at a maximum interval of one sign every 200 feet along the perimeter fence.
3. Adjacent Property Owner (Broussard Property) to the south has discarded trash, and scrap metal pieces, on the dock driveway entrance site property (see site inspection photographs in Attachment D). The debris affects aesthetics of the site and creates a deterrent to the re-sale and reuse of this site and its large structure, dock and facilities.

Recommendations and Follow-up Actions: The following recommendations and follow-up actions have been defined for the Site:

1. **Continue monitoring the ground water contaminant concentrations in MW-7, and evaluate possible causes of the low level detections.** If contaminant concentrations continue to increase and/or approach the MCLs, evaluate measures to address potential contamination in the deeper aquifer. Consider incorporating adjacent private wells (neighboring residential wells) into the sampling program if contaminant concentrations continue to increase.
2. **Post additional warning signs at a maximum distance of 200 foot intervals along the Site fence.** Include on the warning signs notice that the Site is a Superfund Site, that contamination is present at the Site, and that trespassers will be prosecuted. Include contact information for both the TCEQ and EPA on the warning signs.
3. **Remove discarded trash and scrap metal debris from the property.** The debris impacts aesthetics of the site and creates a deterrent to the re-sale and reuse of this site and its large structure, dock and facilities.

Protectiveness Statement(s): The remedy implemented for the Triangle Chemical Company Site is considered protective of human health and the environment in the short-term. Liquid contents in tanks and drums were disposed of off-site through incineration or deep well injection. Contaminated trash and debris were sent off-site for disposal, and the site buildings were decontaminated. Contaminated soils at the Site were remediated through mechanical aeration. The ground water continues to be monitored to ensure that contaminated ground water is not migrating off-site and that contaminant concentrations attenuate. Continued O&M will ensure that the selected remedy continues to be protective.

Because the completed remedial action implemented at the Triangle Chemical Company Site continue to be protective for the short-term, the overall remedy for the Site continues to be protective of human health and the environment for the short-term. The selected remedy will continue to be protective if the recommendations and follow-up actions identified in this five-year review are addressed.

Other Comments: In the third five-year review period, TCEQ actions to implement the recommendations from the second five-year review in conjunction with ongoing Operations & Maintenance activities has helped to ensure continued protectiveness of human health and the environment at the Site.

Third Five Year Review Report

Triangle Chemical Company Site

The United States Environmental Protection Agency (EPA) Region 6 has conducted a third five-year review of the remedial actions implemented at the Triangle Chemical Company Superfund Site ("Site") for the period between June 1, 2001 (when the second five-year review was completed) to April 2006. The Triangle Chemical Company Site is located in Bridge City, Orange County, Texas. The purpose of a five-year review is to determine whether the remedy at a site remains protective of human health and the environment, and to document the methods, findings, and conclusions of the five-year review in a Five-Year Review Report. Five-Year Review Reports identify issues found during the review, if any, and make recommendations to address the issues. This Third Five-Year Review Report documents the results of the review for the Triangle Chemical Company Superfund Site, conducted in accordance with EPA guidance on five-year reviews.

EPA guidance on conducting five-year reviews is provided by Office of Solid Waste and Emergency Response (OSWER) Directive 9355.7-03B-P, *Comprehensive Five-Year Review Guidance (EPA, 2001a)* (replaces and supersedes all previous guidance on conducting five-year reviews). EPA followed the guidance provided in this OSWER directive in conducting the five-year review performed for the Triangle Chemical Company Site.

1.0 Introduction

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 United States Code (USC) §9601 *et seq.* and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 Code of Federal Regulations (CFR) 300 *et seq.*, call for five-year reviews of certain CERCLA remedial actions. EPA policy also calls for a five-year review of remedial actions in some cases. The statutory requirement to conduct a five-year review was added to CERCLA as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA), P. L. 99-499. The EPA classifies each five-year review as either 'statutory' or 'policy' depending on whether it is being required by statute or is being conducted as a matter of policy. The third five-year review for the Triangle Chemical Company Site is a policy review. The EPA Five-Year Review guidance specifies that five-year reviews are required or appropriate whenever a remedial action results in hazardous substances, pollutants, or contaminants remaining on-site at levels that will not allow for unrestricted use or unrestricted exposure. As specified by CERCLA and the NCP, statutory reviews for such sites are required if the Record of Decision (ROD) was signed on or after the effective date of SARA. CERCLA §121(c), as amended, 42 USC §9621(c), states:

If the President selects a remedial action that results in any hazardous substances, pollutants, or contaminants remaining at the site, the President shall review such remedial action no less often than

each five years after the initiation of such remedial action to assure that human health and the environment are being protected by the remedial action being implemented.

The implementing provisions of the NCP, as set forth in the CFR, state at 40 CFR 300.430(f)(4)(ii):

If a remedial action is selected that results in hazardous substances, pollutants, or contaminants remaining at the site above levels that allow for unlimited use and unrestricted exposure, the lead agency shall review such action no less often than every five years after the initiation of the selected remedial action.

EPA five-year review guidance further states that a five-year review should be conducted as a matter of policy for the following types of actions:

- A pre-SARA remedial action that leaves hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure;
- A pre or post SARA remedial action that, once completed, will not leave hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure, but will require more than five years to complete; or,
- A removal-only site on the National Priorities List (NPL) where the removal action leaves hazardous substances, pollutants, or contaminants on-site above levels that allow for unlimited use and unrestricted exposure and no remedial action has or will be conducted.

The five-year review for the Triangle Chemical Company Site is being conducted as a matter of EPA policy because the ROD for the Site was signed on June 11, 1985, before the effective date of SARA, and hazardous substances, pollutants, or contaminants remain on-site above levels that allow for unlimited use and unrestricted exposure.

This is the third five-year review for the Triangle Chemical Company Site. The triggering action for this policy review is the date of completion of the second five-year review, in June 1, 2001.

2.0 Site Chronology

A chronology of significant site events and dates is included in [Table 1](#), provided at the end of the report text. Sources of this information are listed in [Attachment 1, Documents Reviewed](#).

3.0 Background

This section describes the physical setting of the Site, including a description of the land use, resource use, and environmental setting. This section also describes the history of contamination associated with the Site, the initial response actions taken at the Site, and the basis for each of the initial response actions. Remedial actions performed subsequent to the initial response actions at the Site are described in [Section 4](#).

3.1 Physical Characteristics

The Triangle Chemical Company Site is located in Bridge City, Orange County, Texas, in the southeast corner of the state (see [Figure 1](#) for a site location map). The City of Bridge City has a population of approximately 8,500 (TSHA and UT, 2006). The Site is located on a 2.3 acre tract of land on Texas State Highway (SH) 87 approximately ½ mile north of Bridge City. The Site is bounded by Coon Bayou to the northwest, a commercial property on the north, a private residence on the south, and SH 87 on the east (EPA, 1985).

The Site is currently vacant, and there do not appear to be any plans for future use. The Triangle Chemical Company buildings remain on-site, but they are in a state of significant disrepair, and one building has collapsed. The Site is currently fenced, and the Texas Commission on Environmental Quality (TCEQ) maintains the fence and nine monitor wells on the Site.

The Site topography is generally flat, but the land surface slopes slightly towards Coon Bayou located just northwest of the Site. The Site is located adjacent to Coon Bayou, which is a tributary of the Cow Bayou. The Cow Bayou drains into the Sabine River. Surface water at the Site drains primarily to Coon Bayou (EPA, 1985).

The Site is located on the Beaumont Clay Formation. The Beaumont Clay consists primarily of interdistributary muds and distributary sands and silts. The soils at the Site consist primarily of silty clays, clayey silts, and trace fine sands. Ground water occurs within a silty clay unit that contains trace amounts of very fine sand. This unit varies in thickness between 2 and 5 feet across the Site. Ground water elevations range between 2 and 6 feet below ground surface and vary with fluctuations in rainfall amounts (EPA, 1985).

3.2 Land and Resource Use

The area around the Site was originally reported as mostly agricultural at the time the ROD was signed (Weston, 1984). Observations made during the site inspection indicate the land use immediately surrounding the Site is currently mixed commercial and residential. A residence is located immediately south of the Site on

SH 87. Across SH 87 are several small businesses and residences. A commercial property is located north of and adjacent to the Site.

The Site is located within the 100 year flood plain, and the site reportedly floods approximately once every six years. Coon Bayou borders the Site to the northwest. The shallow, contaminated aquifer has been deemed unusable, but the next lower aquifer could be used as a potential water supply (**Weston, 1989**). The primary aquifers used for drinking water in the area are the Chicot and Evangeline aquifers, which are present at depths greater than 100 feet in the area of the Site (**Weston, 1984**)

3.3 History of Contamination

The Triangle Chemical Company operated a chemical mixing and blending facility from the early 1970's until 1981 (see **Figure 2** for a site map). Various types of chemicals were handled at the Site, including industrial cleaning compounds, automotive brake fluid, windshield washer solvent, hand cleaners, and pesticides. The raw materials and finished products were stored at the Site in surface storage tanks and 55 gallon drums (**EPA, 1985**). Waste management practices at the Site were poor, and contamination at the Site resulted from discharges from deteriorated drums and spills and leaks from drums and tanks (**EPA, 1994**). As a result, the Site soils and ground water became contaminated with volatile organic compounds (VOCs). Local residents reported seven fish kills in Coon Bayou during a six year period between March 1976 and October 1982. The fish kills were believed to have resulted from discharges of hazardous materials from the Site to the bayou (**EPA, 1985** and **EPA, 1994**).

3.4 Initial Response

The Texas Department of Water Resources (TDWR), predecessor to the Texas Water Commission (TWC), Texas Natural Resources Conservation Commission (TNRCC), and Texas Commission on Environmental Quality (TCEQ), initiated their involvement at the Site in 1981. Initial investigations indicated the seven fish kills that occurred between March 1976 and October 1982 in Coon Bayou were the result of discharges of hazardous waste from the facility. In August 1981, TDWR acquired an injunction against Triangle Chemical Company to achieve compliance with pollution control laws and to prevent further untreated discharges from the Site. The TDWR found the Site abandoned in October 1981. At that time, the Site included five buildings, thirty large tanks, and 1,095 55-gallon drums. Eleven of the tanks contained a total of 51,000 gallons of hazardous liquids. Also, there were 350 cubic yards of contaminated soil and trash left at the Site. When the Site was abandoned, it was left unsecured (**EPA, 1994**).

