Five-Year Review Report

Third Five-Year Review Report
for
Marzone Inc./Chevron Chemical Co.
EPA ID GAD991275686

Tifton
Tift County, Georgia

June 2012

Prepared By:
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For:
United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by:

for Franklin E. Hill
Director, Superfund Division

Date: 7/3/12

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for
Marzone Inc./Chevron Chemical Co.
Golden Road
Tifton
Tift County, Georgia

Figures

List of Acronyms

AOC1	Area of Concern 1
AOC2	Area of Concern 2
ARAR	Applicable or Relevant and Appropriate Requirement
AROD	Amended Record of Decision
B&V	Black & Veatch
BHC	Benzene Hexachloride
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CCC	Chevron Chemical Company
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
CMC	CMC Environmental Services, Inc.
COC	Contaminant of Concern
COPC	Contaminant of Potential Concern
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
F&G	Funnel-and-Gate
GAEPD	Georgia Environmental Protection Division
GAC	Granular Activated Carbon
HI	Hazard Index
IC	Institutional Control
LTTD	Low-Temperature Thermal Desorption
MCL	Maximum Contaminant Level
MNA	Monitored Natural Attenuation
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU1	Operable Unit 1
OU2	Operable Unit 2
PCB	Polychlorinated Biphenyl
ppm	parts per million
PRG	Preliminary Remediation Goal
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SDWA	Safe Drinking Water Act
TBC	To-Be-Considered
UAO	Unilateral Administrative Order
VOC	Volatile Organic Compound

Executive Summary

Introduction

The Marzone Inc./Chevron Chemical Company (Marzone) site (the Site) is located in south central Georgia, just outside the City of Tifton. The United States Environmental Protection Agency (EPA) identified two operable units (OUs) at the Site. OU1 consists of the Harper Enterprises Inc. and the Slack's properties which encompass approximately 1.68 acres and 4.16 acres respectively. OU2 consists of three adjacent properties which encompass approximately 18 acres and includes a segment of the drainage ditch that runs alongside the railroad tracks, Gum Creek and associated wetlands. Figure 1 presents the approximate extent of OU1 and OU2.

Chevron Chemical Company (CCC) owned and operated a former pesticide and herbicide-formulating plant located on the OU1 portion of the Site from 1950 to 1970. After 1970, a number of other companies owned and operated the plant until full-scale chemical formulation operations ceased in January 1983. The former north and south warehouses located on the OU1 portion of the Site are currently used for light industry, including equipment storage.

The OU2 portion of the Site was formerly used as a formulation and packaging plant for pesticides and fertilizers. Handling of agricultural chemicals on this portion of the Site could have begun as early as 1967. Pesticide formulation and fertilizer operations, or both, were conducted by a succession of owners until 1992, when business operations at the OU2 portion ceased. The Site was listed on EPA's National Priorities List (NPL) in October 1989.

The triggering action for this Five-Year Review (FYR) was the signing of the previous FYR on September 27, 2007.

Remedial Components

EPA issued the OU1 Record of Decision (ROD) on September 30, 1994. Remedial action objectives (RAOs) were not defined in the 1994 ROD; the 1994 ROD indicated that the cleanup goal of OU1 was to remediate the soils and ground water to levels that were appropriate for residential use.

Major components of the OU1 cleanup approach outlined in the 1994 ROD included:

- Excavation of contaminated soil and sediments
- Installation of a ground water treatment system
- Installation of fencing
- Implementation of institutional controls

The 1994 ROD was amended in 1997 to change the OU1 cleanup approach for soil from excavation/low-temperature thermal treatment to excavation/landfill disposal. The ROD was amended a second time in 1998 to include dioxin as a contaminant of concern (COC) in the burn pit area. In 2000, the ROD was amended a third time to change the cleanup approach for ground water from a pump-and-treat system to an on-site funnel-and-gate (F&G) system and monitored natural attenuation (MNA) south of the treatment system.

On July 1, 1999, EPA issued a ROD for OU2. The RAOs defined in the 1999 ROD for OU2 were:

- Containment or treatment of all contaminated surface soils above health-based or ecological action levels
- Containment or treatment of contaminated sediment above ecological action levels
- Restoration of ground water to drinking water levels

Major components of the OU2 cleanup approach that were outlined in the 1999 ROD included:

- Excavation of contaminated soil and sediments
- Use of natural processes to break down contaminants in ground water and remaining contaminated sediments, referred to as MNA. A contingency remedy of an in-situ treatment wall system could be implemented at EPA's sole discretion, if results do not confirm that natural attenuation is effective.
- Implementation of institutional controls for ground water

Technical Assessment

The OU1 remedy is functioning as intended by the decision documents. Soil and sediment cleanup activities were completed by 1999. The F&G ground water treatment system continues to remove COCs from ground water. Ground water downgradient from the F&G system is being treated by MNA. MNA data indicate limited microbial activity and optimization of the MNA might be needed. Optimization of the remedy should be explored to expedite the ground water cleanup and potentially reducing sampling and operation and maintenance (O&M) costs. Institutional controls to prevent use of ground water are in place at one of the two OU1 properties, but controls at the other property need to be put in place to prevent potential exposure to contaminated ground water.

The OU2 remedy is functioning as intended by the decision documents. Excavation of contaminated soils and sediments was completed by 2006, but optimization of the ground water remedy may be necessary to enhance COC degradation. Institutional controls as specified in the 1999 ROD need to be put in place to prevent potential exposure to the contaminated ground water. The ROD indicated that a contingency remedy consisting of an in-situ treatment wall system could be implemented at EPA's sole discretion, if results do not confirm that natural attenuation is effective.

Lack of adequate drainage from the ditch that runs between OU1 and OU2 and along the rail tracks was evident during the site inspection visit. Standing water and significant erosion damage were observed during the site inspection visit. Broken locks and illegible labels were also observed at several monitoring wells during the site inspection.

Toxicity factors for several site-specific COC have changed since the risk assessments were conducted and the 1994 and 1999 RODs were issued. As a result, potential risks associated with the Site COC were re-evaluated during the FYR process. The purpose of this evaluation was to ensure the calculated risks were within the acceptable range for increased incremental lifetime concern risk of $1x10^{-6}$ and $1x10^{-4}$, which is protective of human health and the environment. The

re-evaluation concluded no additional risks were identified as a result of the changes in toxicity factors.

Conclusion

The remedies implemented at OU1 and OU2 are protective of human health and the environment in the short term because contaminated soil and sediments have been excavated; monitoring is ongoing; and there is no evidence of current exposure or completed pathways to site-related contamination. However, in order for the remedy to be protective in the long term, implementation of the ground water institutional controls (IC) as specified in the 1994 and 1999 RODs is necessary. In addition, the ground water data collected since the last FYR indicate the concentrations of the site-specific COC are either decreasing or fluctuating. Therefore, evaluation of potential optimization of the ground water remedies is necessary to enhance COC attenuation.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Marzone Inc./Chevron Chemical Co.		
EPA ID: GAD991275686		
Region: 4	**State:** GA	**City/County:** Tifton/Tift

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: EPA **If "Other Federal Agency" was selected above, enter Agency name:** Not Applicable
Author name: Christy Fielden, Johnny Zimmerman-Ward and Kirby Webster (reviewed by EPA)
Author affiliation: EPA Contractor, Skeo Solutions
Review period: July 2011 – June 2012
Date of site inspection: October 19, 2011
Type of review: Policy
Review number: 3
Triggering action date: September 27, 2007
Due date *(five years after triggering action date)*: September 27, 2012

Five-Year Review Summary Form (continued)

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU1	**Issue Category: Institutional Controls**			
	Issue: Institutional controls, as called for in decision documents, are not in place to restrict ground water use on a portion of OU1.			
	Recommendation: Implement institutional control and access agreement for OU1 T061 014 parcel.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	03/01/2013

OU(s): OU2	**Issue Category: Institutional Controls**			
	Issue: Institutional controls, as called for in decision documents, are not in place to restrict ground water use at OU2.			
	Recommendation: Implement institutional controls to restrict ground water use on OU2 properties.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA/State	03/01/2013

OU(s): OU1	**Issue Category: Remedy Performance**			
	Issue: OU1 ground water MNA data indicate optimization is necessary.			
	Recommendation: Evaluate potential optimization of the OU1 ground water MNA, and implement optimization accordingly.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	03/01/2013

Five-Year Review Summary Form (continued)

OU(s): OU2	Issue Category: Remedy Performance			
	Issue: OU2 ground water data indicate optimization is necessary.			
	Recommendation: Review effectiveness of MNA at OU2. Evaluate ground water alternate remedies, and implement the preferred alternative accordingly.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA	EPA/State	09/30/2014

OU(s): OU1 & OU2	Issue Category: Monitoring			
	Issue: Some monitoring wells had broken locks and illegible labels during the site inspection.			
	Recommendation: Replace or fix broken locks and re-label wells as needed.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	No	EPA and PRP	EPA	03/01/2013

Five-Year Review Summary Form (continued)

Protectiveness Statement(s)

Operable Unit:	*Protectiveness Determination:*	*Addendum Due Date (if applicable):*
OU1 and OU2	Short-term Protective	Click here to enter date.

Protectiveness Statement:
The remedies implemented at OU1 and OU2 are protective of human health and the environment in the short term because contaminated soil and sediments have been excavated; monitoring is ongoing; and there is no evidence of current exposure or completed pathways to site-related contamination. However, in order for the remedy to be protective in the long term, implementation of the ground water institutional controls (IC) as specified in the 1994 and 1999 RODs is necessary. In addition, the ground water data collected since the last FYR indicate the concentrations of the site-specific COC are either decreasing or fluctuating. Therefore, evaluation of potential optimization of the ground water remedies is necessary to enhance COC attenuation.

Site-wide Protectiveness Statement (if applicable)

For sites that have achieved construction completion, enter a site-wide protectiveness determination and statement.

Protectiveness Determination:	*Addendum Due Date (if applicable):*
Short-term Protective	

Protectiveness Statement:
NA

Environmental Indicators

- Current human exposures at the Site are under control.
- Ground water migration is under control.

Are Necessary Institutional Controls in Place?

☐ All ☒ Some ☐ None
Institutional controls have not been implemented to restrict ground water use on all impacted parcels.

Has the Site Been Designated as Site-Wide Ready for Anticipated Use?

☐ Yes ☒ No

Has site been put into reuse?

☒ Yes ☐ No

There are existing and active facilities within OU1 and OU2 boundaries.

Third Five-Year Review Report
for
Marzone Inc./Chevron Chemical Co. Superfund Site

1.0 Introduction

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy will continue to be protective of human health and the environment. The methods, findings and conclusions of FYRs are documented in FYR reports. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency (EPA) prepares FYRs pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121 and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). CERCLA Section 121 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. In addition, if upon such review it is the judgment of the President that action is appropriate at such site in accordance with section [104] or [106], the President shall take or require such action. The President shall report to the Congress a list of facilities for which such review is required, the results of all such reviews, and any actions taken as a result of such reviews."

EPA interpreted this requirement further in the NCP; 40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii), which states:

> "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 actions no less often than every five years after the initiation of the selected remedial action."

Skeo Solutions, an EPA Region 4 contractor, conducted the FYR and prepared this report regarding the remedy implemented at the Marzone Inc./Chevron Chemical Co. site (the Site) located in Tifton, Tift County, Georgia. This FYR was conducted from July 2011 to June 2012. EPA is the lead agency for developing and implementing the remedy for the Superfund-financed and Potentially Responsible Party (PRP)-financed cleanup at the Site. Georgia Environmental Protection Division (GAEPD), as the support agency representing the State of Georgia, has reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the third FYR for the Site. The triggering action for this policy review is the second FYR signed on September 27, 2007. The FYR is required due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and

unrestricted exposure. The Site consists of two Operable Units (OUs), both of which are addressed in this FYR. Remediation activities are currently being conducted at both OUs.

2.0 Site Chronology

Table 1 lists the dates of important events for the Site.

Table 1: Chronology of Site Events

Event	Date
Initial discovery of contamination	May 1, 1984
EPA-lead removal start date	October 29, 1984
Preliminary site assessment	November 1, 1984
EPA-lead removal completion date	December 3, 1984
EPA issued an administrative order on consent	April 5, 1985
Technical assistance grant start date	April 25, 1995
PRP-lead removal start date	May 5, 1985
PRP-lead removal completion date	May 18, 1985
Site inspection	August 9, 1985
EPA proposed Site to the National Priorities List (NPL)	June 24, 1988
Chevron Chemical Company (CCC), Kova Fertilizer, Inc. (Kova) and Billy G. Mitchell signed Consent Decree with EPA addressing recovery of costs incurred by the United States in response to the alleged release or threatened release of hazardous substances at the Site	June 20, 1989
Site listed on NPL	October 4, 1989
PRP-lead OU1 remedial investigation/feasibility study (RI/FS) start date	September 28, 1990
EPA-lead site-wide removal assessment	September 20, 1991
EPA-lead OU1 ecological risk assessment EPA-lead OU1 risk/health assessment	October 20, 1993
PRP-lead OU1 RI/FS completion date OU1 record of decision (ROD) signed	September 30, 1994
EPA-lead OU2 combined RI/FS started	April 15, 1995
Unilateral Administrative Order issued by EPA to CCC and Kova to perform the remedial design/remedial action (RD/RA)	July 11, 1995
First PRP-lead OU1 RD started	August 14, 1995
Site-wide Consent Decree	February 6, 1996
Second PRP-lead OU1 RD started	March 26, 1996
First PRP-lead OU1 RD completed Third PRP-lead OU1 RD started First PRP-lead OU1 RA started	May 20, 1996
Third PRP-lead OU1 RD completed	August 12, 1996
Fourth PRP-lead OU1 RD started	August 14, 1996
OU1 Explanation of Significant Differences (ESD) issued	September 1996
Second PRP-lead OU1 RA started	September 9, 1996
First PRP-lead OU1 RA completed	September 25, 1996
Fourth PRP-lead OU1 RD completed	April 28, 1997
OU1 ROD Amendment (AROD) signed	June 18, 1997
Third PRP-lead OU1 RA started	June 30, 1997
Fourth PRP-lead OU1 RA started	April 2, 1998
Second PRP-lead OU1 RD completed	April 2, 1998
Second OU1 AROD signed	November 10, 1998
Second PRP-lead OU1 RA completed	December 24, 1998
Technical assistance grant completed	February 3, 1999
Third PRP-lead OU1 RA completed	June 7, 1999
EPA-lead OU2 combined RI/FS completed OU2 ROD signed	July 1, 1999

Event	Date
EPA-lead OU2 RD started	September 24, 1999
OU1 AROD signed	May 2, 2000
OU1 operation and maintenance started	September 30, 2000
EPA-lead OU2 RD completed	September 30, 2001
First FYR signed	March 25, 2002
Sitewide Consent Decree	February 3, 2005
EPA-lead OU2 RA started	May 10, 2005
EPA-lead OU2 RA completed	September 13, 2006
EPA-lead OU2 long term response action started	December 1, 2006
Second FYR signed	September 27, 2007
Fourth PRP-lead OU1 RA completed	September 28, 2007
PRP-lead OU1 long-term response action started	September 30, 2008

3.0 Background

3.1 Physical Characteristics

The Site is located in south central Georgia, outside the city of Tifton, at the intersection of Golden Road and the Norfolk Southern Railroad (Figure 1). The Site is located in a rural area that has a combination of light industrial, agricultural and residential land uses. The parcels within the vicinity of the Site are summarized and illustrated in Table 2 and Figure 3 respectively.

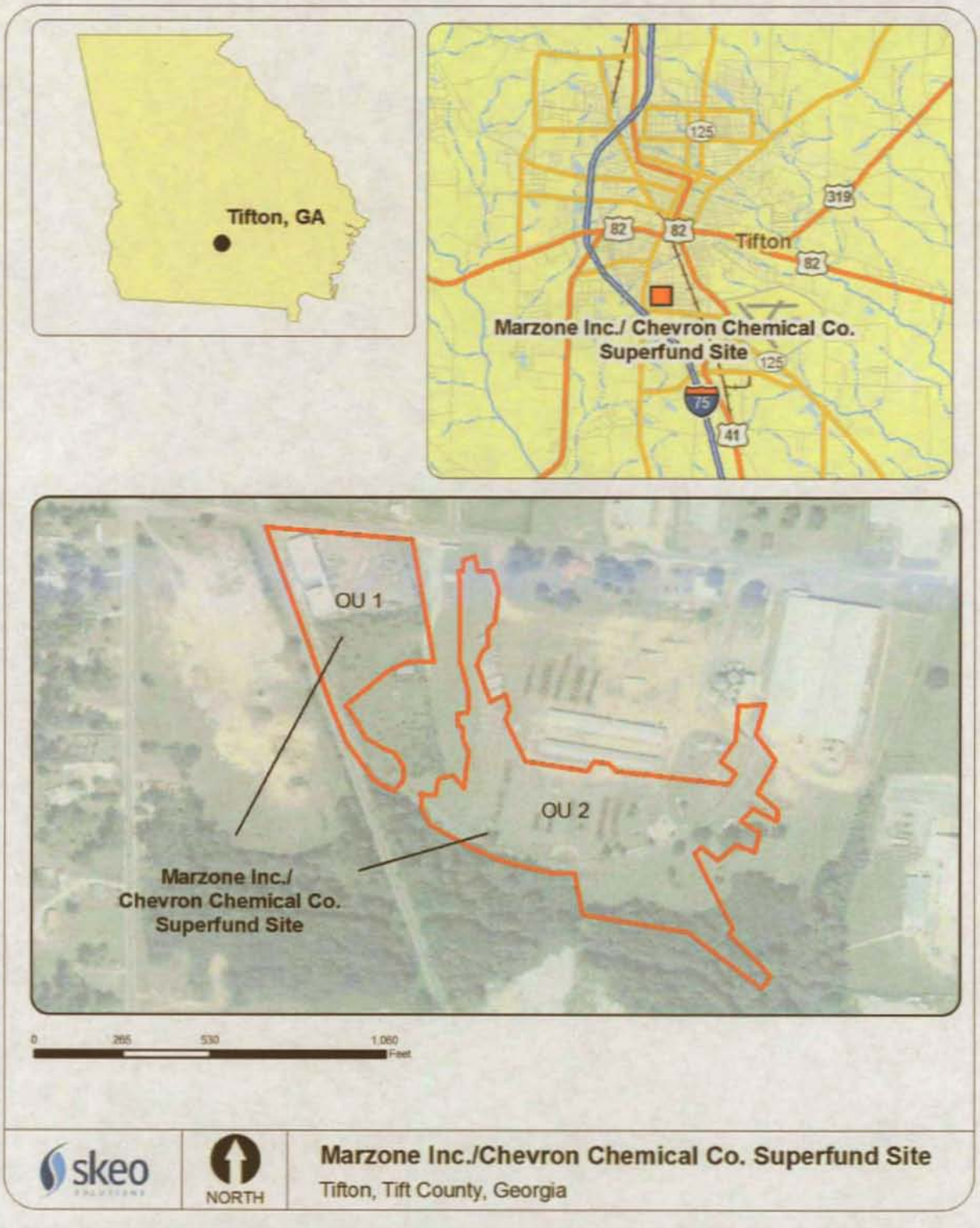
Table 2: Site Parcels

Parcel Number	Property Class	Total Parcel Acres	Owner
T061 013	C4-Commercial	1.68	Harper Enterprises Inc.
T061 014	C4-Commercial	4.16	Private Owner/Slack's Property
T061 015	C4-Commercial	7.84	Banner Grain Company
T061 020	C4-Commercial	1.79	Banner Grain Company
T061 021	C4-Commercial	1.3	Private Owner/Taylor's Property
T061 022	C4-Commercial	5.53	Banner Warehouse, Inc.
T061 026	C4-Commercial	8.81	Private Owner/Golden's Property

OU1 encompasses the Harper Enterprises Inc. property (T061 013), and the northern portion of the Slack's property (T061 014) to the south, which included a former burn pit and a portion of the drainage ditch along the western perimeter of the Site (Figure 2). OU1 is approximately 6 acres in size and has flat topography. A fence was erected to secure the area where the funnel-and-gate system was installed.

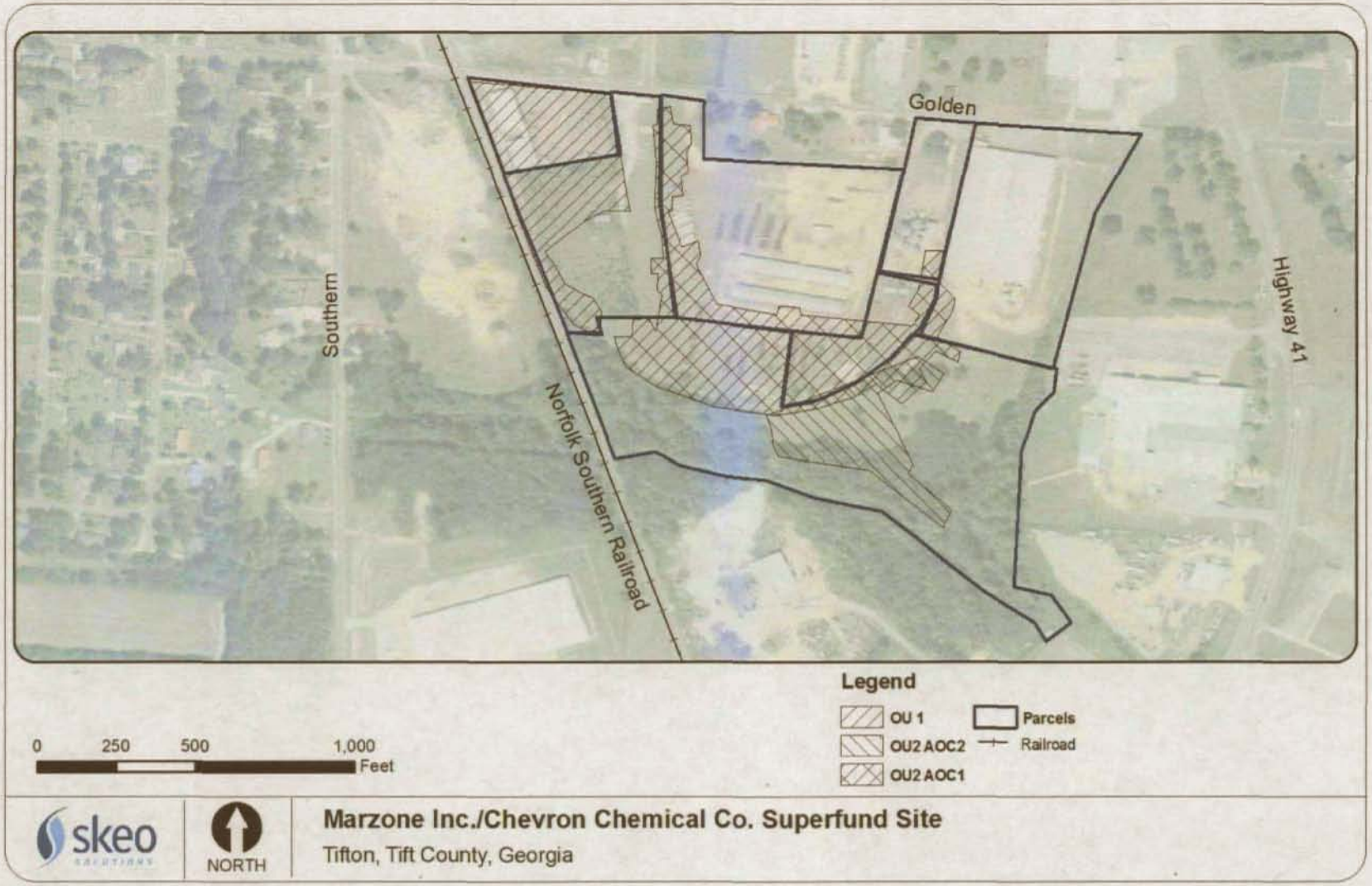
OU2 consists of three adjacent properties encompassing approximately 18 acres in size, and is roughly defined as the Golden Seed property (T061 026), Gum Creek and the associated wetlands, and a segment of the railroad drainage ditch (Figure 2). The Site is located within the drainage basin of the southeast-flowing Alapaha River. Local drainage moves by overland flow to Gum Creek (part of OU2). Gum Creek forms a small (less than 1 acre) pond approximately 2,000 feet east of the Site. Drainage at the Golden Seed property is to the south, toward the railroad drainage ditch that follows the rail spur. The railroad drainage ditch drains into a marshy area adjacent to Gum Creek via two culverts that pass beneath the railroad tracks. Following periods of rain, this area contains a series of stagnant pools of water that overflow toward Gum Creek.

Figure 1: Site Location Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site, and is not intended for any other purpose.

Figure 2: Detailed Site Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site, and is not intended for any other purpose.

3.2 Land and Resource Use

The Site is zoned for wholesale light industrial land use. The Site is located in a rural area that has a combination of light industrial, agricultural and residential land uses.

OU1

OU1 consists of two former facilities where various liquid and dry formulations of pesticides and fertilizers were handled for approximately 30 years. During this time, the property was owned and operated by a number of companies.

Chevron Chemical Company
From 1950 to 1970, Chevron Chemical Company (CCC) owned and operated a former pesticide- and herbicide-formulating plant at the Site. Bulk chemical handling facilities were operated throughout CCC's ownership, including unpaved railcar and truck loading areas for raw materials and finished products.

Tifton Chemical Company
On March 30, 1970, the facility was purchased by a private citizen, who founded Tifton Chemical Company, which operated at the Site until 1977. Tifton Chemical Company formulated liquid and dry pesticides similar to CCC's and processed pesticides for several companies.

Waste handling practices during Tifton Chemical Company's ownership were reportedly very similar to those used by CCC. The rinsate pond collected stormwater and washdown water and was regularly treated with caustic soda or lime to facilitate degradation of pesticides.

In 1973, Tifton Chemical Company purchased two nearby properties from IMC Corporation. These properties are not contiguous with OU1. One, known as the Marzone Annex, is located on Golden Road, approximately 1,000 feet east of OU1. The other, a former fertilizer plant identified as the Golden Seed property, is included in OU2 and located approximately 1,000 feet southeast of OU1, along the railroad spur. These two properties were sold with the Site in each of the subsequent property transfers.