EPA initiated an Immediate Removal Action in April 1982. This action was conducted to prevent access to the Site. The action included the digging of a canal to prevent runoff from reaching SH 87, construction of a

fence around the material storage area, and the posting of warning signs. A Planned Removal Action was conducted in August 1982 to remove drums and contaminated trash and soil. The wastes removed during this removal action were taken to an approved waste disposal facility. A total of 21,000 gallons of liquids, 350 cubic yards of contaminated soil and trash, and 1,095 drums were removed from the Site. In March 1985, an Emergency Action was conducted by EPA to install a fence around the entire Site to prevent unauthorized access and vandalism, which had been observed (EPA, 1985, and EPA, 1994).

The Triangle Chemical Company Site was proposed to the NPL on December 30, 1982, and the Site became final on the NPL on September 8, 1983. A Remedial Investigation (RI) was conducted between August 1983 and April 1984. The RI results indicated that soil contamination was limited to the drum and tank storage areas, to depths ranging between 1.0 and 6.5 feet (EPA, 1994). The soil was determined to be extensively contaminated with VOCs. Several shallow ground water monitor wells at the Site indicated that the ground water was slightly contaminated, and Coon Bayou was also determined to be slightly contaminated. Weston conducted a pilot study in February 1985 as part of the Feasibility Study (FS), and concluded that mechanical aeration was an effective means of treating the contaminated soils (Weston, 1985).

The results from the RI/FS indicated that near surface soils at the Site were contaminated from the migration of waste materials through spills and leaks from drums and tanks. Ground water at the Site and surface water near the Site were determined to not be significantly impacted. In addition, air quality at the Site was not measurably impacted. Potential threats or risks to human health and/or the environment were determined to be presented through (1) potential material releases onto the ground surface from storage tanks that would either percolate into site soils or flow into Coon Bayou; (2) a sudden release of tank materials that presented risks to persons living or working near the Site through airborne release of VOCs or direct contact; and, (3) the VOCs in the soils could be released to the atmosphere during future development of the Site, posing a risk to worker health and safety (EPA, 1985).

3.5 Basis for Taking Action

The purpose of the response actions conducted at the Triangle Chemical Company Site were to protect public health and welfare and the environment from releases or threatened releases of hazardous substances from the Site. The major threats posed by the Site were the continued deterioration or rupture of storage tanks and drums resulting in continued releases of hazardous materials to the soil, surface water, and atmosphere, direct contamination of the ground water from leaching of soil contamination, and uncontrolled releases of VOCs in the subsurface soils from any potential future excavation activities (EPA, 1985).

4.0 Remedial Actions

The third five-year review specifically addresses actions taken at the Site since completion of the Second Five-Year Review Report, completed in June 1, 2001 (**EPA, 2001b**). Included in this section is a description of the remedy objectives, selection, and implementation at the Triangle Chemical Company Site. It also describes the ongoing O&M activities performed and the overall progress made at the Site in the period since completion of the second five-year review. The TCEQ is managing the Site O&M activities.

4.1 Remedy Objectives

The specific remedial objectives for the Triangle Chemical Company Site Remedial Action (RA) were:

- Remove and dispose of the contents of the storage tanks in an approved disposal facility and decontaminate the tanks;
- Prevent significant degradation of the shallow ground water;
- Prevent significant degradation of surface water;
- Reduce contamination in the soil to mitigate future impacts on human health, the environment, and site development; and,
- Remove and dispose of the trash in and around the on-site buildings (**EPA, 1985**).

In order to achieve the remedial objectives, the ROD established the following remediation goals for the Site:

- Contaminated soils would be cleaned up to background concentrations; and,
- Closure of the Site tanks in accordance with the requirements of the Resource Conservation and Recover Act (RCRA) at 40 CFR 264.197 (**EPA, 1985**).

4.2 Remedy Selection

One ROD has been issue by EPA for the Triangle Chemical Company Site. The Site was also addressed through three emergency response actions as described in [Section 3.4](#). The ROD for the Site was signed on June 11, 1985. The ROD addressed the threats posed by the Site to human health and the environment.

The remedy selected in the 1985 ROD for the Triangle Chemical Company Site consisted of the following elements:

- Off-site incineration of approximately 32,000 gallons of liquids and sludges stored in tanks; Off-site deep well injection of approximately 24,000 gallons of non-ignitable liquids;

- Decontamination of on-site buildings and structures;
- Off-site disposal of trash and debris;
- Treatment of on-site contaminated soils through mechanical aeration; and,
- O&M would include landscaping and fence repair and ground water monitoring for a period of five years (EPA, 1985).

4.3 Remedy Implementation

The RA for the Site was conducted by the TWC. The TWC awarded the RA contract to ENSCO Services in August 1986, and cleanup activities began on January 13, 1987. Mechanical aeration of the soils was performed through tilling. The contents of the tanks and drums were analyzed and classified for proper disposal. The buildings, process equipment, and tanks left onsite were decontaminated using a triple rinse process. The final inspection was conducted on March 12, 1987, and the cleanup was documented in Weston's June 1987 Remedial Action Close Out Report and the EPA's September 1990 Site Interim Closure Report (Weston, 1987, EPA, 1990, EPA, 2006).

4.4 Operations and Maintenance and Long-Term Monitoring

O&M activities at the Site, including ground water monitoring, site inspections, fence repairs, and mowing, have been conducted at the Site since 1987. During the first year of O&M ground water sampling, MW-1, MW-3, and MW-4 were sampled. During the remedial action, MW-2 was decommissioned, and replaced with new monitor well MW-4. During the first year of quarterly O&M ground water monitoring after completion of the remedial action, samples from MW-4 demonstrated contamination at higher levels than previously detected in the other onsite wells. MW-4 was decommissioned and replaced with new monitor wells MW-5 and MW-6. Sampling of these wells confirmed the ground water contamination documented in MW-4, and a supplemental ground water investigation was conducted from December 1988 through May 1989 (Weston, 1989).

A supplemental ground water investigation was conducted to evaluate the extent of the contamination detected in MW-4, MW-5, and MW-6. The investigation included a cone penetrometer survey of the Site, installation of additional monitor wells in the shallow and deeper aquifer, collection and analysis of ground water samples from two cone penetrometer locations, all monitor wells, and two residential wells near the Site, hydrogeologic testing, and ground water modeling. The investigation concluded the presence of significant VOC contamination was limited to the area near monitor wells MW-5 and MW-6 (up to 630 parts per billion [ppb] methylene chloride and 3,500 ppb 1,1-dichloroethene). Lower levels of contamination (up to 310 ppb chlorobenzene) were also detected in new monitor well MW-11 (located on the adjacent property to the north

of the Site). One indicator constituent was detected in the well installed in the deeper aquifer (MW-7) (**EPA, 1994b**).

Evaluation of ground water transport as part of this study concluded the ground water flow directions were northwest and/or north-northeast (variable). Modeling showed future potential contaminant migration to be minimal and impeded by Coon Bayou, and a risk assessment showed the low levels of contamination in Coon Bayou did not pose a risk. The northwest flow direction was impeded by a pinching out of the upper zone, and the north-northeast flow direction would result in the transport of contamination only about 100 feet onto the neighboring property after 70 years. The shallow ground water was not deemed usable due to native conditions, but the deeper aquifer, located 30 to 80 ft below ground surface (**EPA, 1994**) qualified as a potential drinking water source. The investigation showed that a 15 foot clay layer separated the two aquifers, however, and a pump test demonstrated that no communication existed between the shallow and deeper aquifers (**Weston, 1989**).

The supplemental investigation concluded that monitored natural attenuation was the appropriate course of action for the observed ground water contamination. The report recommended the four new shallow wells (MW-8, MW-9, MW-10, and MW-11) and the new deep well (MW-7) be included in the quarterly O&M sampling program for two years for determination of the need for further action, and that if contamination in the deeper well was found to increase, the neighboring residential wells be included in the sampling program (**Weston, 1989**).

During the period from 1994 to 2000, shallow wells MW-1, MW-3, MW-5, MW-6, MW-8, MW-9, MW-10, and MW-11 and deep well MW-7 were sampled semi-annually. Wells MW-1, MW-3 and MW-9 were dropped from the sampling program after the last sampling event in 1998, due to a lack of detections. Based on recommendations from the second five-year review, monitor wells MW-1, MW-3, and MW-9 were placed back into the O&M monitoring program on a semiannual basis, and these wells have been sampled since the February 2000 sampling event.

The TCEQ is currently responsible for O&M activities at the Site, which include semi-annual site inspections and ground water sampling and analysis. The Site is also mowed as necessary. Quarterly inspections and ground water sampling were originally required at the Site; semi-annual inspection and ground water sampling events have been conducted since at least as far back as 1993 (per ground water data included in the latest O&M report, dated March 2006). The TCEQ has repaired the site fence on two occasions since the second five-year review. **Table 2** provides a summary of the annual O&M costs recorded to-date as reported by the TCEQ. See **Section 6.3** for a summary of projected versus actual annual O&M costs.

The O&M plan estimated the annual O&M costs to be \$11, 900 (based on 1986 costs) (**Weston, undated**). This cost does not factor into account the additional wells added in 1989 at the Site, nor has this cost been adjusted for inflation. The only change to O&M costs at the Site since the previous five-year review have been due to fence and monitor well repairs. These repairs resulted in a slight increase in O&M costs. Other than those two items, no significant costs have been incurred at the Site.

4.5 Progress Since Initiation of Remedial Action

The remedial activities specified in the ROD were implemented as planned. The remedy for the Site included the offsite incineration and deep well injection of the contents of drums and tanks, the decontamination of onsite buildings, the offsite disposal of contaminated debris and trash, and onsite mechanical aeration of the contaminated soils to remove VOCs to background levels. A supplemental ground water investigation conducted in late 1988 and early 1989 concluded that higher levels of contamination than previously thought existed in the shallow ground water at the Site, but that monitored natural attenuation would be an effective remedy (**EPA, 1994**).

The Site Close Out Report was signed on September 27, 1990 which signified the completion of remedial action. The First Five-Year Review Report was finalized on July 11, 1994. At the time of the first five-year review, the remedy was found to be protective of human health and the environment and operating as designed. The first five-year review found no major deficiencies at the Site and only recommended continued O&M activities (**EPA, 2001b**).

On March 23, 1995, the Site was deleted from the NPL. The Notice of Deletion of the Triangle Chemical Company Superfund Site from the NPL was signed on February 21, 1997. The second Five-Year Review Report was signed on June 1, 2001, and is further discussed in [Section 5.0](#). Since the completion of the second five-year review, 10 ground water sampling events have been conducted at the Site (**URS, 2006**).

5.0 Progress Since Last Five-Year Review

The second five-year review of the Triangle Chemical Company Site was completed in June 2001. The findings of the second five-year review, the status of recommendations and follow-up actions, the results of implemented actions, and the status of any other issues are described in the following sections.