Tiftchem Products Inc.
Tiftchem Products Inc. (Tiftchem) purchased the property from Tifton Chemical Company in 1977 but defaulted to the Farmer's Bank of Tifton in 1979. Only Georgia Environmental Protection Division (GAEPD) correspondence and depositions taken during EPA's 1988 cost recovery action are available regarding site activities during this time period. According to those accounts, new tanks were added for formulation of atrazine, the rinsate pond was expanded, a new loading dock was installed, and the eastern section of the warehouse was expanded and enclosed during Tiftchem's ownership. In addition to offering a full line of both dry and liquid pesticides, Tiftchem also processed pesticides for a number of other companies.

Marzone Chemical Company
Marzone Chemical Company (Marzone) purchased the property from the Farmer's Bank of Tifton in January 1980 and operated the facility until September 1982. Marzone used the facility for formulation of pesticides for domestic use and export.

Kova Fertilizer Inc.
Kova Fertilizer Inc. (Kova) acquired the bank's lien to the property in November 1982. Kova completed nonjudicial foreclosure on the property and acquired the Site on January 21, 1983. Marzone and Kova had a business relationship buying and selling pesticides, and Marzone's debt was secured by the property. A private citizen, part owner of Marzone and who was the site manager under Marzone's ownership, continued to manage the property for Kova. In May 1985, ownership of the OU1 was transferred to Kova of Georgia Inc.

Milan Inc.
In August 1985, Milan Inc. (Milan) purchased the Site. Milan and other companies owned by the same owners (Ray Taylor Plant Company and Golden Seed Inc.) used the Site for general storage and plant seedling distribution, as well as vegetable washing and repackaging. Farm application equipment was tested with atrazine during Milan's ownership. Site activities were discontinued during late 1992.

A portion of the Site is currently occupied by a metal recycling facility

OU2

OU2 includes a segment of the drainage ditch that runs alongside the railroad, the former Golden Seed property site, Gum Creek and associated wetlands. Banner Grain & Peanut Company (Banner Grain) borders the northeastern part of OU2. The Golden Seed property was formerly used as a formulation and packaging plant for pesticides and fertilizers. The handling of agricultural chemicals commenced at OU2 as early as 1967. Pesticide formulation and fertilizer operations were conducted by a succession of owners at OU2, including Golden Seed Inc., until 1992, when business operations at the OU2 property ceased.

The ground water aquifer underlying the Site is not used as a source of drinking water. Gum Creek flows through the Golden Seed portion of OU2 and is surrounded by a wetland, which supports a sensitive wetland ecosystem.

3.3 History of Contamination

OU1

OU1 was formerly used as a pesticide formulation and storage facility, which operated from 1950 until 1983. Various formulations of pesticides and fertilizers were handled under several different owners and operators during this time. Tiftchem bought the

operation in 1977 from Tifton Chemicals. It is likely that Tiftchem formulated common organophosphate and organochlorine pesticides. Inspections made by GAEPD found repeated rinsate discharges to unlined drainage ditches that led to the former rinsate pond (lagoon) located at the southeast corner of the property, and poor housekeeping practices inside and around the buildings. Tiftchem defaulted to the Farmer's Bank of Tifton in 1979. Following the 1979 bank foreclosure, a GAEPD site inspection found approximately 70,000 pounds of pesticides on site.

Marzone purchased the property in January 1980. Prior to the purchase, Marzone requested information regarding the environmental condition of the Site from GAEPD. The company was informed that operations would not be allowed at the Site until the pesticides that remained from Tiftchem operations were removed and the rinsate pond was closed and replaced with a zero-discharge system. Marzone developed a plan to remove the materials, including the rinsate pond water and sludge, and to dispose of them at the Pinewood Disposal Facility in South Carolina. In early January 1980, Marzone reportedly moved some of the remaining pesticides off site to the Marzone Annex, or the Tifton Machine Works. A fire erupted at the Site on January 26, 1980, attracting regulatory attention. The waste materials identified by GAEPD during a subsequent inspection included dichlorodiphenyldichloroethylene (DDE), dichlorodiphenyltrichloroethane (DDT), chlordane, lindane, methyl and ethyl parathion, malathion, methoxychlor, sutan, toxaphene, and xylene. After the fire, pesticide wastes were removed to the Marzone Annex. In 1982, Marzone failed to take delivery of a shipment of 100 tons of DDT (labeled as atrazine) at the Port of Savannah. U.S. Customs concluded that the material was being imported "under fraudulent circumstances based upon false documents for the sole purpose of dumping the substance." The bank foreclosed on the property in 1982 and took over ownership from Marzone.

In 1983, regular commercial operation of the Site ceased when Kova acquired the property in foreclosure. Following Kova's acquisition, a GAEPD inspection of the Site identified open drums of pesticides and pesticide wastes on site. Some of the wastes were brought on site from the Marzone Annex after the 1980 fire. GAEPD issued a notice of violation and required Kova to remove all hazardous waste, contaminated soil and debris from the Site within 45 days. In December 1983, Mr. Rienstra advised GAEPD that toxaphene, methyl parathion and carbaryl had been removed to his farm in Palatka, Florida. By March 1984, Kova had manifested 49 drums of pesticide waste for off-site disposal by Chemical Waste Management. Mr. Reed, president of Kova, advised GAEPD that the atrazine and propachlor inventory had been shipped to a Kova facility in Indiana and that the remaining inventory would remain on site until the facility was sold and its disposition could be determined by the new owner. Kova obtained concurrence from GAEPD that the facility was in compliance with hazardous waste regulations and that the remaining inventory did not contain hazardous waste.

In 1984, the former owner of Tiftchem formulated a test batch of red peanut seed treater (a pesticide mixture) on site. The formulation failed and left a visible residue throughout the formulation area. Kova later sold equipment salvage rights to Microflo. Most of the formulation and storage equipment was removed by Microflo.

OU2

During the remedial investigation for OU1, pesticides and metals were discovered in the soils and sediments in and around the Golden Seed facility. OU2 includes a segment of the drainage ditch that runs alongside the railroad tracks, the former Golden Seed property site, Gum Creek and associated wetlands. Because the Golden Seed facility served as a separate source area and had different PRPs, it was deemed a separate OU from OU1. The facility at OU2 was in operation for about 30 years.

Operations were conducted by a succession of owners beginning as early as 1967 until 1992, when business operations ceased. Primary sources of contamination include drums and disposal pits. Leaching from the pits and spills from the drums caused the release of contaminants into the soil and ground water.

3.4 Initial Response

OU1

From 1979 to 1984, as a result of state enforcement efforts, about 70,000 pounds of pesticides and pesticide drums were removed from OU1, and the rinsate pond was closed. In September 1984, EPA initiated a removal action at the Site based on the evidence of soil contamination, the presence of "pure substance scattered about," and a pesticide inventory of 35 to 50 drums, 20 to 30 pallets of bagged material, and five small pails. Various containers and bags were open and leaking. Wastes generated during the EPA removal action and the ensuing CCC cleanup were classified as hazardous. In May 1985, ownership of the OU1 was transferred to Kova of Georgia Inc.

In 1985, EPA initiated an Immediate Response Action that removed an additional 1,700 pounds of pesticides. Excavation of ditch sediments occurred in May 1985, and in October 1989, the Site was listed on EPA's National Priorities List (NPL). The listing was based on analytical results indicating the presence of pesticides in ground water and the potential for future release from the surficial soils. In September 1990, Kova, Kova of Georgia Inc., CCC, and Billy G. Mitchell, signed an Administrative Order on Consent with EPA for the Site. The Administrative Order by Consent directed the PRPs to develop and implement a remedial investigation/feasibility study (RI/FS) which identified the nature and extent of contamination and proposed remedial action for the Site. The RI/FS was conducted by Brown and Caldwell and PTI Environmental. The 1994 RI/FS resulted in a Record of Decision (ROD) that set risk-based action levels for surface soils, subsurface soils and ground water. Risk-based action levels were established by a baseline risk assessment (BRA), which was performed by Brown and Caldwell in 1993.

OU2

In 1993, EPA conducted a removal action at OU2 to remove raw chemicals, contaminated debris and heavily-contaminated surface soils. Containers of chemicals, including pesticides and herbicides, were found at the Site. EPA demolished and removed several on-site structures, excavated and removed the top 1 foot of soil in areas of contamination, and excavated and removed contaminated subsurface soil and debris to an action level for subsurface soils of 10 parts per million (ppm) for total pesticides. Over 6,000 tons of soil and debris were removed and shipped to a permitted landfill. EPA conducted an RI at OU2 in 1996 and an FS in 1998.

3.5 Basis for Taking Action

OU1

Included as part of the RI/FS, the 1993 BRA characterized potential current and future risks to human health and the environment from exposure to chemicals present at the Site. Chemicals of potential concern (COPC) included zinc, benzene hexachloride (BHC) isomers, lindane, heptachlor, aldrin, heptachlor epoxide, endosulfan, dieldrin, DDT and constituents, endrin and isomers, endosulfan sulfate, methoxychlor, chlordane, toxaphene, polychrorinated biphenyls (PCBs), parathion, methyl parathion, ethoprop, malathion, ethion atrazine, ethylbenzene and xylene. The BRA indicated that under current scenarios, direct contact with surface soil for the on-site visitor or worker was the exposure pathway that exceeded EPA's acceptable incremental lifetime cancer risk range of 1×10^{-4} to 1×10^{-6} or an acceptable hazard index (HI) of 1.0.

Under the future residential scenario, ingestion of ground water and direct contact with surface soil exceeded acceptable risk ranges. Based on the results of the BRA, the media of concern were surface soil and ground water. Subsurface soil was also a medium of concern because of potential cross-media chemical transport from subsurface soil to ground water.

Surface sediment was not a medium of concern because it did not exceed risk levels. The most important contributor to estimated cancer risks from surface soil was toxaphene. In ground water, BHC isomers were the most important contributors to estimated cancer risks.

OU2

The BRA for OU2, which was included as part of the 1998 RI/FS, provided the basis for determining the necessity of remedial action and the justification for performing remedial action. Based upon the BRA analysis, it was determined that the surface soil, sediments and ground water posed current or potential risks. Major contaminants included chlordane, DDT-related compounds, toxaphene, aluminum, arsenic, cadmium, chromium, copper, iron, lead, magnesium, manganese and zinc. The BRA determined the major current human health risks for OU2 as ingestion of, and dermal contact with,

contaminated soil by on-site visitors. For potential future residents, the major risks associated with OU2 were determined as ingestion of, and dermal contact with, contaminated soil, and ingestion of ground water. The BRA determined that sediment contamination posed a current and future unacceptable ecological risk.

4.0 Remedial Actions

In accordance with CERCLA and the NCP, the overriding goals for any remedial action are protection of human health and the environment and compliance with applicable or relevant and appropriate requirements (ARARs). A number of remedial alternatives were considered for the Site, and final selection was made based on an evaluation of each alternative against nine evaluation criteria that are specified in Section 300.430(e)(9)(iii) of the NCP. The nine criteria include:

1. Overall Protectiveness of Human Health and the Environment
2. Compliance with ARARs
3. Long-Term Effectiveness and Permanence
4. Reduction of Toxicity, Mobility or Volume of Contaminants through Treatment
5. Short-term Effectiveness
6. Implementability
7. Cost
8. State Acceptance
9. Community Acceptance

4.1 Remedy Selection

OU1 consists of the Harper Enterprises Inc. and the Slacks properties and included the former burn pit and a portion of the drainage ditch along the western perimeter of the properties. OU2 includes a segment of the drainage ditch that runs alongside the railroad tracks, the former Golden Seed property, Gum Creek and associated wetlands. Because the Golden Seed facility served as a separate source area and had different PRPs, it was deemed a separate OU from OU1.

OU1

EPA issued the OU1 ROD on September 30, 1994. Remedial action objectives (RAOs) were not defined in the 1994 ROD, but the 1994 ROD indicated that the cleanup goal of OU1 was to remediate the soils and ground water to levels that were appropriate for residential use. The ground water remedy selected in the 1994 ROD consisted of the following remedial components:

- Implementation of a pumping test, to aid in determining specific design criteria for the extraction system.
- Design and construction of ground water extraction wells.
- Installation of a security fence around the on-site treatment unit.
- Design and installation of a ground water pumping system, a ground water filtration system, an on-site treatment system, and an infiltration gallery.
- Start-up and operation of this system.
- Transportation, regeneration, recycling and disposal of the spent filters.
- Operation and maintenance (O&M) of a long-term ground water monitoring program, including quarterly monitoring of parameters in extraction wells and specified monitoring wells.

- Implementation of institutional controls.

The 1994 ROD selected cleanup goals for the contaminants of concern (COCs) in ground water are summarized in Table 3.

Table 3: OU1 Ground Water COC Cleanup Goals

Ground Water COC	ROD Cleanup Goal (mg/L)
Alpha-BHC	0.00003[a]
Beta-BHC	0.0001[a]
DDD (dichlorodiphenyldichloroethane)	0.00077[a]
DDT	0.00054[a]
Ethylbenzene	0.7[b]
Lindane (Gamma-BHC)	0.0002[b]
Methyl Parathion	0.0039[a]
Xylene	10[b]

a. Risk-based cleanup goals.
b. Ground water cleanup level based on maximum contaminant level (MCL) or safe drinking water level.

The 1994 ROD selected low-temperature thermal desorption for the soil remedy. The surface and subsurface soil remedy consisted of the following remedial components for soil:

- Excavation of all soil with contaminant concentrations above the performance standards.
- Staging and pre-conditioning of soil for entry into the thermal desorption unit.
- Feeding and processing of contaminated soil into the heated chamber for treatment.
- Placement of treated, decontaminated soil back on the Site.
- Periodic soil sampling during treatment to verify effectiveness of the remedy.
- Air monitoring to ensure safety of nearby residents and workers.
- Demobilization and removal of the thermal desorption unit after completion of the remedy.

The 1994 ROD selected cleanup goals for the COCs in soil are presented in Table 4.

For the low-temperature thermal desorption remedy, the performance standards for surface soil are based upon a 1×10^{-6} risk level for a cleanup associated with future residential land use.

For subsurface soil, the cleanup level was calculated using the MULTIMED ground water model for protection of ground water. Performance standards are listed in Table 4.

Table 4: OU1 Soil COC Cleanup Goals

Soil COC	Surface Soil ROD Cleanup Goal[b] (mg/kg)	Subsurface Soil ROD Cleanup Goal[c] (mg/kg)
Atrazine	3.5	0.150
Alpha-BHC	0.12	1.142
Beta-BHC	[a]	0.547
DDD	3.2	[a]
DDE	2.28	[a]
DDT	2.29	[a]
Dieldrin	0.049	[a]
Dioxin	0.001	[a]
Endosulfan II	2.6	[a]
Ethylbenzene	[a]	5.73
Heptachlor	0.085	[a]
Epoxide	[a]	[a]
Lindane (Gamma-BHC)	[a]	0.463
Methyl Parathion	[a]	4.55
Toxaphene	0.7	[a]
Xylene	[a]	213

a. Blank spaces indicate that no cleanup level was set because the chemical is not a COC for the medium.
b. Surface soil cleanup levels are based on future residential land use. Cleanup levels are based on a cancer risk of 1×10^{-6}, or a hazard index of 1.0. Surface soil refers to the top foot of soil.
c. Subsurface soil cleanup levels were calculated using the MULTIMED model.

In September 1996, EPA issued an Explanation of Significant Differences (ESD) to modify part of the remedy described in the 1994 OU1 ROD. The purpose of the ESD was to document that the low-temperature thermal desorption (LTTD) unit selected for the Site will be able to meet performance standards while operating at a temperature of 600 to 800 degrees Fahrenheit instead of 700 to 900 degrees Fahrenheit, as initially stated in the ROD. The ESD explained that excavation of soil would continue until computer modeling demonstrated that soil cleanup goals for protection of ground water were met. In addition, the ESD discussed soils with high levels of sulfur and dioxins, discovered during the Focused Field Investigation conducted for the remedial design. Soils with high levels of sulfur could interfere with the LTTD unit's operation. Soils with sulfur levels that could not be treated in the LTTD, estimated at 1,000 tons, would be transported off- site and disposed of at a Subtitle C or Subtitle D landfill. Dioxin-contaminated soil, detected during the Focused Field Investigation, did not require treatment for dioxin, but would be treated with the LTTD unit to remove pesticide contamination. LTTD emissions and ambient air at the site perimeter would be monitored for dioxin as outlined in the Ambient Air Monitoring Plan and the LTTD Operations and Maintenance Plan.

On June 18, 1997, EPA issued an Amended Record of Decision (AROD) to modify the soil remedy. These changes were based on information gained during the remedial design. The major components of the amended soil remedy were:

- Excavation of all surface soil that has contaminant concentrations above the performance standards (excluding the former burn pit area).

- Excavation of subsurface soil to meet performance standards on a site-wide basis, which will achieve protection of ground water.
- Transportation of the soil from the main portion of the Site (excluding the former burn pit area) to a permitted landfill for off-site disposal.
- Placement of clean fill soil in the excavated areas.
- Air monitoring to ensure safety of nearby residents and workers.

In June 1998, EPA issued an ESD extending the boundary of OU1 to include the railroad drainage ditch from the southwest corner of the horse pasture to the midpoint between the two culverts near the southernmost point of the railroad spur. Testing showed that concentrations of COCs in this portion of the railroad drainage ditch were identical to those COCs specified in the OU1 ROD, as amended. Drainage from OU1 flows into this ditch and addition of this area to OU1 allowed cleanup activities for this area to be conducted earlier and more cost effectively.

On November 10, 1998, EPA issued an AROD based on new information obtained during the remedial design. The 1998 AROD amended the soil remedy for the former burn pit area. The major components of the 1998 AROD were to excavate surface soil with concentrations above performance standards, transport surface soil with concentrations above the dioxin performance standard (0.001 mg/kg) to a permitted landfill for off-site disposal (with treatment, if necessary), and monitor the air to ensure safety of nearby residents and workers.

On May 2, 2000, EPA issued an AROD amending the ground water remedy based on new information obtained during the remedial design.

The major components of the 2000 AROD, amending the ground water remedy are:

- Implementation of institutional controls to restrict the use of ground water as a drinking water source until performance standards are achieved.
- Design and construction of an in-situ funnel-and-gate (F&G) system, consisting of an impermeable barrier wall to direct contaminated ground water (approximately 93 percent of total contamination) through a granular activated carbon (GAC) treatment medium.
- Start-up, operation and maintenance of this system.
- Reduction of contamination in ground water south of the treatment system (approximately 7 percent of total contamination) by natural attenuation.
- Operation and maintenance of a long-term ground water monitoring program, including periodic monitoring of the effectiveness of the treatment system and of natural attenuation.
- Proper closure of the treatment system after performance standards are met.

The selected remedy was installed as a full-scale pilot project in 1998. The F&G system has been successfully treating ground water since installation.

OU2

On July 1, 1999, EPA issued a ROD for OU2. The RAOs defined in the 1999 ROD for OU2 are:

- Containment or treatment of all contaminated surface soils above health-based or ecological action levels.
- Containment or treatment of contaminated sediment above ecological action levels.
- Restoration of ground water to drinking water standards.

The major components of the selected remedy for OU2 include:

- Excavation and disposal of surface soils with concentrations exceeding the surface soil performance standards.
- Excavation and disposal of sediments from the railroad drainage ditch and the non-wooded wetland area south of the railroad spur that have concentrations exceeding the sediment performance standards.
- Transportation by truck of contaminated soil and sediment to a permitted Subtitle C or D landfill.
- Restoration of surface soil and wetland areas.
- Confirmation sampling to verify that contaminant concentrations in remaining soil and sediment are below performance standards.
- Monitoring of wetland and creek areas for at least five years to determine if remaining contamination is naturally attenuating. Levels of contamination in these areas do not pose an immediate or acute threat; therefore, access restriction is not necessary.
- Installation of at least two additional ground water monitoring wells.
- Annual ground water monitoring for at least five years for the COCs, potential transformation products and geochemical parameters to determine if contamination is naturally attenuating.
- Review of ground water data after five years to determine if natural attenuation is effective. A contingency remedy of an in-situ treatment wall system could be implemented at EPA's sole discretion, if results do not confirm that natural attenuation is effective.
- Institutional controls to restrict use of contaminated ground water.

The selected remedy addressed the principal threat wastes of toxaphene and DDT and its breakdown products, as well as secondary threat wastes of chlordane, BHCs, endrin, dinoseb and metals. Performance standards for soil and sediment are listed in Table 5. Performance standards for ground water are listed in Table 6.

Table 5: OU2 Soil and Sediment COC Performance Standards

COC	Surface Soil (mg/kg)	Sediment (mg/kg)**
DDT	1.0*	5.0
DDE	1.0*	5.0
DDD	2.0*	5.0
Toxaphene	0.4*	3.0
Alpha-chlordane	0.1**	0.1
Gamma-chlordane	0.1**	0.1
Copper	20**	20
Lead	330**	330
Zinc	100**	100

* Surface soil performance standards are based on protection of future residents at a 10^{-5} calculated cancer risk level for direct contact.

** Surface soil or sediment performance standards are based on ecological risk; surface soil standards are also protective of future residents at a 10^{-4} calculated cancer risk level for direct contact and a Hazard Index of less than 1.0 for non-carcinogens.

Table 6: OU2 Ground Water COC Performance Standards

COC	Performance Standards (µg/L)
Aluminum	28,702*
Beryllium	4**
Cadmium	5**
Manganese	660*
Nickel	100**
Lead	15***
Iron	8,611*
Nitrate/Nitrite	1,000 (MCL for nitrite)
Alpha-BHC	0.03***
Gamma-BHC	0.2**
Endrin	2**
Dinoseb	7**

* Calculated value for Hazard Quotient = 1

** EPA MCL

*** EPA Action Level

4.2 Remedy Implementation

OU1

Pursuant to a Unilateral Administrative Order (UAO) issued by EPA to CCC and Kova on July 11, 1995, the two companies agreed to perform the remedial design/remedial action. After issuance of the UAO, CCC and Kova expressed interest in entering into a Consent Decree, which was lodged with the U.S. District Court but later withdrawn by the United States. Work at the Site continues under the UAO.

Soil

Soil remediation activities for OU1 began after issuance of the 1994 ROD and the 1995 UAO. Remedial design, conducted in conformance with the ROD and approved by EPA, began in September 1995. A series of supplementary site characterization activities conducted from November 1995 through August 1996 provided additional information needed to develop the soil and ground water remedial design documents. Demolition activities were completed during June and July 1996. A pole barn located in an area where pesticides were previously handled was carefully deconstructed and decontaminated. The decontaminated pieces were disposed of off-site at a secure Subtitle D landfill. In addition, several old tanks and concrete pads were also demolished and removed from the Site.

During the fall of 1996, excavation of surface and subsurface soil on the northern portion of the Site began. The excavated soil was disposed of in a Resource Conservation and Recovery Act Subtitle D landfill located in Florida. Excavation and landfill disposal of contaminated soil was complete at OU1 in May 1999. A final construction and remedial action report for OU1 was approved by EPA on May 27, 1999.

Ground Water

The remedial design for ground water, conducted in conformance with the 1994 ROD and approved by EPA, was completed by June 1996, and remedial action activities began shortly thereafter. During the design phase, EPA recognized that a pump-and-treat system might not be the most effective remedy, given the characteristics of the Site. Alternative strategies were evaluated and compared with the pump-and-treat system and were documented in a FS addendum. An in-situ F&G strategy was thought to hold more promise for reducing the contamination at OU1, and was selected as the remedy for OU1 ground water in the May 2, 2000 AROD. An F&G system had already been installed as a full-scale pilot project in 1998 and has been operating since that time to remove COCs from ground water. Monitored natural attenuation (MNA) was selected as the remedy for contamination downgradient from the treatment wall. Ground water monitoring activities are ongoing.

The funnel portion of the system is a low permeability cutoff wall inserted into the aquifer to direct flow toward the permeable gate portion of the system. The gates are constructed of precast concrete vaults, stainless steel piping and valves. An adsorptive medium, GAC, is installed within the gate. The collection channel connects via piping to the treatment vaults. The contaminated ground water flows into the collection channel and then passes through the vaults. As the ground water passes through the GAC in the treatment vaults, the dissolved contaminants adsorb to the GAC. Treated ground water then flows through the cutoff wall, via a pipe through the wall, to a distribution channel downgradient from the cutoff wall. The distribution channel consists of a gravel-filled trench.

On July 26, 2000, a deed restriction was put in place for the property parcel T061 013. The restriction acts as an institutional control precluding the use of contaminated ground water north of the F&G treatment system. A summary of the ICs is presented in Table 12 and Figure 3.

OU2

Remedial action at OU2 was conducted by EPA and its contractor, Black & Veatch (B&V). B&V collected surface soil and sediment samples during site investigation activities in February 2000. Based on contaminant concentrations that exceeded site cleanup criteria for soil and sediment, B&V defined two areas of concern (AOC) at OU2. Area of Concern One (AOC1) consists of the 5.67 acres of soil contamination and includes the former Marzone facility, the railroad spur and a portion of the Golden Seed property. Area of Concern Two (AOC2) consists of the 1.48 acres of sediment contamination and includes the wetland area located south of the former Marzone facility.

In accordance with the 1999 ROD, B&V installed two additional ground water monitoring wells at OU2 in 2000, and baseline ground water monitoring began.

The remedial design was started in September 1999 and completed in 2001. Remedial action funding became available in 2005. After obtaining landfill approval, CMC Environmental Services, Inc. (CMC) (remedial action contractor) began transporting contaminated soil on February 1, 2006, while continuing to excavate contaminated soil. Contaminated soil was excavated around the area of the former Marzone facility and the Banner Grain property. CMC completed the ditch on the east side of the property, and proceeded on the south side of the Banner Grain property moving west. All sediment material excavated from AOC2 was stockpiled with drier material from AOC1 for shipment to the approved landfill. A total of 18,979 cubic yards of contaminated soil and sediment were removed from the Site and disposed of at the Pecan Row Landfill.

A topographic survey was completed prior to and after railroad spur removal, and Jessamine Construction Company began removing the rail from the spur in February 2006. All railroad ties associated with the spur were removed and stockpiled for disposal. Once all the railroad ties were removed, the ties were placed into 40- and 65-cubic-yard roll-off boxes and transported to the Pecan Row Landfill for proper disposal. During railroad spur removal, new rails and ties were delivered and staged on site.