5.1 Protectiveness Statements from Second Five-Year Review

The Second Five-Year Review Report concluded that the remedial actions implemented at the Triangle Chemical Company Site were protective of human health and the environment. The Second Five-Year Review Report stated that the remedy continued to function as intended by the ROD, and that the TNRCC's

conclusions that the ground water contamination was not migrating were supported by the data review (**EPA, 2001b**).

5.2 Second Five-Year Review Recommendations and Follow-up Actions

The second five-year review of the Triangle Chemical Company Site, completed in June 2001, recommended the following follow-up actions:

- Repair the Site fence to prevent unauthorized access, possible tampering with wells, and vandalism;
- Provide a new PVC cap for the inner well casing of MW-3;
- Add locks to the outer casings of MW-3 and MW-8;
- Keep site mowed on a regular basis per the original requirements of the ROD; and,
- Add monitor wells MW-1, MW-3, and MW-9 back into the O&M sampling program at least annually to verify the continued lack of contaminant migration.

The Second Five-Year Review Report also recommended that five-year reviews for the Site continue until contaminant concentrations have attenuated to levels that allow for unrestricted use at the Site (**EPA, 2001b**).

5.3 Status of Recommended Actions

This section describes the current status of implementation of the recommendations included in the Second Five-Year Review Report. O&M activities have continued at the Site as dictated by the O&M Plan. The perimeter fence was repaired at all three locations where it was damaged to prevent unauthorized access to the Site. Monitor wells MW-1, MW-3, and MW-9 were placed back into the O&M monitoring program on a semiannual basis. Monitor wells requiring maintenance have been repaired and secured. Regular inspections of the fence and mowing are being performed at the Site.

Refer to **Table 3** for a summary of the actions taken since the last five year review.

6.0 Five-Year Review Process

This third five-year review for the Triangle Chemical Company Site has been conducted in accordance with the EPA's Comprehensive Five-Year Review guidance, dated June 2001 (**EPA, 2001a**). Interviews were conducted with relevant parties; a site inspection was conducted; and applicable data and documentation covering the period of the review were evaluated. The findings of the review are described in the following paragraphs.

6.1 Administrative Components

The five-year review for this Site was initiated by EPA. The review team was led by the EPA Remedial Project Manager (RPM) for this Site, Mr. Ernest Franke/EPA Region 6. The components of the review included document review, data review, a site inspection, interviews, and development of this Five-Year Review Report, as described in the following paragraphs.

6.2 Community Involvement

Upon signature, the Third Five-Year Review Report will be placed in the information repositories for the Site, including the Orange Public Library, located at 20 North Fifth Street, Orange, TX 77630, the TCEQ office in Austin, Texas, and the EPA Region 6 office in Dallas, Texas. A notice announcing completion of the five-year review will be published in the local newspaper to summarize the findings of the review and announce the availability of the report at the information repositories; a copy of the draft notice is presented in [Attachment 5](#) to this report.

6.3 Document Review

This five-year review for the Site included a review of relevant site documents, including decision documents, the First and Second Five-Year Review Reports, O&M reports, and related monitoring data. Documents that were reviewed are listed in [Attachment 1](#).

6.4 Data Review

Data collected at the Site since June 2001 includes ground water sampling results and ground water level measurements. [Table 4](#) summarizes the ground water sample results collected at the Site from January 1993 through January 2006. [Figure 2](#) shows the location of site monitor wells as well as the ground water flow direction for the June 29, 2004 sampling event (the last event for which a map was prepared) ([SSCI, 2004b](#)).

In the most recent sampling events, conducted on July 19, 2005 ([Weston, 2005](#)) and January 13, 2006 ([URS, 2006](#)), nine monitor wells (MW-1, MW-3, MW-5, MW-6, MW-7 (deeper aquifer), MW-8, MW-9, MW-10, and MW-11) were sampled. These wells have been sampled in each event since the second five-year review. Wells MW-3 and MW-9 are the wells closest to Coon Bayou, on the western side of the Site; MW-1 is located at the eastern perimeter near SH 87 (see [Figure 2](#)). The ground water flow direction has been historically documented as radial away from wells MW-6 and MW-8 (located central to the Site - see [Figure 2](#)) or towards the east ([EPA, 2001b](#)). Since the last five year review, similar ground water flow directions have been documented, as reported in the O&M Activities Reports ([TERRA-MAR, 2001](#), [TERRA-MAR, 2002a](#),

TERRA-MAR, 2002b, TERRA-MAR, 2003a, TERRA-MAR, 2003b, SSCI, 2004a, and SSCI, 2004b).

Ground water monitoring data collected at the Site since May 2001 were reviewed as part of this five-year review. Based on analytical results from [Table 4](#), it appears that the contaminant plume is not migrating towards the perimeter wells since no analytes have been detected in monitor wells MW-1 and MW-3. Similarly, MW-9 reported a few detections of contaminants at low concentrations during the January 2006 sampling event. These detections were not above the MCLs.

[Table 4](#) shows that in MW-5, the concentrations of four contaminants increased slightly and then began to decrease in the period since the last five-year review. These four contaminants were detected above the MCL during the review period, but only Chlorobenzene concentrations remained above the MCL during the January 2006 sampling event.

Historically, the most contaminated ground water samples at the Site have been collected from MW-6. The analytical results show that contaminant concentrations are low, and most contaminant concentrations appear to be attenuating in MW-6 (see [Table 4](#)). Benzene and chlorobenzene were detected above the MCL during the period of this five-year review. Benzene concentrations have fluctuated in MW-6, but the overall benzene concentration trend has been decreasing. Chlorobenzene concentrations have also fluctuated, but the overall concentration trend for this contaminant has been decreasing.

Monitor well MW-7 is located adjacent to MW-6 (see [Figure 2](#)). This well is completed in the deeper aquifer and is used to monitor for potential contaminant migration into the deeper aquifer. All analytes previously sampled in MW-7 were not detected until Methylene Chloride was reported in the July 2001 sampling event. However, this contaminant was also present in the associated blank sample, and it has not been detected in this monitor well since. Five contaminants have been detected in MW-7 since June 2004 ([Table 4](#)). The concentrations of the contaminants have been below the MCLs. Possible causes of the detections need to be investigated, including, but not limited to: changes in sampling contractors and sampling procedures; changes in detection limits and analysis procedures; and changes in laboratory protocols.

Monitor well MW-8 is located near the center of the Site along the southern Site boundary (see [Figure 2](#)). The contaminants 1,1-dichloroethene (1,1-DCE) and tetrachloroethylene have been historically detected above the MCLs in this well. The 1,1-DCE concentrations have fluctuated since this contaminant was first analyzed for in 1996, but the overall concentration trend appears to be slightly increasing. Tetrachloroethylene concentrations increased through June 2004, and have decreased slightly since that time.

Monitor well MW-10 is located near the center of the Site (see [Figure 2](#)). The data review for MW-10 shows that benzene and chlorobenzene were detected above the MCLs in one sampling event during the review

period. The benzene concentrations have been decreasing during the review period. Chlorobenzene concentrations were decreasing during the review period until it was detected above the MCL in the most recent sampling event in January 2006 (see [Table 4](#)).

Monitor well MW-11 is located on the outside of the Site fence along the north property boundary, next to Process Building No. 2 (see [Figure 2](#)). Chlorobenzene is the only contaminant that has been detected in this monitor well during the review period. Chlorobenzene concentrations have fluctuated since monitoring for this contaminant began in 1996, but the overall concentration trend has been decreasing.

The data presented in [Table 4](#) shows that the overall concentration trends for most contaminants present in the shallow ground water are decreasing, or the concentrations of most contaminants are very low. Low level detections of contaminants detected in the deeper aquifer monitor well (MW-7) need to be reviewed to eliminate the possibility of quality assurance/quality control issues before a conclusion can be made regarding these results.

6.5 Interviews

During the course of this third five-year review, an interview was conducted with the TCEQ representative for the Site, Mr. Ken Davis. An Interview Record Form documenting the issues discussed during this interview is provided in [Attachment 2](#).

The interview was conducted with Mr. Ken Davis at the Site on March 29, 2006. Mr. Davis' overall impression of the remedy effectiveness since the previous five-year review was that the remedy is still protective of human health and the environment. Mr. Davis also indicated he was not aware of any concerns about the Site expressed by people in the local community and that he had received no phone calls regarding the Site. Mr. Davis' main concern regarding the Site was related to trespassing. He indicated that fence repairs were made after the second five-year review and again in March 2006.

As part of the review, actual O&M costs were compared to the projected costs to determine if any unanticipated costs have been incurred during the review period. In his interview, Mr. Davis stated that the estimated annual costs for site O&M activities are currently \$15,000 to \$20,000, and he further indicated that this amount appropriately reflected the annual O&M cost since 2000. The O&M costs are not an issue of concern for this site.

[Table 2](#) summarizes the O&M costs since the first five-year review.

6.6 Site Inspection

A site inspection was conducted at the Site on March 29, 2006. The completed site inspection checklist is provided in [Attachment 3](#). Photographs taken during the site inspection are provided in [Attachment 4](#).

As observed during the site inspection, a fence surrounds the perimeter of the Site, and the entrance to the Site is controlled through a locked gate located on SH 87 ([Photograph 1](#)). The perimeter fence was observed to be in good condition, and repairs had been made to the fence as recommended in the last five-year review ([Photographs 1, 2, 3, 15, and 18](#)). Only one faded warning sign was observed posted on the southern portion of the fence. The section of the fence located at the south entry doors to Process Building No. 1 had been repaired in March 2006 ([Photograph 8](#)).

The onsite buildings were noted as being in poor condition. The former office building had most of the roof missing, and the building formerly located next to the office building had collapsed ([Photographs 1, 12, and 17](#)). The tanks located near the corner where Process Buildings No. 1 and 2 join had fallen over ([Photograph 13](#)). One drum of purge water from sampling activities, along with some supplies was stored inside Process Building No. 2. Several empty drums reported in the second five-year review were still staged inside Process Building No. 2. The Site had been recently mowed ([Photograph 1, 2, 3](#)).

Each existing monitor well was visited and photographed during the site inspection. Well MW-1 had a bent guard posts ([Photograph 2](#)). All monitor wells were in good condition and secured with locks ([Photograph 2, 3, 4, 5, 7, 9, 10, 11, 14, 15, and 16](#)).

7.0 Technical Assessment

The five-year review must determine whether the remedy at a site is protective of human health and the environment. The EPA guidance describes three questions used to provide a framework for organizing and evaluating data and information and to ensure all relevant issues are considered when determining the protectiveness of a remedy. These questions are answered for the Site in the following paragraphs. At the end of the section is a summary of the technical assessment.