After the rails and ties were removed from the spur, CMC excavated the top one foot of contaminated soil from the spur area. After the soil was removed from underneath the old railroad spur, Jessamine Construction Company began railroad spur replacement. Elevations of the railroad spur were collected in 50-foot intervals prior to railroad spur removal. Jessamine County Construction Company and CMC used the topography survey conducted on the railroad spur during replacement to ensure the railroad spur graded downward toward the Banner Grain property. Jessamine County Construction completed railroad spur replacement in May 2006.

The soil/sediment excavation and landfill disposal remedy was completed in September 2006, and EPA finalized the Interim Remedial Action Report on September 13, 2006.

4.3 Operation and Maintenance (O&M)

OU1

In the 2000 AROD, the ground water remedy was changed from pump-and-treat to an F&G system and MNA. The F&G system consisted of an impermeable barrier wall that directs the contaminated ground water through a GAC-treatment medium and natural attenuation south of the treatment system. O&M of a long-term ground water monitoring program was also designated, including periodic monitoring of the effectiveness of the treatment system and of natural attenuation. A detailed description of the system operations and O&M requirements are presented in the Operation and Maintenance Manual for the Marzone Funnel-and-Gate Groundwater Treatment System, July 2000. The F&G remedy was installed as a full-scale pilot project in 1998 and has been successfully treating ground water since installation.

F&G Remediation System Operations

Periodic water elevation measurements were conducted monthly from system start-up until April 2001, after which, activities were performed quarterly. These measurements were collected to ensure the ground water is flowing as anticipated. System influent and effluent were sampled quarterly from system start-up through 2001, and biannually after that time. Sampling ensures that the GAC is effectively removing contaminants from ground water. Samples are collected from water before it passes to the series reactor to assess whether contaminant "breakthrough" has occurred from the primary reactor.

Site ground water has been periodically monitored to determine if natural attenuation is occurring. The MNA sampling program includes six piezometers and four monitoring wells, which are cross-gradient, downgradient, and upgradient of the F&G system. The location of the wells and overall layout of the treatment system is presented in Appendix G.

Activities Since 2007 FYR

Quarterly F&G system maintenance visits were conducted from March 2007 through March 2011 to record operational parameters, including flow rate and water elevations for the system. The system was also inspected for flow variability or flow inhibition. Water level measurements were collected from SP-01, SP-02, SP-03, SP-04, primary reactor and series reactor. An automated flushing system was installed in the F&G system during March 2003, and continues to operate today. Approximately 150 gallons of treated water is discharged into the system discharge line every 10 days. In addition to the automated purging, the F&G system is manually flushed with a minimum of 200 gallons of potable water during the quarterly O&M events. Gas buildup, likely due to

increased biological activity in the warm, wet summer and fall months, has not been a significant issue within the system since automated flushing was instituted.

Ground water samples from the treatment wall area have been collected semi-annually since March 2007. In addition, the shallow aquifer water elevations have been measured quarterly, and the data have been used to generate water level contour maps. Since the 2007 FYR, MNA sampling occurred annually in June. The last MNA sampling event occurred in June 2011.

Problems Encountered

A ground water flow rate through the F&G system in the range of 1 to 3 gallons per minute has been observed during much of the system's operating period; however, flow stoppages occur periodically. Various troubleshooting activities were conducted during the initial start-up period to evaluate and address this issue, such as:

- Comprehensive geochemical analysis of ground water in the system.
- Inserting a video camera into the distribution channel piping to inspect the piping.
- Cleaning the pipe via a "snake."
- Purging or back-flushing various system components.
- Monitoring piezometric heads and flow rate frequently throughout the system.

During the first several months of operation (September 1998 through April 1999), flow stoppage appeared to be associated with discharge piping between the GAC vaults and the distribution channel. Typically large head differentials between the piezometric level recorded at SP-02 versus SP-03 indicated flow stoppages. Under these conditions, when the flow rate dropped to zero, flow was re-established by forcibly flushing several hundred gallons of clean water through the distribution channel piping, with the cleanout end cap removed to allow the purged water to exit the system.

The presence of gas pockets in the discharge piping was also confirmed in early February 1999 by inserting a video camera through this piping. Eventually, it was concluded that the cause of flow stoppage was accumulation of biologically-derived gases within the piping system that connects the GAC vaults. Gas buildup has not been a significant issue within the system since automated flushing was instituted in March 2003.

The source of the biologically-derived gases is not precisely known, but it is believed to be associated with aerobic degradation of xylene in the ground water. Also, the use of guar to construct the collection and distribution channels might have contributed a significant amount of biologically-degradable substrate that exacerbated gas accumulation in the ground water system.

Annual System Operations / O&M Costs

The O&M contractor, ARCADIS is conducting long-term monitoring and maintenance activities according to the 2000 O&M Manual that was approved by EPA. The primary activities associated with O&M include:

- Quarterly water level monitoring and flow rate measurements
- Biannual COC and annual MNA sampling
- Miscellaneous system improvement and maintenance activities

One aspect of the current system O&M possibly impacting future maintenance costs is GAC change-out that will ultimately be required once contaminant breakthrough of the primary reactor is reached. If breakthrough occurs, the series reactor will prevent the contaminants from discharging to the environment, but replacement of the first carbon bed will be needed to properly maintain the system.

O&M costs include operating and maintaining the F&G system, general site upkeep (mowing and fence repairs), and treatment system COC sampling. O&M costs have been averaging approximately $70,000 annually since October 2003. O&M costs were estimated to be $285,500 in the 1994 ROD for monitoring continued operation, but were not estimated in subsequent decision documents that altered the remedy. The automated flushing system has required some maintenance and repairs over the last five years, but these were completed at minimal cost. Engineered remedies, such as automated flushing and sample optimization, have achieved cost savings over the past five years.

<u>OU2</u>

The 2007 FYR indicated that five years of data were needed to determine effectiveness of MNA at OU2. In 2009, a ground water and sediment sampling plan was developed. Ground water and sediment sampling was conducted on a quarterly basis to assess the effectiveness of MNA. OU2 wells were sampled several times during 2009 and 2010. The cost of this program was approximately $175,000. The 1999 ROD estimated O&M costs for MNA would be $279,589.

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2007 FYR for the Site stated the following:

"The remedies at OU1 and OU2 currently protect human health and the environment because contaminated soil and sediments have been excavated; monitoring efforts are ongoing; and there is no evidence of current human or ecological exposure to Site-related contamination. However, in order for the OU1 and OU2 remedies to be protective long-term, all institutional controls necessary to provide for protectiveness associated with the remedies need to be put in place, and the vapor intrusion pathway should be evaluated as a potential exposure pathway.

The remedy at OU1 is expected to be protective of human health and the environment upon attainment of groundwater cleanup goals, through the groundwater treatment wall and natural attenuation. In the interim, exposure pathways that could result in unacceptable risks are being controlled, and institutional controls are preventing exposure to, or the ingestion of, contaminated ground water on the north parcel. The excavation of contaminated soil and sediments, the installation of fencing, and the implementation of institutional controls on the north parcel has reduced the potential for exposure to contaminated soils, sediment and groundwater at the site. Long-term protectiveness of the remedial action will be verified by continued sampling of the groundwater treatment system and Site monitoring wells, putting in place additional institutional controls at the site, and assessing whether the vapor intrusion pathway from groundwater is a potential exposure pathway that should be addressed at the Site. Current monitoring data indicate that the remedy is functioning as required to achieve groundwater cleanup goals.

A protectiveness determination of the remedy at OU2 cannot be made until additional monitoring data are collected. Additional data will be obtained by continuing to monitor groundwater and remaining contaminated sediments at least annually. It is expected that after collecting monitoring data for five years (from the completion of the OU2 soil/sediment remedial action [September 2006]), a determination of MNA effectiveness can be made. A protectiveness determination for OU2 will be made in the next five-year review. Institutional controls required through the OU2 ROD will be put in place within the next year."

The 2007 FYR included nine issues and recommendations. The status of the recommendations is discussed below.

Table 7: Progress on Recommendations from the 2007 FYR

Section	Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
5.1	Additional natural attenuation data should be collected to assess current site conditions.	PRP	9/1/08	OU1 monitoring data has been collected.	12/18/2007, 06/11/2008, 12/18/2008, 06/16/2009, 12/16/2009, 06/21/2010, 12/20/2010, 06/14/2011
5.2	Small trees growing too close to the barrier wall at OU1 should be removed.	PRP	1/31/08	Trees have been removed. During the site inspection no trees were observed to be growing close to the barrier wall.	09/30/2008
5.3	Loose tags on the OU1 F&G remediation system should be re-attached to the cover plate.	PRP	1/31/08	Tags were re-attached.	09/30/2008
5.4	In addition to the solar-powered flushing system, quarterly maintenance activities should continue at the F&G remediation system to remove gas, until the gas blockage problem is eliminated.	PRP	9/1/08	A new flushing system was installed in March 2003. Gas blockage has not been an issue since the creation of the new system.	03/31/2003
5.5	Sampling of the F&G treatment system should continue on a semi-annual basis. After GAC is replaced, sampling can be reduced to once per year for at least two years.	PRP	9/1/08	Sampling has been conducted on a semi-annual basis.	12/18/2007, 06/11/2008, 12/18/2008, 06/16/2009, 12/16/2009, 06/21/2010, 12/20/2010, 06/14/2011
5.6	Deed restrictions should be reevaluated at OU1 to ensure that they are in place for all ground water exceeding COC remedial cleanup goals. If necessary, additional restrictions should be put in place to prevent use of contaminated ground water.	PRP	9/1/08	Evaluation of OU1 deed restrictions has been completed but not all restrictions are in place. PRP continues to work with the owner of parcel T061- 014 to place ground water restrictions on the remaining property at OU1.	Incomplete

Section	Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
5.7	The vapor intrusion pathway should be evaluated to determine if it potentially presents an unacceptable risk to human health.	PRP	9/1/08	The vapor intrusion pathway was evaluated by CCC risk assessors and was determined to not present an unacceptable risk to human health.	12/11/2008
5.8	The OU2 MNA plan should be evaluated and revised, if necessary, to ensure that adequate data are collected to assess MNA effectiveness during the next FYR.	EPA	9/1/08	A sampling and analysis program was developed in 2009 to collect the necessary data. Ground water and sediment samples were collected and analyzed. The results were utilized to evaluate the effectiveness of MNA. It was determined that COC concentrations are generally decreasing or fluctuating. Therefore, optimization of the remedy is necessary to achieve the cleanup levels.	04/12/2011
5.9	Institutional controls should be implemented at OU2.	EPA	9/1/08	EPA is working with the property owners to place the necessary institutional controls for OU2.	Incomplete

5.1 Collect additional natural attenuation data to assess current site conditions

Semi-annual sampling has been conducted for OU1, as discussed in Section 6.4 of this report. The most recent O&M event took place in December 2011. Concentrations of contaminants appear to be declining or fluctuating. ARCADIS made suggestions for increasing the efficiency of MNA sampling, which are presented in Section 6.6 of this report.

5.2 Remove small trees growing too close to barrier wall in OU1

Small trees were removed in September 2008. During the site inspection on October 19, 2011, no trees were observed growing near the F&G barrier wall.

5.3 Re-attach loose tags on F&G system in OU1

Loose tags on F&G system were re-attached in September 2008.

5.4 Conduct quarterly maintenance activities at F&G system until gas blockage problem is eliminated

A new flushing system was installed in March 2003. Gas blockage has not been an issue since the creation of the new system.

5.5 Sampling at F&G treatment system

Additional sampling has been completed semi-annually. A work plan is being developed to determine how to enhance the F&G system currently in place. Ground water sampling data for the F&G system indicate that the system is removing contamination from ground water.

5.6 Re-evaluate deed restrictions at OU1

A deed restriction is in place for parcel T061- 013 limiting ground water use and other activities relating to ground water. PRP continues to work with the owner of parcel T061- 014 to place ground water restriction on the remaining property at OU1.

5.7 Re-evaluate vapor intrusion pathway

The vapor intrusion pathway was evaluated in the ARCADIS Final Vapor Intrusion Evaluation Memo dated December 11, 2008. Using conservative parameters for on-site building conditions, the estimated Hazard Index for on-site workers is below the target level of 1.0, while the estimated hazards for hypothetical future on-site residents slightly exceed the target level. The estimated HI for current and future on-site industrial workers is approximately 0.25. Estimated HIs for hypothetical future on-site child and adult residents are both approximately 1.9. These residential HIs exceed the EPA target hazard index of 1.0. However, given that future ground water concentrations of ethylbenzene

and xylenes are likely to be reduced by continued operation of the ground water treatment system and natural attenuation, and that features of future residential buildings were very conservatively modeled, the hazard estimates are conservative. Based on higher average building air exchange rates noted in the literature, hazard estimates for child and adult residents may be on the order of 0.14. Furthermore, if ground water cleanup goals for the Site set in the 1994 ROD are achieved, then ground water concentrations of COCs will be reduced to levels below the Generic Screening Levels protective of the vapor intrusion pathway and the estimated risk and hazards will be negligible.

5.8 Evaluate and revise OU2 MNA plan

The OU2 MNA plan was evaluated and a sampling and analysis program was develop to collect the necessary data to evaluate the effectiveness of MNA.

5.9 Implement institutional controls at OU2

The necessary institutional controls to restrict ground water usage have not been in place for the OU2 properties. EPA is currently working with the property owners to have the necessary institutional controls in place.