7.1 Question A: Is the Remedy Functioning as Intended by the Decision Documents?

The original decision document for the Triangle Chemical Company Site is the June 11, 1985 ROD ([EPA, 1985](#)). The Site is now undergoing semi-annual ground water sampling and O&M activities. Based on the data review, site inspection, and interview, it appears that the Triangle Chemical Company Site remedy is functioning as intended by the ROD ([EPA, 1985](#)), although some low level detections of contaminants (below MCLs) have been detected in deeper aquifer sentinel well MW-7. Opportunities for optimization, early

indicators of remedy problems, and institutional controls are described below.

Opportunities for Optimization. No opportunities for optimization have been identified. The ground water sampling frequency is semi-annual, and will remain semi-annual due to low level detections (below MCLs) in MW-7.

Early Indicators of Potential Remedy Problems. As described in [Section 6.4](#), samples collected from well MW-7 indicate the presence of low levels of contamination (below MCLs) in the deeper aquifer. These results must be reviewed to eliminate the possibility of quality assurance/quality control issues before a conclusion can be made regarding these results.

Institutional Controls. A deed notice describing the site hazards is in place for the Triangle Chemical Company Site. See [Section 8.0](#) for further information.

7.2 Question B: Are the Exposure Assumptions, Toxicity Data, Cleanup Levels, and Remedial Action Objectives Used at the Time of the Remedy Selection Still Valid?

Changes in Exposure Pathways, Toxicity, and Other Contaminant Characteristics. There have been no changes in exposure pathways for the Site since completion of the second five-year review. In addition, no new contaminants or routes of exposure have been identified for the Site as part of this five-year review. Post-remediation site conditions have eliminated or reduced the exposure pathways present at the Site.

Changes in ARARs. ARARs for this site were identified in the ROD dated June 11, 1985. This five-year review included identification of and evaluation of changes in these ARARs to determine whether such changes may affect the protectiveness of the selected remedy.

The ROD identified the following ARARs as having an impact on the proposed remedy:

1. The Resource Conservation and Recovery Act (RCRA) substantive requirements for the closure of tanks and container storage facilities, as regulated under 40 CFR Part 264.
2. Water quality criteria for human health and drinking water established under the Clean Water Act.
3. Air exposure limits established by the Occupational Safety and Health Administration (OSHA).
4. Requirements to evaluate the potential impacts to flood plains as regulated under the Executive Order on Floodplain Management, Executive Order No. 11988.

No state ARARs were identified in the ROD.

The first five year review for the Triangle Chemical Company also identified the MCLs promulgated under the Safe Drinking Water Act as to-be-considereds (TBCs) for the lower ground water bearing unit at the Site.

All tanks, containers, and associated hazardous substances have been removed from the Site. Soil contamination was remediated to background concentrations. Since no hazardous wastes remain on-site, the requirements under RCRA are no longer applicable to the Site.

No changes have occurred to Executive Order No. 11988 or the Clean Water Act which would call into question the effectiveness of the remedy. The lower ground water bearing unit is not known to be used. No changes have occurred to the MCL requirements since the first five year review.

Although OSHA air exposure limits no longer apply to the site remedy, ground water monitoring is still occurring at the Site, and OSHA requirements related to ground water sampling would be applicable requirements for the Site. These requirements are addressed under the site-specific health and safety plan.

In summary, it appears that no new laws or regulations have been promulgated or enacted that would call into question the effectiveness of the remedy at the Triangle Chemical Company Site to protect human health and the environment.

7.3 Question C: Has any Other Information Come to Light that Could Call into Question the Protectiveness of the Remedy?

Examples of other information that might call into question the protectiveness of the remedy include potential land use changes in the vicinity of the Site or other unexpected changes in site conditions or exposure pathways; no such information has been identified as part of this third five-year review for the Site.

7.4 Summary of the Technical Assessment

The technical assessment, based on the site interviews, site inspection, technical evaluation, and data review indicates that the remedial actions selected for the Site generally appear to have been implemented and are functioning as intended by the ROD. The assumptions used at the time of remedy selection are still valid. There are no early indicators related to the remedy that would suggest potential remedy problems at the Site. No changes in exposure pathways, toxicity, or other contaminant characteristics were identified that affect the cleanup levels originally established for the Site, or affect the protectiveness of the remedy. No new laws or regulations have been promulgated or enacted that would call into question the effectiveness of the remedy to protect human health and the environment. No other information such as a potential future land use change in the vicinity of the Site or other changes in site conditions or exposure pathways have been identified as part of this five-year review that might call into question the protectiveness of the selected remedy.

As determined during the site inspection, there is only one warning sign present on the Site fence. It is recommended that warning signs be posted every 200 feet along the fence (see [Section 9.0](#)).

As determined during the data review, low levels of contamination (below MCLs) have been detected in monitor well MW-7 (in the deeper aquifer). The deeper aquifer has been determined to be a usable source of ground water, and the MCLs are designated as TBCs for the deep ground water at the Site. In the shallow ground water, the data indicate that most contaminant concentrations are attenuating, or the contaminant concentrations are very low and below the MCLs.

8.0 Institutional Controls

Institutional Controls (ICs) are generally defined as non-engineered instruments such as administrative and legal tools that do not involve construction or physically changing the site and that help minimize the potential for human exposure to contamination and/or protect the integrity of a remedy by limiting land and/or resource use (EPA, 2005). ICs can be used for many reasons including restriction of site use, modifying behavior, and providing information to people (EPA, 2000). ICs may include deed notices, easements, covenants, restrictions or other conditions on deeds, and/or ground water and/or land use restriction documents (EPA, 2001). The following paragraphs describe the ICs implemented at the Site, the potential affect of future land use plans on ICs and any plans for changes to site contamination status.

8.1 Types of Institutional Controls in Place at the Site

A deed notice describing the site hazards is in place for the Site. Although not of themselves considered institutional controls, the Site is secured by a perimeter fence, entrance to the Site is restricted by a locked gate, and one warning sign is visible on the southern portion of the fence (main access side).

8.2 Effect of Future Land Use Plans on Institutional Controls

No future land uses has been established for the Site that will require introduction of new ICs. However, if contaminant concentrations continue to increase at MW-7 an enforcement tool to obtain an easement from adjacent property owners in order to conduct ground water sampling will be required to evaluate the contamination in the deeper aquifer.

8.3 Plans for Changes to Site Contamination Status

Monitored Natural Attenuation (MNA) is the current remediation strategy at the Site. No further changes to the site contamination are being considered.

9.0 Issues

Operations and Maintenance (O&M) and long-term monitoring (LTM) is ongoing at the Site, and based on the data review, site inspection, interviews, and technical assessment, it appears the remedy is functioning as intended by the decision documents in the short-term. To ensure continued protectiveness, three issues were identified in the second five-year review for this site, as described in the following paragraphs. These issues do not currently affect the protectiveness of the remedy, although they need to be addressed to ensure continued protectiveness.

1. Low levels of contamination below MCLs have been detected in deep aquifer monitor well MW-7.

Possible causes of the detections need to be investigated, including, but not limited to: changes of sampling contractors and sampling procedures; changes in detection limits and analysis procedures; and change in laboratory protocols. Because the deep ground water aquifer (30 to 80 feet below ground surface) has been deemed to be a usable ground water source, monitoring of MW-7 must continue.

2. Warning signs are not present on most of the perimeter fence. During the site inspection, only one warning sign was observed on the perimeter fence. Warning signs are necessary to notify potential trespassers that the Site is a Superfund Site and that contamination is present. Warning signs also make it possible to prosecute people who trespass onto the Site. Warning signs need to be posted at a maximum interval of one sign every 200 feet along the perimeter fence.

3. Adjacent Property Owner (Broussard Property) to the south has discarded trash, and scrap metal pieces, on the dock driveway entrance site property (see site inspection photographs in Attachment D). The debris affects aesthetics of the site and creates a deterrent to the re-sale and reuse of this site and its large structure, dock and facilities.

10.0 Recommendations and Follow-up Actions

As described in the previous section, two issues were identified during the third five-year review for this Site. To address these issues, the following recommendations and follow-up actions have been defined.

1. Continue monitoring the ground water contaminant concentrations in MW-7, and evaluate possible causes of the low level detections. If contaminant concentrations continue to increase and/or approach the MCLs, evaluate measures to address potential contamination in the deeper aquifer. Consider incorporating adjacent private wells (neighboring residential wells) into the sampling program if contaminant concentrations continue to increase.

2. Post additional warning signs at a maximum distance of 200 foot intervals along the Site fence.

Include on the warning signs notice that the Site is a Superfund Site, that contamination is present at the Site, and that trespassers will be prosecuted. Include contact information for both the TCEQ and EPA on the warning signs.

3. Remove discarded trash and scrap metal debris from the property. The debris impacts aesthetics of the site and creates a deterrent to the re-sale and reuse of this site and its large structure, dock and facilities.

11.0 Protectiveness Statement

The remedy implemented for the Triangle Chemical Company Site is considered protective of human health and the environment in the short-term. Liquid contents in tanks and drums were disposed off-site through incineration or deep well injection. Contaminated trash and debris were sent off-site for disposal, and the Site buildings were decontaminated. Contaminated soils at the Site were remediated through mechanical aeration. The ground water continues to be monitored to ensure that contaminated ground water is not migrating off-site and that contaminant concentrations are continuing to attenuate. Continued O&M will ensure that the selected remedy continues to be protective. Because the completed remedial action implemented at the Triangle Chemical Company Site continues to be protective of human health and the environment in the short-term, the overall remedy for the Site continues to be protective of human health and the environment in the short-term. The selected remedy will continue to be protective if the recommendations and follow-up actions identified in this five-year review are addressed.

12.0 Next Review

The next five year review, the fourth for the Site, should be completed on or before April 2011. This review should include an evaluation of the ground water monitoring data to ensure that contaminant concentrations in the deeper aquifer are not increasing. If warranted based on the contaminant concentrations detected during the next five-year review period, an exit strategy for discontinuing the ground water monitoring activity should be evaluated as part of the next five-year review.