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 4 initiated the FYR in July 2011 and scheduled its completion for June 2012. The EPA site review team was led by EPA Remedial Project Manager (RPM) Robenson Joseph and also included EPA site attorney Lawrence Bradford, EPA Community Involvement Coordinator (CIC) Linda Starks (Tonya Whitsett assumed CIC duties starting in January 2012), and contractor support provided to EPA by Skeo Solutions. In August 2011, EPA held a scoping call with the review team to discuss the Site and items of interest as they related to the protectiveness of the remedy currently in place. A review schedule was established that consisted of the following activities:

- Community notification
- Document review
- Data collection and review
- Site inspection
- Local interviews
- FYR Report development and review

6.2 Community Involvement

In March 2012, a public notice was published in the Tifton Gazette newspaper announcing the commencement of the FYR process for the Site, providing contact information for Robenson Joseph and Tonya Whitsett and inviting community participation. The press notice is available in Appendix B. One person, Mr. Patrick Atwater, the Tift County Schools Superintendent, contacted EPA as a result of this advertisement.

The FYR Report will be made available to the public once it has been finalized. Copies of this document will be placed in the designated site repository: Tifton-Tift County Library, One Library Lane, Tifton, Georgia 31794. Upon completion of the FYR, a public notice will be placed in the Tifton Gazette newspaper to announce the availability of the final FYR Report in the Site's document repository.

6.3 Document Review

This FYR included a review of relevant, site-related documents including the ROD, remedial action reports, and recent monitoring data. A complete list of the documents reviewed can be found in Appendix A.

ARARs Review

CERCLA Section 121(d)(1) requires that Superfund remedial actions attain "a degree of cleanup of hazardous substance, pollutants, and contaminants released into the environment and of control of further release at a minimum which assures protection of

human health and the environment." The remedial action must achieve a level of cleanup that at least attains those requirements that are legally applicable or relevant and appropriate. Applicable requirements are those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal environmental or state environmental or facility siting laws that specifically address a hazardous substance, remedial action, location, or other circumstance found at a CERCLA site. Relevant and appropriate requirements are those standards that, while not "applicable," address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site. Only those state standards that are more stringent than federal requirements may be applicable or relevant and appropriate. To-Be-Considered (TBC) criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, TBCs may be particularly useful in determining health-based levels where no ARARs exist or in developing the appropriate method for conducting a remedial action.

Chemical-specific ARARs are health- or risk-based numerical values or methodologies which, when applied to site-specific conditions, result in the establishment of numerical values. These values establish an acceptable amount or concentration of a chemical that may remain in, or be discharged to, the ambient environment. Examples of chemical-specific ARARs include MCLs under the Federal Safe Drinking Water Act and ambient water quality criteria enumerated under the Federal Clean Water Act.

Action-specific ARARs are technology- or activity-based requirements or limits on actions taken with respect to a particular hazardous substance. These requirements are triggered by a particular remedial activity, such as discharge of contaminated groundwater or in-situ remediation.

Location-specific ARARs are restrictions on hazardous substances or the conduct of the response activities solely based on their location in a special geographic area. Examples include restrictions on activities in wetlands, sensitive habitats and historic places.

Remedial actions are required to comply with the chemical-specific ARARs identified in the ROD. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

OU1 Ground Water ARARs

The 1994 OU1 ROD identified federal MCLs under the Safe Drinking Water Act (SDWA) as ARARs for ground water. Cleanup goals were based on the MCL, and when primary MCLs were unavailable, secondary MCL or other TBC criteria were utilized. Cleanup levels from the ROD were compared to current SDWA MCLs (Table 8). There have been no changes to the primary MCLs for the three COCs for which MCLs were used as cleanup goals in the 1994 ROD and no new MCLs have been promulgated for the other five COCs.

Table 8: Previous and Current ARARs for OU1 Ground Water COCs

Contaminants of Concern	1994 OU1 ROD ARARs-Based Ground Water Criteria (mg/L)	Current ARARs (mg/L)[a]	ARARs Change
Alpha-BHC	NA[b]	NA	NA
Beta-BHC	NA[b]	NA	NA
DDD	NA[b]	NA	NA
DDT	NA[b]	NA	NA
Ethylbenzene	0.7[a]	0.7[a]	None
Lindane	0.0002[a]	0.0002[a]	None
Methyl Parathion	NA[b]	NA	NA
Xylene	10[a]	10[a]	None

a. Based on the SWDA primary MCL. Current SDWA standards can be found at: http://water.epa.gov/drink/contaminants/index.cfm (accessed 8/22/2011).
b. Cleanup goal is based on TBC criteria.

OU1 Soil ARARs

The 1994 ROD did not specify ARARs for soil. Risk-based cleanup goals for soil COCs were developed based on future residential land use.

OU2 Ground Water ARARs

The 1999 OU2 ROD identified federal MCLs under the SDWA as ARARs for ground water. Cleanup goals were based on the MCL, and when primary MCLs were unavailable, secondary MCL or other TBC criteria were used. Cleanup levels from the ROD were compared to current SDWA MCLs (Table 9). There is no longer an MCL for nickel or alpha-BHC. There have been no changes to the MCLs for the other ten COCs.

Table 9: Previous and Current ARARs for OU2 Ground Water COCs

Contaminants of Concern	1999 OU2 ROD ARARs-Based Ground Water Criteria (mg/L)	Current ARARs (mg/L)[a]	ARARs Change
Aluminum	NA[b]	NA	None
Beryllium	0.004[a]	0.004[a]	None
Cadmium	0.005[a]	0.005[a]	None
Manganese	NA[b]	NA	None
Nickel	0.1[a]	NA	NA
Lead	0.015[c]	0.015[c]	None
Iron	NA[b]	NA	NA
Nitrate/Nitrite	1 (MCL for nitrite)[a]	1[a]	None
Alpha-BHC	0.00003[c]	NA	NA
Lindane	0.0002[a]	0.0002[a]	None
Endrin	0.002[a]	0.002[a]	None
Dinoseb	0.007[a]	0.007[a]	None

a. Based on the SDWA primary MCL. Current SDWA standards can be found at: http://water.epa.gov/drink/contaminants/index.cfm (accessed 8/22/2011).
b. Cleanup goal is based on the calculated value for Hazard Quotient = 1.
c. Based on the EPA Action Level.

OU2 Soil ARARs

The 1999 ROD did not specify ARARs for soil. Risk-based cleanup goals for soil COCs were developed based on future residential land use.

6.4 Data Review

OU1 Ground Water

Ground water data collected from 2007 through 2011 is included in Appendix F. A map showing the locations of the monitoring wells is also included in Appendix G. Analytical results of ground water samples collected within the treatment system (primary, series reactor wells, and effluent) showed that COC concentrations were below the cleanup levels. However, concentrations above the cleanup levels were observed for alpha-BHC, beta-BHC, gamma-BHC, methyl parathion, ethylbenzene and xylene in several monitoring wells both upgradient and downgradient of the treatment system.

OU2 Ground Water

A summary of the ground water data collected in 2009 and 2010 is presented in Appendix H. Concentrations exceeding the cleanup levels as specified in the 1999 ROD were observed in several monitoring wells for alpha-BHC, dinoseb, gamma-BHC, aluminum, arsenic, iron, lead, manganese and nitrate/nitrite. The locations of the ground water monitoring wells are also presented in Appendix H. The data shows COC concentrations are generally declining but some fluctuations were also observed. The data also indicates that optimization of the ground water remedy is necessary in order to attain the cleanup levels within a reasonable timeframe.

OU2 Sediment

Sediment samples were collected from four locations during the 2009 and 2010 sampling events. The sampling locations and the analytical results are included in Appendix H. The data shows alpha-chlordane, gamma-chlordane, toxaphene, copper and zinc resulted in concentrations above the cleanup levels specified in the OU2 ROD.

6.5 Site Inspection

The site inspection was conducted on October 19, 2011. In attendance were Robenson Joseph and Lawrence Bradford, EPA; Yi Lu, GAEPD; John MacLeod, CCC; and Christy Fielden and Kirby Webster, Skeo Solutions. The Site Inspection Checklist is included in Appendix D and site photographs in Appendix E. The north and south warehouses located on the OU1 portion of the Site are currently used for light industry, including equipment storage, although there are a few businesses nearby. There was no evidence of vandalism, the grass was mowed, and the Site appeared to be well-maintained. The

perimeter of a portion of OU1, including the F&G system used in the ground water treatment process, is fenced with secured gates.

Ground water monitoring wells observed at OU1 were in good condition, but some wells were unlocked and had labels that were difficult to read. Site inspection participants checked the F&G system and the flushing system that was built to reduce air locks in the F&G system. Both of these systems appear to be working well and it has not been necessary to change the carbon used in the flushing system as frequently as was anticipated.

OU2 monitoring wells for MNA appeared to be in good condition, but several locks were broken and labels were missing or difficult to read. During the site inspection, the RPM discussed concerns about the effectiveness of MNA in achieving the cleanup levels. He also explained that other remedial options are under review to address remaining contamination. Erosion and lack of adequate drainage appear to be an issue along the drainage ditch that runs between OU1 and OU2 and along the railroad spur. Standing water was observed in the ditch, as well as significant erosion near the railroad tracks.

As part of the site inspection, Skeo Solutions staff visited the designated local site repository on October 19, 2011, at the Tifton-Tift County Library, One Library Lane, Tifton, Georgia 31794. The site repository was listed on CERCLIS and contained ARCADIS documents: Pilot Test Work Plan (August 16, 2011), 2010 Annual Sampling Report and Site Status Update (May 20, 2011).

Contractor staff conducted research at the Tift County Public Records Office and found deed information pertaining to OU1, which is summarized in Table 10.

Table 10: Deed Documents from Tift County Public Records Office

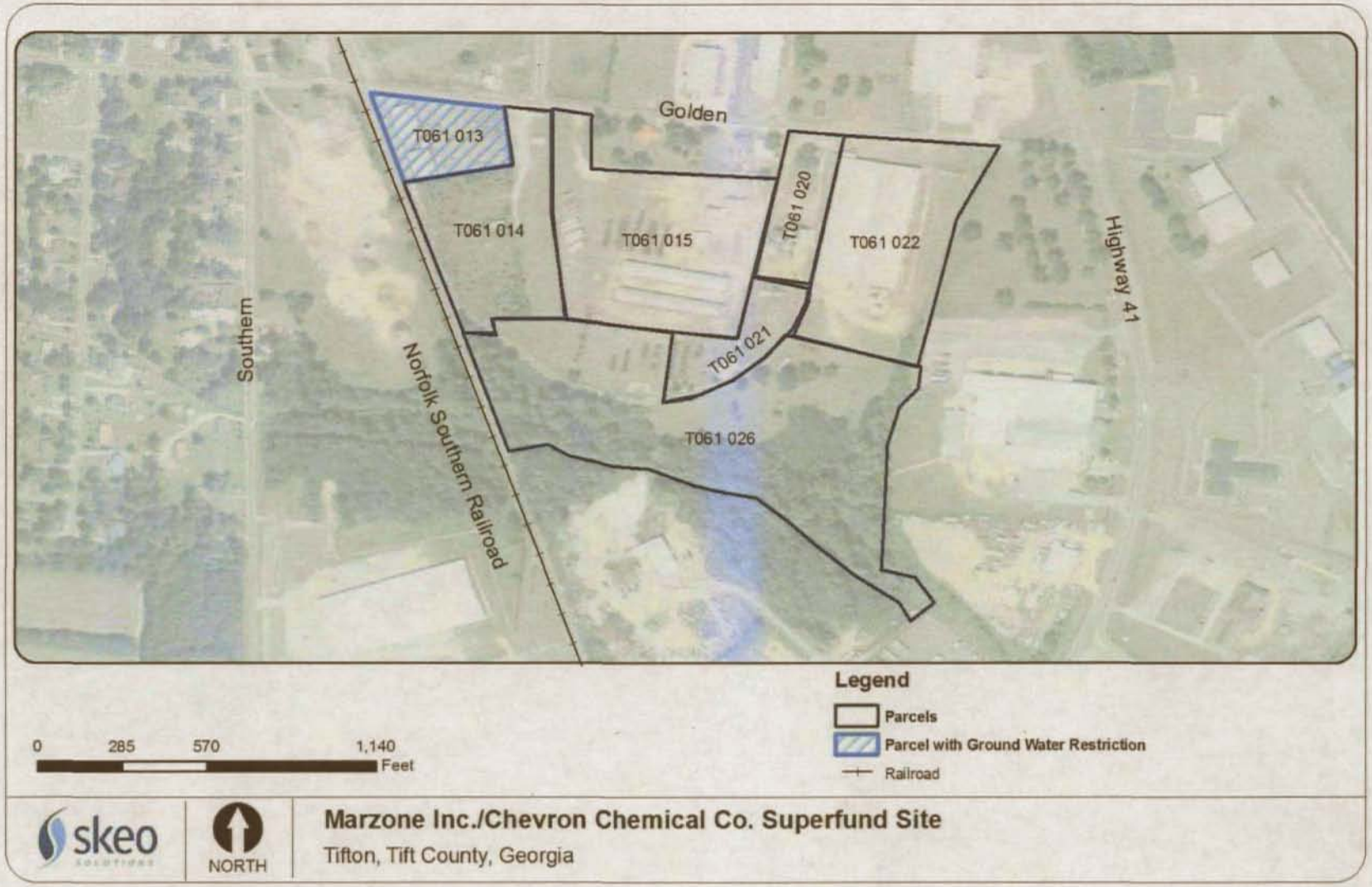
Date	Type of Document	Description	Book	Page	Parcel #
2001	Warranty Deed	Warranty deed transferring property from Milan, Inc. to Harper Enterprises with ground water restrictions.	883	179	T061 013
2000	Declaration of Restrictions	Limits ground water use and other activities relating to ground water.	817	71	T061 013

Table 11 lists the institutional controls associated with areas of interest at the Site. Institutional controls are part of the remedy for ground water, as stated in the 1994 OU1 ROD and 1999 OU2 ROD. There is a deed restriction on a portion of OU1 that serves as an institutional control to restrict ground water usage. There are no institutional controls in place on OU2. Figure 3 depicts the site parcels that currently have deed restrictions.