Table 1
Chronology of Site Events
Triangle Chemical Company Site
Bridge City, Orange County, Texas

Date	Event
March 1976 - October 1982	Texas Department of Water Resources (TDWR) documented seven fish kills in surface waters near the Triangle Chemical Company site.
August 1981	TDWR acquired a temporary injunction against Triangle Chemical Company to attain compliance with pollution control laws and to prevent further discharges from the site.
October 1981	TDWR found the site abandoned.
April 1982	The Environmental Protection Agency (EPA) initiated an Immediate Removal Action to deter public access to hazardous materials at the site. The actions taken included the installation of security fencing around the drum storage area, the posting of warning signs, and the creation of a drainage canal to prevent contaminated surface water runoff from reaching the highway in front of the site.
August 1982	A Planned Removal Action was undertaken by EPA to remove drums, contaminated soil, and contaminated debris from the site.
August 1983	A Cooperative Agreement was signed by the EPA and the State of Texas that gave the state lead responsibilities to conduct the Remedial Investigation/Feasibility Study (RI/FS).
April 1984	The RI was completed (issued in August 1984).
August 1984 - March 1985	The FS was conducted.
February 1985	A pilot study was conducted by the state contractor, Weston, to determine if mechanical aeration would effectively treat the soils at the site.
March 1985	Third Emergency Action conducted, to enclose the site within a security fence.
June 11, 1985	The Record of Decision (ROD) was signed.
January 2, 1987	Notice to Proceed with the Remedial Action (RA) was given to the state contractor, ENSCO
January 13, 1987	ENSCO mobilized to the site.
March 12, 1987	Final RA inspection conducted at the site.
June 1987	Final Remedial Action Close Out report (prepared by Weston).
October 1989	Supplemental Groundwater Monitoring Final Report (prepared by Weston) is issued.
September 1990	EPA issued the Site Interim Close Out report.
July 11, 1994	First Five-Year Review Report issued by EPA.

Table 1
Chronology of Site Events
Triangle Chemical Company Site
Bridge City, Orange County, Texas

February 21, 1997	The Notice of Deletion of the Triangle Chemical Company from the NPL was signed.
August 2000	Operations and Maintenance (O&M) groundwater sampling and site inspections continue semi-annually (includes sampling of MW-1, MW-3, and MW-6 through MW-11).

Table 2 Annual O&M Costs <i>Triangle Chemical Company Site</i> <i>Bridge City, Orange County, Texas</i>		
Dates		Total Cost rounded to nearest \$100
From	To	
August 1994	July 1996	\$88,200
1997	2000	Cost estimated by the Texas Natural Resources Conservation Commission at \$19,200 annually since 1997
2000	2006	Cost estimated by the Texas Commission on Environmental Quality at \$15,000 to \$20,000 annually

Table 3
Actions Taken Since Last Five-Year Review

Triangle Chemical Company Site
Bridge City, Orange County, Texas

Deficiencies from Previous Review	Recommendations/ Follow-up Actions	Party Responsible	Milestone Date	Action Taken	Date of Action
Damaged and/or missing fence in three observed locations: (1) an approximate 20 foot length of fence is missing along the perimeter adjacent to monitor well MW-8, and the adjacent remaining sections are damaged (southwest property line), (2) fence damaged at the southern corner of the perimeter and, (3) fence damaged and almost completely down near the eastern corner of the perimeter.	Repair the fence to prevent unauthorized access, possible tampering with wells, and vandalism.	TCEQ	N/A	Fence was repaired after Second Five Year Review to prevent unauthorized access to the site.	Unknown
Monitor wells MW-3 and MW-8 do not have locks.	Add locks to outer casings of MW-3 and MW-8.	TCEQ	N/A	Locks were placed on each monitor well.	Unknown
Monitor well MW-3 does not have a cap on its PVC casing.	Provide a new PVC cap for the inner casing of MW-3.	TCEQ	N/A	Monitoring wells requiring maintenance have been repaired and secured.	Unknown
Monitor wells MW-1, MW-3, and MW-9 were dropped from the semi-annual O&M groundwater sampling program during the 1999 event due to lack of detections.	Add monitor wells MW-1, MW-3, and MW-9 back into the O&M monitoring program at least annually to verify the continued lack of contaminant migration.	TCEQ	N/A	Monitor wells MW-1, MW-3, and MW-9 were placed back into the O&M monitoring program on a semiannual basis	February 29, 2000
The grass at the site had not been mowed in at least a year, and was overgrown.	Keep site mowed on a regular basis per the original requirements of the ROD.	TCEQ	N/A	Regular mowing is occurring at the site.	Prior to each sampling event.
Continue five- year reviews.	N/A	EPA	March 2006	Third five-year review conducted.	April 2006

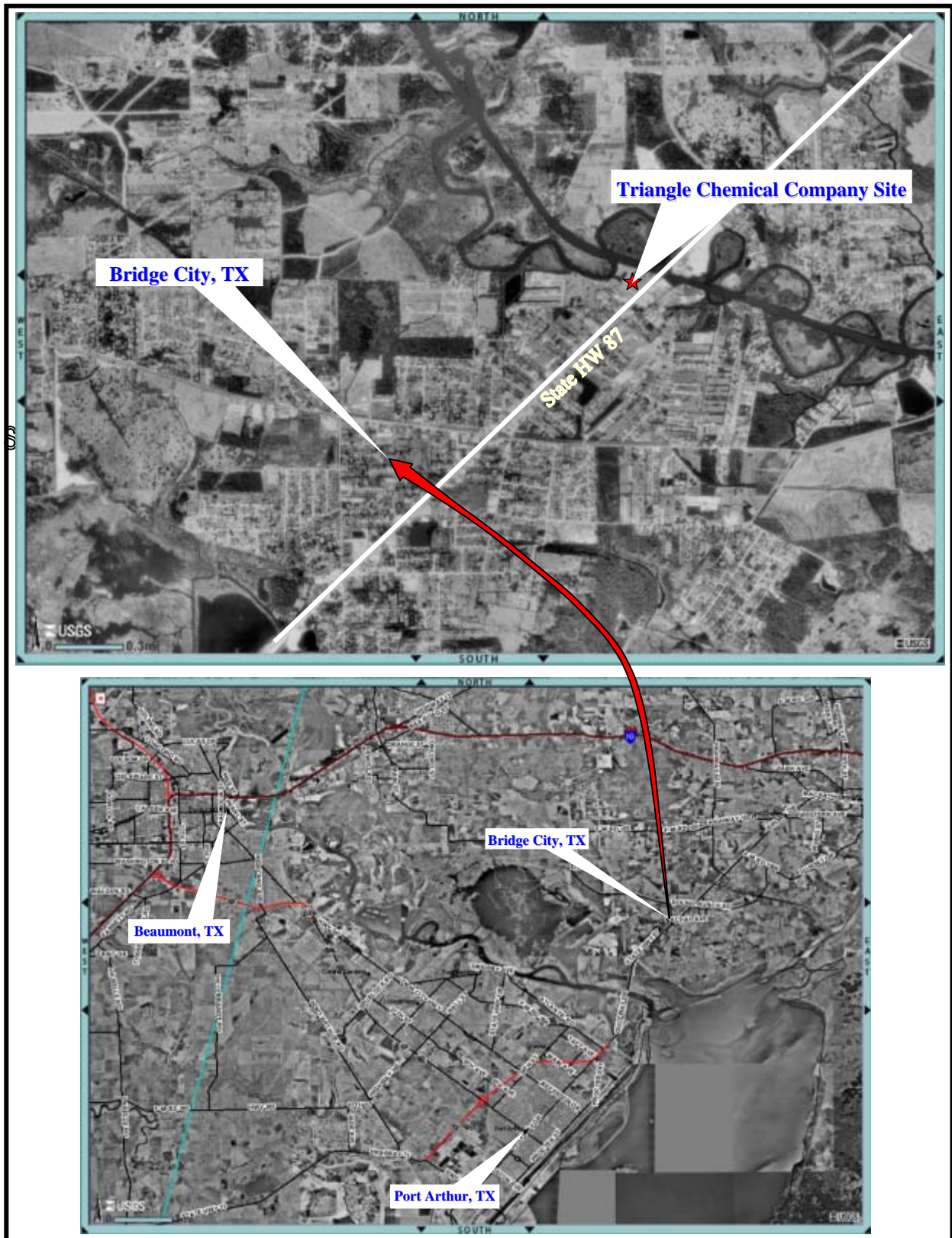
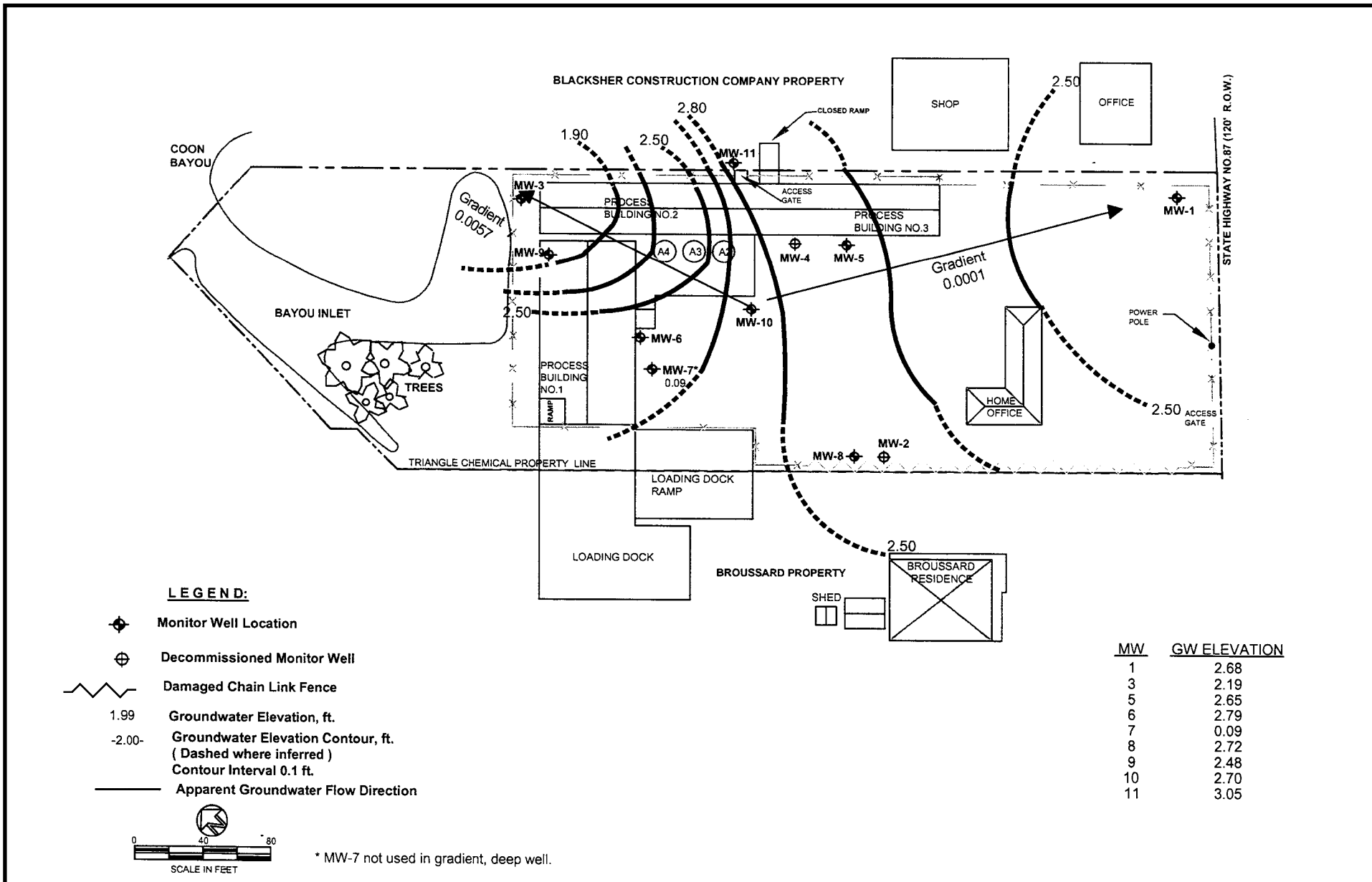


Figure 1
Site Location
Third Five-Year Review Report
Triangle Chemical Company Site
Bridge City, Texas



SSCI
Separation Systems Consultants, Inc.