Table 11: Institutional Control (IC) Summary Table

Area of Interest – OU1 (Parcels: T061 013 and T061 014)						
Media	**ICs Needed**	**ICs Called for in the Decision Documents**	**Impacted Parcel(s)**	**IC Objective**	**Instrument in Place**	**Notes**
Ground Water	Yes	Yes	T061 013 and T061 014	Restrict use of ground water	A deed restriction is in place on parcel T061 013	No restriction is currently in place on parcel T061 014
Area of Interest – OU2 (Parcels: T061 015, T061 021 and T061 026)						
Ground Water	Yes	Yes	T061 015, T061 021, T061 026	Restrict use of ground water	None	

Figure 3: Institutional Control Base Map



Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding EPA's response actions at the Site, and is not intended for any other purpose.

6.6 Interviews

During the FYR process, interviews were conducted with parties impacted by the Site, including the current landowners and regulatory agencies that are involved in site activities or are aware of the Site. The purpose of the interviews was to document the perceived status of the Site and any perceived problems or successes with the phases of the remedy that have been implemented to date. All of the interviews were conducted after the site inspection via email. Interviews are summarized below and complete interviews are included in Appendix C.

Yi Lu: Mr. Lu is a hydrogeologist with GAEPD. Mr. Lu explained that soil excavation was extensive and soil cleanup was thorough at the Site. The ground water interception system (F&G system) at OU1 is working properly with routine maintenance and the ground water monitoring systems at both OU1 and OU2 are in fair condition. He believes that natural attenuation is working on the southern part of the OU1 unit, while the ground water on the northern part is intercepted and treated by the funnel-and-gate system. He explained that the effect of natural attenuation is less evident due to elevated contamination and possibly the slow release of contaminants from clay lenses. For OU2, nitrate/nitrite have a wide area of occurrence in ground water, other constituents have generally met remediation performance standards, with dinoseb, elevated nitrate/nitrite and low pH detected in a small area delineated by MW-02SH and MW-08SH. Gum Creek is in an industry/office district and the creek's access is restricted by vegetation. Based on a search of GAEPD's comprehensive complaint tracking system, no complaints have been received related to the Site. GAEPD has not conducted any site-related activities or communications in the past five years, and Mr. Lu is not aware of any changes to state laws that could affect the protectiveness of the Site's remedy. Mr. Lu stated that the 2002 FYR indicated a deed restriction was in place for the former Taylor parcel, but the deed restriction document was not presented. He explained that it is not clear if the deed restriction is for the former Taylor parcel of OU2, or the former Marzone facility, which is the north parcel of OU1. He explained that since soil remediation was completed at both OU1 and OU2, and ground water remediation is in the final stages, institutional controls might be less critical at this time. Mr. Lu is not aware of any changes in projected land use at the Site. He recommended that in-situ chemical oxidation in the saturated zone in a selected area of the northern part of OU1 might be one of the remedial choices to achieve cleanup goals earlier. In addition, application of lime in the saturated zone in the small area at OU2 where MW-2SH and MW-8SH are located might be a remedial choice to achieve cleanup goals earlier.

Robenson Joseph: Mr. Joseph is the EPA RPM for the Site. Mr. Joseph indicated that the implemented remedies are operating as intended at the Site. The Site is active, properly maintained, and the overall impression of the Site is positive. Mr. Joseph is aware of complaints received from the owner of Banner Grain about erosion issues. In terms of the current performance of the remedy, Mr. Joseph believes that the remedy is generally performing as intended, but that enhancement might be necessary to facilitate

or expedite attenuation to meet cleanup goals. Mr. Joseph explained that institutional controls on a couple of properties are still pending. Mr. Joseph is not aware of any community concerns regarding the Site or the operation and management of its remedy.

John MacLeod: Mr. MacLeod is the Operation, Maintenance and Monitoring Superintendent from CCC, the PRP for OU1. Mr. MacLeod indicated that remedial activity corrective actions have reduced impacts to receptors and reduced contaminant concentrations in ground water for both OU1 and OU2. He believes the Site looks better now that the soil removal is complete and grasses have been established. He believes the Site currently has very little environmental impact on the surrounding community and explained that the former Chevron property is in active reuse as a recycling center for scrap iron. He explained that the F&G system is meeting objectives and appears to be a satisfactory solution in limiting downgradient migration of impacted ground water. He expects that the system will require continued operation for a while. Mr. MacLeod is unaware of any complaints or inquiries from residents regarding environmental issues or remedial activities. He explained that the remedy gap that still needs to be closed is the property restriction and access on the Slack's property. He believes this might be difficult to obtain due to the required language of any such restriction and the willingness of the Slack family to approve such restrictions.

Allen Just: Mr. Just is a representative for ARCADIS, the O&M contractor for OU1. Mr. Just explained that the Chevron property is currently occupied by a metal recycling facility. He explained that the system and Slack property are maintained on a quarterly basis with removal of trees and brush adjacent to the collection and barrier walls, as needed. He believes the Slack property looks much like it did five years ago. He believes the system at OU1 appears to be meeting the objective of the remedy, which was to limit downgradient migration of contaminants in ground water. Mr. Just explained that the MNA data collected from wells MW-5D, MW-10S, MW-12 and AP-03 indicate limited microbial activity in ground water at these locations. He explained that concentrations of the contaminants in ground water at the Site are generally decreasing or stable. BHC concentrations in well AP-03 appear to be trending slightly upward, but significant decreases were observed during the second quarter 2011 monitoring event. He explained that there is no need for a continuous on-site O&M presence since the remedy is a gravity fed system. O&M of the system is performed on a quarterly basis with routine activities including gauging depth to water, measuring system flow rate, verifying the automated flushing system is operating properly, and manually flushing portions of the ground water treatment, as needed. AP-03, MW-5D, MW-10S and MW-12 are sampled on an annual basis. Samples are collected from the treatment system (primary reactor, series reactor and system piezometers SP-01 and SP-02) on a semi-annual basis.

Mr. Just explained that there have been no significant changes to the O&M requirements, maintenance schedule, or sampling routines over the past five years. There have been no significant O&M difficulties or costs. The automated flushing system has required some maintenance and repairs but these were completed at minimal cost. The repairs included replacing the battery and pump for the automated flushing system. Mr. Just discussed

opportunities for optimizing O&M activities and sampling efforts. These would include conducting a pilot test to evaluate remedial options for source reduction. This could ultimately shorten the project life for O&M and potentially shorten the overall project life and significantly reduce sampling costs. ARCADIS recommends revising the current monitoring plan by discontinuing monitoring for the following MNA parameters:

- Dissolved gases (microseeps)
- Daughter products (Websar)
- Inorganics (laboratory and field measurements)

In order to monitor the ground water and system conditions, ARCADIS proposes to continue the following under the existing monitoring plan:

- Collect ground water samples from MW-5D, MW-10S, MW-12 and AP-03 on an annual basis.
- Collect water samples from the primary reactor, series reactor, SP-01 and SP-02 on a semi-annual basis.
- Analyze all ground water samples for:
  - Organochlorine pesticides
  - Organophosphorus pesticides
  - VOCs
- Conduct quarterly site visits to verify the automated flushing system is working properly. The system will also be flushed manually during the site visits, as warranted.
- Measure the flow of water through the system on a quarterly basis.
- Gauge depth to water in the system (primary reactor, series reactor, SP-01, SP-02, SP-03 and SP-04) and 13 wells (AP-01, AP-02, AP-03, AP-04, AP-05, AP-06, MW-3S, MW-5D, MW-5H, MW-10S, MW-12, MW-13 and MW-14) on a quarterly basis.
- Submit system performance monitoring reports on a semi-annual basis.
- Submit site status update reports on a semi-annual basis.
- In lieu of the MNA monitoring, ARCADIS proposes performing concentration trend analysis using the Mann-Kendall test. The trend analysis would be performed every five years in preparation for the FYR process. The objective of these analyses is to determine if statistically significant concentration trends exist for the potential COCs in monitoring wells currently being sampled. ARCADIS believes information obtained through the trend analysis would be more valuable than the MNA data currently being collected, since the data indicate limited microbial activity.

7.0 Technical Assessment

7.1 Question A: Is the remedy functioning as intended by the decision documents?

The OU1 remedy is functioning as intended by the decision documents. Soil and sediment cleanup activities were completed by 1999. The F&G ground water treatment system continues to remove COCs from ground water. Ground water downgradient from the F&G system is being treated by MNA. MNA data indicate limited microbial activity and optimization of the MNA is necessary.

Institutional controls to prevent use of ground water are in place at one of the two OU1 properties, but controls at the other property need to be put in place to prevent potential exposure to contaminated ground water.

The OU2 remedy is functioning as intended by the decision documents. Contaminated soils and sediments were excavated by 2006, and ground water monitoring data show that COC concentrations are generally decreasing or fluctuating. To achieve the cleanup levels specified in the ROD, enhancement and/or optimization of the remedy is necessary. The 1999 ROD also called for the placement of institutional controls on several properties to restrict the potential use of the contaminated ground water but these restrictions are not currently in place. A sampling and analysis program was developed in 2009 to assess the effectiveness of the remedy (MNA). Five sampling events were conducted and the results showed that concentrations above the cleanup levels for alpha-BHC, dinoseb, gamma-BHC, aluminum, arsenic, iron, lead, manganese and nitrate/nitrite were present in the site ground water. Cleanup goal exceedances of alpha-chlordane, gamma-chlordane, toxaphene, copper and zinc were also detected in the collected sediment samples. The ROD indicated that a contingency remedy of an in-situ treatment wall system could be implemented at EPA's sole discretion, if results do not confirm that natural attenuation is effective.

There is a lack of adequate drainage in the ditch that runs between OU1 and OU2 and along the railroad spur. During the site inspection, standing water was observed in the ditch, and significant erosion was evident near the railroad tracks. While this does not affect the remedy, it is a general site maintenance concern. During the site inspection, it was also observed that several monitoring wells had broken locks and illegible labels.

7.2 Question B: Are the exposure assumptions, toxicity data, cleanup levels and remedial action objectives (RAOs) used at the time of remedy selection still valid?

Toxicity factors for several site-specific COC have changed since the risk assessments were conducted and the 1994 and 1999 RODs were issued (see Appendix I). As a result, potential risks associated with the Site COC were re-evaluated during the FYR process. The purpose of this evaluation was to ensure the calculated risks were within the acceptable incremental lifetime cancer risk range of $1x10^{-6}$ and $1x10^{-4}$, and therefore remain protective of human health and the environment. The re-evaluation concluded no additional risks were identified as a result of the changes in toxicity factors.

7.3 Question C: Has any other information come to light that could call into question the protectiveness of the remedy?

No other information has come to light that could call into question the protectiveness of the remedy.

7.4 Technical Assessment Summary

The OU1 remedy is functioning as intended by the decision documents. Soil and sediment cleanup activities were completed by 1999. The F&G ground water treatment system continues to remove COCs from ground water. Ground water downgradient from the F&G system is being treated by MNA. MNA data indicate limited microbial activity and optimization of the MNA is recommended. Optimization of the remedy should be explored to expedite the ground water cleanup and reduce sampling costs. Institutional controls to prevent use of ground water are in place at one of the two OU1 properties, but controls at the other property need to be put in place to prevent potential exposure to contaminated ground water.

The OU2 remedy is functioning as intended by the decision documents. Contaminated soils and sediments were excavated by 2006, and ground water monitoring data show that COC concentrations are generally decreasing or fluctuating. To achieve the cleanup levels specified in the ROD, enhancement and/or optimization of the remedy is necessary. A sampling and analysis program was developed in 2009 to assess the effectiveness of the remedy (MNA). Five sampling events were conducted and the results showed that COC concentrations are generally decreasing or fluctuating indicating the presence of a potential localized source area where active treatment may be necessary to attain the remedial cleanup levels. Institutional controls called for in the 1999 ROD are not in place. To ensure long term protectiveness, all ICs should be put in place. There is a lack of adequate drainage in the ditch that runs between OU1 and OU2 and along the railroad spur.

Toxicity factors for several site-specific COC have changed since the risk assessments were conducted and the 1994 and 1999 RODs were issued. As a result, potential risks associated with the Site COC were re-evaluated during the FYR process. The purpose of this evaluation was to ensure the calculated risks were within the acceptable incremental lifetime cancer risk range of $1x10^{-6}$ and $1x10^{-4}$, and therefore protective of human health and the environment. The re-evaluation concluded no additional risks were identified as a result of the changes in toxicity factors.