J D HOLT 6/29/04 37376

TRIANGLE CHEMICAL COMPANY
BRIDGE CITY, TEXAS

June 29, 2004

FIGURE 2
GROUNDWATER GRADIENT
AND FLOW DIRECTION MAP

Note: Reproduced from "Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site". June 2004 (SSCI, 2004b)

Attachment 1
Documents Reviewed

Attachment 1 Documents Reviewed

- SSCI, 2004a *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. January 2004
- SSCI, 2004b *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. June 2004
- Terra-Mar, 2001. *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. August 2001.
- Terra-Mar, 2002a. *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. March 2002.
- Terra-Mar, 2002b. *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. August 2002.
- Terra-Mar, 2003a. *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. April 2003.
- Terra-Mar, 2003b. *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. August 2003.
- Texas State Historical Associate, and the University of Texas General Libraries (TSHA and UT), 2006. *The Handbook of Texas Online*. www.tsha.utexas.edu/handbook/online/. 2006.
- URS, 2006 *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. March 2006.
- U.S Environmental Protection Agency (EPA), 1985. *Record of Decision, Remedial Action Alternative*. Final, June 11, 1985.
- U.S. Environmental Protection Agency (EPA), 1990. *Site Interim Close Out Report*. September 1990.
- U.S. Environmental Protection Agency (EPA), 1994. *First Five-Year Review, Triangle Chemical Company Superfund Site, Bridge City, Orange County, Texas*. July 1994.
- U.S. Environmental Protection Agency (EPA), 2000. *Institutional Controls: A Site Manager's Guide to Identifying, Evaluating and Selecting Institutional Controls at Superfund and RCRA Corrective Action Cleanups*. EPA 540-F-00-005. September 2000.

- U.S. Environmental Protection Agency (EPA), 2001a. *Comprehensive Five-Year Review Guidance*. EPA 540-R-01-007. June 2001.
- U.S. Environmental Protection Agency (EPA), 2001b. *Second Five-Year Review Report for the Triangle Chemical Company Site, Bridge City, Orange County, Texas*. June 2001.
- U.S. Environmental Protection Agency (EPA), 2005. *Institutional Controls: A Citizen's Guide to Understanding Institutional Controls at Superfund, Brownfields, Federal Facilities, Underground Storage Tank, and Resource Conservation and Recovery Act Cleanups*. EPA-540-R-04-003. February, 2005.
- U.S. Environmental Protection Agency (EPA), 2006. *Site Status Summary Triangle Chemical Company Site, Bridge City, Orange County*. March 6, 2006.
- Weston, 1984. *Site Investigation, Triangle Chemical Company, Bridge City, Texas*. Final, September 1984.
- Weston, 1985. *Feasibility Study, Triangle Chemical Company, Bridge City, Texas*. Final, June 1985.
- Weston, 1987. *Remedial Action Closeout Report*. June 1987.
- Weston, 1989. *Triangle Chemical Company Superfund Site Supplemental Groundwater Monitoring Final Report*. Final, October 1989.
- Weston, 2005. *Operations and Maintenance Activity Report for the Triangle Chemical Company Federal Superfund Site*. July 2005.
- Weston, undated. *Operation and Maintenance Plan for Triangle Chemical Co. Remedial Action*.

Attachment 2
Interview Record Forms

Five-Year Review Interview Record Triangle Chemical Superfund Site Bridge City, Orange County, Texas		Interviewee: Ken Davis Affiliation: TCEQ Telephone: (512)-239- 6791 Email address: KEDAVIS@tceq.state.tx.us		
Site Name	EPA ID Number	Date of Interview	Interview Method	
Triangle Chemical Superfund Site	EPA ID# TXD055143705	March 29, 2006	In person	
Interview Contacts				
Name	Organization	Phone	Email	Address
Ernest Franke	EPA Region 6	214-665-8521	Franke.Ernest@epamail.epa.gov	1445 Ross Ave Dallas, Texas 75202
Darren, Davis	CH2M HILL, EPA contractor	972-980-2170	ddavis9@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Victor Martinez	CH2M HILL, EPA contractor	972-980-2170	vmartin1@ch2m.com	12377 Merit, Suite 1000 Dallas, Texas 75251
Purpose of the Five-Year Review				
<p>The purpose of the five-year review is to evaluate the implementation and performance of the remedy, to confirm that human health and the environment continue to be protected by the remedial actions performed. This interview is being conducted as a part of the third five-year review for the Triangle Chemical Company site. The period covered by this five-year review is from completion of the second five-year review in 2000 to current.</p>				
Interview Questions				
<p>1. What is your overall impression of the work conducted at the site since the second Five-Year Review (since last review)?</p> <p>Response: Mr. Davis indicated that everything at the site that should be done in regards to site O&M is being done. He indicated that the site is currently undergoing semi-annual ground water sampling activities, which are conducted by the TCEQ.</p>				
<p>2. From your perspective, what effects have continued remedial operations at the site had on the surrounding community? Are you aware of any ongoing community concerns regarding the site or its operation and maintenance, particularly in reference to the hurricane impacts, or other issues?</p> <p>Response: Mr. Davis stated that continued O&M activities at the site have had no effect positive or negative on the community. He did indicate that he has had no phone calls regarding the site, and that the previous TCEQ manager for the site had not received any phone calls regarding the site.</p>				
<p>3. Have there been routine communications or activities conducted by your office regarding the site? (e.g. site visits, inspections, reporting activities, etc.) If so, please describe purpose and results.</p> <p>Response: Mr. Davis indicated that the TCEQ performs the O&M at the site. This includes semi-annual ground water monitoring, maintenance of the site fence, and mowing.</p>				

4. Are you aware of any unanticipated events, incidents, or activities that have occurred at the site, such as dumping, vandalism, fire, or anything that required emergency response from local authorities? If so, please give details.

Response: Mr. Davis indicated that trespassing onto the site has resulted in some repairs being made to the site fence. The fence was repaired following the last five-year review and in March 2006.

5. What is the status of groundwater monitoring?

Response: Mr. Davis indicated that overall, contaminant concentrations are decreasing in the ground water. He did indicate that the deeper monitor well, MW-7, had some low level hits in July 2005 and January 2006, which was not expected. He also stated that a Data Quality Summary is prepared by the TCEQ's contractor annually to validate and determine the quality of the analytical results.

6. What are the O&M costs related to the site? Have you noticed any significant changes in the O&M costs?

Response: Mr. Davis stated that the O&M costs are approximately \$15,000 - \$20,000 per year. He stated that the costs were slightly increased this year due to the fence repairs that were required after Hurricane Rita. Also, the hasp on one of the well lids had to be repaired. Other than those two items, no significant costs have been incurred at the site.

7. Do you have any comments, suggestions, or recommendations regarding the site?

Response: Mr. Davis indicated that he was considering installing some cameras or motion sensors at the site to address the trespasser issues. The trespasser(s) usually cut through the fence to gain access to the site, which has resulted in the need to repair the fence.

Attachment 3
Site Inspection Checklist

Triangle Chemical Company Superfund Site Bridge City, Orange County, Texas Five-Year Review Site Inspection Checklist

Please note that "O&M" is referred to throughout this checklist. At sites where Long-Term Response Actions are in progress, O&M activities may be referred to as "system operations" since these sites are not considered to be in the O&M phase while being remediated under the Superfund program. N/A means -"not applicable".

I. SITE INFORMATION	
Site Name: Triangle Chemical Company	EPA ID: TXD055143705
City/State: Bridge City, Orange County, Texas	Date of Inspection: 03/29/2006
Agency Completing 5 Year Review: EPA	Weather/temperature: Cloudy, approximately 70 °F
Remedy Includes: (Check all that apply) <input type="checkbox"/> Landfill cover/containment <input checked="" type="checkbox"/> Access controls <input checked="" type="checkbox"/> Institutional controls <input type="checkbox"/> Groundwater pump and treatment <input type="checkbox"/> Surface water collection and treatment <input checked="" type="checkbox"/> Other: Monitored Natural Attenuation	
Attachments: <input checked="" type="checkbox"/> Inspection team roster attached <input checked="" type="checkbox"/> Site map attached	
II. INTERVIEWS (Check all that apply)	
1. O&M site manager Texas Commission on Environmental Quality: Name: Ken Davis Title: Project Manager Date: 512-239-6791 Interviewed: <input checked="" type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone Number: <u>Problems, suggestions:</u> <input checked="" type="checkbox"/> Additional report attached (if additional space required). Mr. Ken Davis mentioned that since he became the state Project Manager for this site there have been repairs made to the fences after someone cut through the fence to get inside of the site at the loading dock side south of Process Building No. 1. He believes that trespassing is a problem at the site and that they have notified local authorities when it occurs.	
2. O&M staff: Name: Title: Date: Interviewed: <input type="checkbox"/> at site <input type="checkbox"/> at office <input type="checkbox"/> by phone Phone Number: <u>Problems, suggestions:</u> <input type="checkbox"/> Additional report attached (if additional space required).	

3. Local regulatory authorities and response agencies (i.e., State and Tribal offices, emergency response office, police department, office of public health or environmental health, zoning office, recorder of deeds, or other city and county offices, etc.) Fill in all that apply.

Agency:

Contact:

Name

Title:

Date:

Phone Number:

Problems, suggestions: Additional report attached (if additional space required).

Agency:

Contact:

Name:

Title:

Date:

Phone Number:

Problems, suggestions: Additional report attached (if additional space required).

Agency:

Contact:

Name:

Title:

Date:

Phone Number:

Problems, suggestions: Additional report attached (if additional space required).

Agency:

Contact:

Name:

Title:

Date:

Phone Number:

Problems, suggestions: Additional report attached (if additional space required).

2. Other interviews (optional) N/A Additional report attached (if additional space required).

III. ONSITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. O&M Documents

O&M Manuals

Readily available

Up to date

N/A

As-Built Drawings

Readily available

Up to date

N/A

Maintenance Logs

Readily available

Up to date

N/A

Remarks: O&M consists of long term monitoring of the ground water and maintenance of the site fence.

2.	Health and Safety Plan Documents <input type="checkbox"/> Site-Specific Health and Safety Plan <input type="checkbox"/> Contingency plan/emergency response plan <u>Remarks:</u>	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
3.	O&M and OSHA Training Records <u>Remarks:</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
4.	Permits and Service Agreements <input type="checkbox"/> Air discharge permit <input type="checkbox"/> Effluent discharge <input type="checkbox"/> Waste disposal, POTW <input type="checkbox"/> Other permits <u>Remarks:</u>	<input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available <input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date <input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A <input checked="" type="checkbox"/> N/A
5.	Gas Generation Records <u>Remarks:</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
6.	Settlement Monument Records <u>Remarks:</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
7.	Groundwater Monitoring Records <u>Remarks:</u>	<input checked="" type="checkbox"/> Readily available	<input checked="" type="checkbox"/> Up to date	<input type="checkbox"/> N/A
8.	Leachate Extraction Records <u>Remarks:</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A
9.	Discharge Compliance Records <u>Remarks:</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A

10. Daily Access/Security Logs <u>Remarks:</u>	<input type="checkbox"/> Readily available	<input type="checkbox"/> Up to date	<input checked="" type="checkbox"/> N/A																				
IV. O&M Costs																							
		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A																				
1. O&M Organization <input checked="" type="checkbox"/> State in-house <input checked="" type="checkbox"/> Contractor for State <input type="checkbox"/> PRP in-house <input type="checkbox"/> Contractor for PRP <input type="checkbox"/> Other: Contractor																							
2. O&M Cost Records <div style="display: flex; justify-content: space-between;"> <input checked="" type="checkbox"/> Readily available <input checked="" type="checkbox"/> Up to date <input type="checkbox"/> Funding mechanism/agreement in place </div> <u>Original O&M cost estimate:</u> <input type="checkbox"/> Breakdown attached <div style="text-align: center;"><u>Total annual cost by year for review period if available</u></div> <table style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;"><u>From (Date):</u></td> <td style="width: 20%;"><u>To (Date):</u></td> <td style="width: 20%;"><u>Total cost:</u></td> <td style="width: 40%; text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td><u>From (Date):</u></td> <td><u>To (Date):</u></td> <td><u>Total cost:</u></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td><u>From (Date):</u></td> <td><u>To (Date):</u></td> <td><u>Total cost:</u></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td><u>From (Date):</u></td> <td><u>To (Date):</u></td> <td><u>Total cost:</u></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> <tr> <td><u>From (Date):</u></td> <td><u>To (Date):</u></td> <td><u>Total cost:</u></td> <td style="text-align: right;"><input type="checkbox"/> Breakdown attached</td> </tr> </table> <p><u>Remarks:</u> Mr. Davis did not provide a yearly breakdown, but he did state that O&M costs are usually between \$15,000 and \$20,000 per year.</p>				<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached	<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached	<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached	<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached	<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached
<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached																				
<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached																				
<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached																				
<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached																				
<u>From (Date):</u>	<u>To (Date):</u>	<u>Total cost:</u>	<input type="checkbox"/> Breakdown attached																				
3. Unanticipated or Unusually High O&M Costs During Review Period <u>Describe costs and reasons:</u> Repair costs made to the fence due to trespassing from unauthorized people.																							
V. ACCESS AND INSTITUTIONAL CONTROLS																							
		<input checked="" type="checkbox"/> Applicable	<input type="checkbox"/> N/A																				
1. Fencing																							
1. Fencing damaged <input checked="" type="checkbox"/> Location shown on site map <input checked="" type="checkbox"/> Gates secured <input type="checkbox"/> N/A <u>Remarks:</u> At the time of inspection no fencing damaged was evident and locations where damaged had been previously identified in the second five year review were repaired.																							

2. Other Access Restrictions		
1. Signs and other security measures	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
<u>Remarks:</u> Only one warning sign was present on the site fence.		
3. Institutional Controls		
1. Implementation and enforcement		
Site conditions imply ICs not properly implemented:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Site conditions imply ICs not being fully enforced:	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	<input type="checkbox"/> N/A
Type of monitoring (e.g, self-reporting, drive by): State contractor visits the site twice a year		
Frequency: Semi-annual		
Responsible party/agency: TCEQ		
Contact:		
Name: Ken Davis		
Title: Project Manager		
Date: 03/29/2006		
Phone Number: 512-239-6791		
Reporting is up-to-date:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A
Reports are verified by the lead agency:	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Specific requirements in deed or decision documents have been met:	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> N/A
Violations have been reported:	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input checked="" type="checkbox"/> N/A
Other problems or suggestions:	<input type="checkbox"/> Additional report attached (if additional space required).	
2. Adequacy <input checked="" type="checkbox"/> ICs are adequate <input type="checkbox"/> ICs are inadequate <input type="checkbox"/> N/A		
<u>Remarks:</u>		
4. General		
1. Vandalism/trespassing <input checked="" type="checkbox"/> Location shown on site map <input type="checkbox"/> No vandalism evident		
<u>Remarks:</u> As reported by Mr. Davis, there is some evidence that trespassing has occurred at the site based on the damage reported on the fence. However there are no signs that vandalism is occurring at the site.		
2. Land use changes onsite <input checked="" type="checkbox"/> N/A		
<u>Remarks:</u> The site is currently vacant, with several abandoned buildings.		
3. Land use changes offsite <input checked="" type="checkbox"/> N/A		
<u>Remarks:</u> No land use changes were noted offsite.		

VI. GENERAL SITE CONDITIONS			
1.	Roads	<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1.	Roads damaged <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Roads adequate <input checked="" type="checkbox"/> N/A
2. Other Site Conditions			
<u>Remarks:</u> Grass had been recently mowed and access to monitor wells is appropriate. Empty 55 gallon drums reported on the last five year review are still present in two of the buildings. No major damage from Hurricane Rita was observed. Two of the buildings (home office and loading building) are in a very bad condition.			
VII. LANDFILL COVERS		<input type="checkbox"/> Applicable	<input checked="" type="checkbox"/> N/A
1. Landfill Surface			
1.	Settlement (Low spots) Areal extent: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map Depth:	<input type="checkbox"/> Settlement not evident
2.	Cracks Lengths: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map Widths: Depths:	<input type="checkbox"/> Cracking not evident
3.	Erosion Areal extent: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map Depth:	<input type="checkbox"/> Erosion not evident
4.	Holes Areal extent: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map Depth:	<input type="checkbox"/> Holes not evident
5.	Vegetative Cover <input type="checkbox"/> Cover properly established <u>Remarks:</u>	<input type="checkbox"/> No signs of stress	<input type="checkbox"/> Grass <input type="checkbox"/> Trees/Shrubs

6. Alternative Cover (armored rock, concrete, etc.) <u>Remarks:</u>		<input type="checkbox"/> N/A
7. Bulges Areal extent: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map Height:	<input type="checkbox"/> Bulges not evident
8. Wet Areas/Water Damage <input type="checkbox"/> Wet areas <input type="checkbox"/> Ponding <input type="checkbox"/> Seeps <input type="checkbox"/> Soft subgrade <u>Remarks:</u>	<input type="checkbox"/> Wet areas/water damage not evident <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map <input type="checkbox"/> Location shown on site map	Areal extent: Areal extent: Areal extent: Areal extent:
9. Slope Instability Areal extent: <u>Remarks:</u>	<input type="checkbox"/> Slides <input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of slope instability
2. Benches (Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)	<input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1. Flows Bypass Bench <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
2. Bench Breached <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay
3. Bench Overtopped <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A or okay

3. Letdown Channels <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1. Settlement Areal extent: Depth: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of settlement
2. Material Degradation Material type: Areal extent: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of degradation
3. Erosion Areal extent: Depth: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of erosion
4. Undercutting Areal extent: Depth: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> No evidence of undercutting
5. Obstructions Type: Areal extent: Height: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> N/A
6. Excessive Vegetative Growth <input type="checkbox"/> Evidence of excessive growth <input type="checkbox"/> Location shown on site map <u>Remarks:</u>	<input type="checkbox"/> No evidence of excessive growth <input type="checkbox"/> Vegetation in channels but does not obstruct flow Areal extent:	

4. Cover Penetrations <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Gas Vents <input type="checkbox"/> Active <input type="checkbox"/> Passive <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Evidence of leakage at penetration <u>Remarks:</u>	<input type="checkbox"/> Routinely sampled <input type="checkbox"/> Functioning <input type="checkbox"/> Needs O& M	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition
2.	Gas Monitoring Probes <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Evidence of leakage at penetration <u>Remarks:</u>	<input type="checkbox"/> Functioning <input type="checkbox"/> Needs O&M	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition
3.	Monitoring Wells (within surface area of landfill) <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Evidence of leakage at penetration <u>Remarks:</u>	<input type="checkbox"/> Functioning <input type="checkbox"/> Needs O&M	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition
4.	Leachate Extraction Wells <input type="checkbox"/> Routinely sampled <input type="checkbox"/> Properly secured/locked <input type="checkbox"/> Evidence of leakage at penetration <u>Remarks:</u>	<input type="checkbox"/> Functioning <input type="checkbox"/> Needs O&M	<input type="checkbox"/> N/A <input type="checkbox"/> Good condition
5.	Settlement Monuments <u>Remarks:</u>	<input type="checkbox"/> Located <input type="checkbox"/> Routinely surveyed	<input type="checkbox"/> N/A
5. Gas Collection and Treatment <input type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1.	Gas Treatment Facilities <input type="checkbox"/> Flaring <input type="checkbox"/> Thermal destruction <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M <u>Remarks:</u>	<input type="checkbox"/> Collection for reuse	<input type="checkbox"/> N/A

2.	Gas Collection Wells, Manifolds and Piping <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M <u>Remarks:</u>	<input type="checkbox"/> N/A
3.	Gas Monitoring Facilities (e.g., gas monitoring of adjacent homes or buildings) <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M <u>Remarks:</u>	<input type="checkbox"/> N/A
6.	Cover Drainage Layer <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Outlet Pipes Inspected <input type="checkbox"/> Functioning <u>Remarks:</u>	<input type="checkbox"/> N/A
2.	Outlet Rock Inspected <input type="checkbox"/> Functioning <u>Remarks:</u>	<input type="checkbox"/> N/A
7.	Detention/Sedimentation Ponds <input type="checkbox"/> Applicable <input type="checkbox"/> N/A	
1.	Siltation Areal extent: <input type="checkbox"/> Siltation evident Depth: <input type="checkbox"/> N/A <u>Remarks:</u>	<input type="checkbox"/> N/A
2.	Erosion Areal extent: <input type="checkbox"/> Erosion evident Depth: <input type="checkbox"/> N/A <u>Remarks:</u>	<input type="checkbox"/> N/A
3.	Outlet Works <input type="checkbox"/> Functioning <u>Remarks:</u>	<input type="checkbox"/> N/A
4.	Dam <input type="checkbox"/> Functioning <u>Remarks:</u>	<input type="checkbox"/> N/A

8. Retaining Walls <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1. Deformations Horizontal displacement: Vertical displacement: Rotational displacement: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Deformation not evident
2. Degradation <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Degradation not evident
1. Perimeter Ditches/Off-site discharge <input type="checkbox"/> Applicable <input type="checkbox"/> N/A		
1. Siltation Areal extent: Depth: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Siltation not evident
2. Vegetative Growth Areal extent: Type: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Vegetation does not impede flow
3. Erosion Areal extent: Depth: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Erosion not evident
4. Discharge Structure <input type="checkbox"/> Functioning <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map <input type="checkbox"/> Good Condition	<input type="checkbox"/> N/A
VIII. VERTICAL BARRIER WALLS <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A		
1. Settlement Areal extent: Depth: <u>Remarks:</u>	<input type="checkbox"/> Location shown on site map	<input type="checkbox"/> Settlement not evident

2.	Performance Monitoring <input type="checkbox"/> Performance not monitored <input type="checkbox"/> Performance monitored <input type="checkbox"/> Evidence of breaching Remarks:	Frequency: Head differential:	<input type="checkbox"/> N/A
IX. GROUNDWATER/SURFACE WATER REMEDIES			
<input checked="" type="checkbox"/> Applicable <input type="checkbox"/> N/A			
1. Groundwater Extraction Wells, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Pumps, Wellhead Plumbing, and Electrical <input type="checkbox"/> All required wells located <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M Remarks:		<input type="checkbox"/> N/A
2.	Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> System located <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M Remarks:		<input type="checkbox"/> N/A
3.	Spare Parts and Equipment <input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be provided Remarks:		<input type="checkbox"/> N/A
2. Surface Water Collection Structures, Pumps, and Pipelines <input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A			
1.	Collection Structures, Pumps, and Electrical <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M Remarks:		<input type="checkbox"/> N/A
2.	Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M Remarks: Not observed.		<input type="checkbox"/> N/A

3.	Spare Parts and Equipment	<input type="checkbox"/> N/A
	<input type="checkbox"/> Readily available <input type="checkbox"/> Good condition <input type="checkbox"/> Requires Upgrade <input type="checkbox"/> Needs to be provided <u>Remarks:</u>	
3.	Treatment System	<input type="checkbox"/> Applicable <input checked="" type="checkbox"/> N/A
1.	Treatment Train (Check components that apply)	
	<input type="checkbox"/> Metals removal <input type="checkbox"/> Oil/water separation <input type="checkbox"/> Bioremediation <input type="checkbox"/> Air stripping <input type="checkbox"/> Carbon adsorbers <input type="checkbox"/> Filters (list type): <input type="checkbox"/> Additive (list type, e.g., chelation agent, flocculent) <input type="checkbox"/> Others (list): <input type="checkbox"/> Good condition <input type="checkbox"/> Needs O&M <input type="checkbox"/> Sampling ports properly marked and functional <input type="checkbox"/> Sampling/maintenance log displayed and up to date <input type="checkbox"/> Equipment properly identified <input type="checkbox"/> Quantity of groundwater treated annually (list volume): <input type="checkbox"/> Quantity of surface water treated annually (list volume): <u>Remarks:</u>	
2.	Electrical Enclosures and Panels (properly rated and functional)	<input type="checkbox"/> N/A
	<input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M <u>Remarks:</u> See Hurricane Katrina Response Technical Memorandum, February 2006	
3.	Tanks, Vaults, Storage Vessels	<input type="checkbox"/> N/A
	<input type="checkbox"/> Good condition <input type="checkbox"/> Proper secondary containment <input type="checkbox"/> Needs O&M <u>Remarks:</u>	
4.	Discharge Structure and Appurtenances	<input type="checkbox"/> N/A
	<input type="checkbox"/> Good condition <input type="checkbox"/> Needs O& M <u>Remarks:</u>	
5.	Treatment Building(s)	<input type="checkbox"/> N/A
	<input type="checkbox"/> Good condition (esp. roof and doorways) <input type="checkbox"/> Needs Repair <input type="checkbox"/> Chemicals and equipment properly stored <u>Remarks:</u>	

6. Monitoring Wells (pump and treatment remedy) N/A
 All required wells located Properly secured/locked Functioning Routinely sampled
 Good condition Needs O&M
Remarks:

4. Monitored Natural Attenuation Applicable N/A

1. Monitoring Wells (natural attenuation remedy) N/A
 All required wells located Properly secured/locked Functioning Routinely sampled
 Good condition Needs O&M
Remarks: All monitor wells were found properly secured and/or locked. Wells that required maintenance were repaired and in good condition at the time of the site inspection.

5. Long Term Monitoring Applicable N/A

2. Monitoring Wells N/A
 All required wells located Properly secured/locked Functioning Routinely sampled
 Good condition Needs O&M
Remarks:

X. OTHER REMEDIES Applicable N/A

If there are remedies applied at the site which are not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

1. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.)

The remedy was chosen to remove the principle threats to human health based on direct exposure to hazardous materials stored at the site, to prevent further degradation of surface and groundwater quality, and to mitigate future impacts to human health, the environment, and site development. Currently, the only remaining contamination at the site is in the groundwater. The contaminant plume does not appear to be migrating.

2. Adequacy of O&M

Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.

Wells requiring maintenance as reported in the previous five year review have been repaired and currently unauthorized access to the site is restricted. Monitored Natural Attenuation would remain the only necessary action at the site as long as attenuation continues to occur.

3. Early Indicators of Potential Remedy Failure

Describe issues and observations such as unexpected changes in the cost or scope of O&M or a high frequency of unscheduled repairs that suggest that the protectiveness of the remedy may be compromised in the future.

The O&M procedures appear adequate to maintain the system and to keep the completed portions of the remedy protective.

4. Opportunities for Optimization

Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

Groundwater sampling is performed on a semi-annual basis. Future monitoring may suggest a change to annual sampling is appropriate.

Attachment 4
Site Inspection Photographs



Photo 1: View of the front entrance on Texas State Highway 87.

Date taken: 3/29/2006



Photo 2: View of the northeast corner of the site, looking north towards monitor well MW-01.

Date taken: 3/29/2006



Photo 3: View of fence along south end of property, facing west. Monitor well MW-08 is in background.

Date taken: 3/29/2006



Photo 4: View of monitor well MW-11, located on north side of Process Building No. 2. An old bailer, used for sampling, is lying next to the well.

Date taken: 3/29/2006



Photo 5: View of monitor well MW-03, located at northwest corner of the site.

Date taken: 3/29/2006



Photo 6: View of inside of Process Building No. 1, facing south. Old debris is lying on the floor inside the building. Doors at the back of the building are fenced to prevent access. These fences are where trespassers have entered the site in the past.

Date taken: 3/29/2006



Photo 7: View of monitor well MW-09, located inside Process Building No. 1.

Date taken: 3/29/2006



Photo 8: View of fence at doors on south side of Process Building No. 1, facing south. Fence was repaired due to trespassers.

Date taken: 3/29/2006



Photo 9: View of monitor well MW-06, located on east side of Process Building No. 1. Old sample tubing is lying on ground next to the well.

Date taken: 3/29/2006



Photo 10: View of monitor well MW-07, located on east side of Process Building No. 1. MW-06 is located north of this well (outside but to the right of this view).

Date taken: 3/29/2006



Photo 11: View of monitor well MW-10.

Date taken: 3/29/2006



Photo 12: View of site, facing east towards the Office Building. The building is in very poor, deteriorated condition.

Date taken: 3/29/2006



Photo 13: View of site facing northwest, towards corner where Process Building Nos. 1 and 2 join. Old tanks have fallen over.

Date taken: 3/29/2006



Photo 14: View of monitor well MW-08, facing west.

Date taken: 3/29/2006



Photo 15: View of monitor well MW-08 and fence line along south side of property, facing west.

Date taken: 3/29/2006



Photo 16: View of monitor well MW-05, located on the south side of Process Building No. 3.

Date taken: 3/29/2006



Photo 17: View of site, facing southwest from monitor well MW-01 and towards the Office building.

Date taken: 3/29/2006



Photo 18: View of the fence along the east side of the property, facing east.

Date taken: 3/29/2006



Photo 19: View of debris placed on property next to the south fence. The fence is not located along the property line, but is set back approximately 20 feet.

Date taken: 3/29/2006

Attachment 5
Notices to the Public Regarding the Five-Year Review



**TRIANGLE CHEMICAL COMPANY SUPERFUND SITE
PUBLIC NOTICE
U.S. EPA Region 6 Completes the
Third Five-Year Review of the Site Remedy
May 2006**



The U.S. Environmental Protection Agency Region 6 (EPA), in coordination with the Texas Commission on Environmental Quality, has completed the Third Five-Year Review of the remedy for the Triangle Chemical Company site in Bridge City, Orange County, Texas. The review consisted of a site inspection, interviews with persons familiar with the site, and review of data and currently applicable regulatory requirements.

Based on the results of the Third Five-Year Review, the remedy conducted at the Triangle Chemical Company site continues to be protective of human health and the environment. The next Five-Year Review is scheduled for April 2011.

The Third Five-Year Review Report is available for review at the following information repository:

**City of Orange Public Library
220 North Fifth Street
West Orange, TX 77630**

Information about the Site is available on the Internet at:

<http://www.epa.gov/earth1r6/6sf/pdffiles/0602026.pdf>

For more information about the site, contact Ernest Franke at (214) 665-8521 or 1-800-533-3508 (toll-free) or by e-mail at franke.ernest@epa.gov.