8.0 Issues

Table 12 summarizes the current site issues.

Table 12: Current Site Issues

Issue	Affects Current Protectiveness (Yes or No)	Affects Future Protectiveness (Yes or No)
Institutional controls, as called for in decision documents, are not in place to restrict ground water use on a portion of OU1.	No	Yes
Institutional controls, as called for in decision documents, are not in place to restrict ground water use at OU2.	No	Yes
OU1 and OU2 data indicate optimization/enhancement is necessary.	No	No
Some monitoring wells had broken locks and illegible labels.	No	No

9.0 Recommendations and Follow-up Actions

Table 13 provides recommendations to address the current site issues.

Table 13: Recommendations to Address Current Site Issues

Issue	Recommendations / Follow-Up Actions	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness? (Yes or No)	
					Current	Future
Institutional controls, as called for in decision documents, are not in place to restrict ground water use on a portion of OU1.	Implement institutional control and access agreement for OU1 T061 014 parcel.	PRP	EPA/EPD	03/01/2013	No	Yes
Institutional controls, as called for in decision documents, are not in place to restrict ground water use at OU2.	Implement institutional controls to restrict ground water use on OU2 properties.	EPA	EPA/EPD	03/01/2013	No	Yes
OU1 MNA data indicate optimization is necessary.	Evaluate and implement optimization of the OU1 remedy.	PRP	EPA/EPD	03/01/2013	No	Yes
Attainment of cleanup levels at OU2 via MNA	Evaluate and implement technologies to enhance/optimize remedy.	EPA	EPA	09/01/2013	No	Yes
Some monitoring wells had broken locks and illegible labels.	Replace or fix broken locks and re-label wells as necessary.	EPA and PRP	EPA/EPD	03/01/2013	No	No

10.0 Protectiveness Statements

The remedies implemented at OU1 and OU2 are protective of human health and the environment in the short term because contaminated soil and sediments have been excavated; monitoring is ongoing; and there is no evidence of current exposure or completed pathways to site-related contamination. However, in order for the remedy to be protective in the long term, implementation of the ground water IC as specified in the 1994 and 1999 RODs is necessary. In addition, the ground water data collected since the last FYR indicate the concentrations of the site-specific COC are either decreasing or fluctuating. Therefore, evaluation of potential optimization of the ground water remedies is necessary to enhance COC attenuation.

11.0 Next Review

The Site is a policy review site that requires ongoing FYRs as long as waste is left on site that does not allow for unrestricted use and unlimited exposure. The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

2009 Annual System Performance Monitoring Report. Marzone Superfund Site, Tifton, Georgia. ARCADIS. March 2010.

2010 Annual System Performance Monitoring Report. Marzone Superfund Site, Tifton, Georgia. ARCADIS. May 2011.

2010 Semiannual System Performance Monitoring Report. Marzone Superfund Site, Tifton, Georgia. ARCADIS. August 2010.

2011 Semiannual System Performance Monitoring Report. Marzone Superfund Site, Tifton, Georgia. ARCADIS. December 2011.

2011 Site Status Update. Marzone Superfund Site, Tifton, Georgia. ARCADIS. December 27, 2011.

Consent Decree. United States of America, Plaintiff v. Chevron Chemical Company, and Kova Fertilizer, Inc., Defendants. United States District Court for the Middle District of Georgia Valdosta Division. March 8, 1996.

Consent Decree. United States of America, Plaintiff, vs. Chevron Chemical Co., et al., Defendants. United States District Court for the Middle District of Georgia Valdosta Division. April 21, 1989.

Draft Data Evaluation Report, Monitoring Event – November 2010. Marzone Inc./ Chevron Chemical Co. Tifton, Georgia. Prepared for U.S. Environmental Protection Agency by J.M. Waller Associates, Inc. February 2011.

Explanation of Significant Difference for Operable Unit One. Marzone Inc./Chevron Chemical Company Site. Tifton, Tift County, Georgia. Environmental Protection Agency Region 4. June 1998.

Explanation of Significant Difference for Operable Unit One. Marzone Inc./Chevron Chemical Company Site. Tifton, Tift County, Georgia. Environmental Protection Agency Region 4. September 1996.

Final Construction and Remedial Action Report. Remediation of Soil at Operable Unit No. 1. Marzone Superfund Site. Tifton, Georgia. Prepared for Chevron Chemical Company, CH2M Hill, U.S. Environmental Protection Agency, Georgia Department of Natural Resources, Geomega, Environmental Communications Solutions, Planners for Environmental Quality, CDM Federal Programs by CH2M Hill. May 1999.

Final Report Ecological Risk Assessment Operable Unit Two, Marzone Chemical Company Inc. Prepared by Mark D. Sprenger, Ph.D. Environmental Response Team and Dale M. Haroski ERT/REAC for U.S. Environmental Protection Agency Region 4. June 1998.

First Five-Year Review Report for Marzone Superfund Site, Tifton, Georgia. Prepared for U.S. Environmental Protection Agency Region 4 by Geomega Inc. and CH2M Hill. March 25, 2002.

Interim Remedial Action Report, Groundwater Remedy for Marzone Superfund Site Operable Unit One, Tifton, Georgia. Prepared for Chevron Environmental Management Company by Geomega Inc. September 2007.

Interim Remedial Action Report. Marzone, Inc. / Chevron Chemical Site. Tifton, Tift County, Georgia. Prepared by CMC, Inc. for Environmental Protection Agency Region 4. September 13, 2006.

Marzone Site Long-Term Groundwater Monitoring Plan to Evaluate Natural Attenuation. Geomega Inc. May 17, 1998.

Operation and Maintenance Manual for the Marzone Funnel-and-Gate Groundwater Treatment System. Prepared for Chevron Chemical Company by CH2M Hill. July 2000.

Record of Decision Amendment Operable Unit One, Marzone Inc./Chevron Chemical Co., Tift County, U.S. Environmental Protection Agency Region 4. June 18, 1997.

Record of Decision Amendment Operable Unit One, Marzone Inc./Chevron Chemical Co., Tift County. U.S. Environmental Protection Agency Region 4. November 10, 1998.

Record of Decision Amendment Operable Unit One, Marzone Inc./Chevron Chemical Co., Tift County. U.S. Environmental Protection Agency Region 4. May 2, 2000

Record of Decision Operable Unit One, Marzone Inc./Chevron Chemical Co., Tift County, Georgia. U.S. Environmental Protection Agency Region 4. September 30, 1994.

Record of Decision Operable Unit Two, Marzone Inc./Chevron Chemical Co., Tift Conty. U.S. Environmental Protection Agency Region 4. July 1, 1999.

Second Five-Year Review Report for Marzone Superfund Site, Tifton, Tift County, Georgia. U.S. Environmental Protection Agency Region 4. September 27, 2007

Second Revised Final Baseline Risk Assessment Operable Unit One, Marzone, Inc./Chevron Chemical Company, Tifton, Tift County, Georgia. Prepared by Dynamac Corporation for U.S. Environmental Protection Agency Region 4. October 20, 1993.

Summary Report Remedial Action at the Former Marzone Chemical Site. Prepared by O.H. Materials Co. for Chevron Chemical Co. August 28, 1985.

Unilateral Administrative Order for Remedial Design and Remedial Action. Marzone Inc./Chevron Chemical Co. U.S. Environmental Protection Agency Region 4. July 11, 1995.

Vapor Intrusion Evaluation. Marzone Superfund Site. Tifton, Georgia. ARCADIS. December 11, 2008.

Appendix B: Press Notice

THE UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

Announces a

3rd Five-Year Review

For the

Marzone Superfund Site

A 3rd Five-Year Review is being conducted by the U.S. Environmental Protection Agency (EPA) of the cleanup up activities taken at the Marzone Inc./Chevron Chemical Superfund Site located in Tifton, Tift County , GA. The purpose of this review is to evaluate the implementation and performance of the remedy in order to determine if the remedy is protective of human health and the environment. When completed, a copy of the review report will be placed in the Information Repository files located in the EPA Record Center, 11th Floor, 61 Forsyth Street, S.W. Atlanta, GA 30303, and Tifton County Library Public Library at 245 Love Street, Tifton GA.

EPA will also conduct a number of interviews with nearby businesses, residents, local officials, state officials, and others to obtain their opinion on the cleanup process.

The community can contribute during this review by providing comments or questions. The scheduled date of completion for the five-year review is June 2012. If you would like to speak with us about this Site or are interested in being interviewed, please call Tonya Whitsett, EPA Community Involvement Coordinator at (404) 562-8487 or email at whitsett.tonya@epa.gov. If you have any technical questions, please contact Robenson Joseph, EPA Remedial Project Manager at (404) 562-8891 or email at joseph.robenson@epa.gov.

Appendix C: Interview Forms

Marzone/Chevron Chemical Co. Superfund Site — Five-Year Review Interview Form

Site Name: Marzone Inc. **EPA ID No.:** GAD991275686
Interviewer Name: **Affiliation:**
Subject Name: Robenson Joseph **Affiliation:** USEPA
Subject Contact Information: 404 562 8891
Time: **Date:**
Interview Location:
Interview Format (circle one): In Person Phone Mail Other:

Interview Category: EPA Remedial Project Manager

1. What is your overall impression of the project; including cleanup, maintenance, and reuse activities (as appropriate)?

   Overall impression of the project is positive. Implemented remedies are operating as intended. Site is active and properly maintained.

2. What have been the effects of this Site on the surrounding community, if any?

   None that I'm aware of

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities since the implementation of the cleanup?

   Yes, the owner of Banner Grain property complained about erosion issues.

4. What is your assessment of the current performance of the remedy in place at the Site?

   In general, remedy is performing as intended but enhancement may be necessary to facilitate/expedite attenuation thereby meet cleanup goals.

5. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   No, institutional controls (IC) on a couple of properties are still pending.

6. Are you aware of any community concerns regarding the Site or the operation and management of its remedy? If so, please provide details.

   None that I'm aware of.

7. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

As stated above, the remedy is operational. However, enhancement may be necessary to achieve remedial goals within a reasonable timeframe.

Marzone/Chevron Chemical Co. Superfund Site **Five-Year Review Interview Form**

Site Name: Marzone Inc. **EPA ID No.:** GAD991275686
Interviewer Name: **Affiliation:**
Subject Name: Yi Lu **Affiliation:** GAEPD
Subject Contact Information: 404-657-8626, yi.lu@dnr.state.ga.us
Time: **Date:**
Interview Location:

Interview Format (circle one): **In Person** **Phone** **Mail** **Other:**

Interview Category: **State Agency**

1. What is your overall impression of the project; including cleanup, maintenance, and reuse activities (as appropriate)?

   As a geologist with EPD's Land Protection Branch, I have briefly reviewed the file for the site. Soil excavation was extensive and soil cleanup was thorough at the site. Ground water monitoring is ongoing. The groundwater interception system (F&G) at OU1 is working properly with routine maintenance. The groundwater monitoring systems at both OU1 and OU2 are in fair condition.

2. What is your assessment of the current performance of the remedy in place at the Site?

   At OU1, natural attenuation is working on the southern part of the unit, while on the northern part where the groundwater is intercepted and treated by the F&G system, the effect of natural attenuation is less evident due to elevated contamination and possibly slow releasing of contaminants from clay lenses.

   At OU2, nitrate/nitrite have a wide area of occurrence in groundwater, other constituents of concern in groundwater have generally met remediation performance standards, with dinoseb, elevated nitrate/nitrite, and low pH detected in a small area delineated by MW02SH and MW08SH. Gum Creek is in an industry/office district and the creek's access is restricted by vegetation.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

   Georgia Department of Environmental Protection has maintained a comprehensive complaint tracking system. A search in the system did not find any complaints related to the site.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

   No.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

   No.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   Deed restriction was indicated in the 2002 1st Five-Year Review as being on the former Taylor parcel, but the deed restriction document was not presented. It is not clear if the deed restriction is for the former Taylor parcel, of OU2, or the former Marzone facility, the north parcel of OU1. As soil remediation was completed at both OU1 and OU2, and groundwater remediation is in the final stages, institutional controls may be less critical at this time.

7. Are you aware of any changes in projected land use(s) at the Site?

   No.

8. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   In-situ chemical oxidation in the saturated zone in a selected area at northern part of OU1 may be one of the remedial choices to achieve cleanup goals earlier.

   Application of lime in the saturated zone in the small area at OU2, where MW2SH and MW8SH are located, may be one of the remedial choices to achieve cleanup goals earlier.

Marzone/Chevron Chemical Co. Superfund Site **Five-Year Review Interview Form**

Site Name: Marzone Inc. **EPA ID No.:** GAD991275686
Interviewer Name: **Affiliation:**
Subject Name: John MacLeod **Affiliation:** Chevron EMC
Subject Contact Information: 6101 Bollinger Canyon Rd, 5th floor, San Ramon, Ca 95452
Time: Noon **Date:** 11/30/11
Interview Location: nmma@chevron.com

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: Potentially Responsible Parties (PRPs)

1. What is your overall impression of the remedial activities at the Site?

   So far the corrective actions have had a positive result in reducing impacts to receptors and reducing concentrations observed in groundwater for both OU1 and OU2.

2. What have been the effects of this Site on the surrounding community, if any?

   The site looks better now that construction (soil removal) is complete and grasses have been established. The site currently has very little environmental impact on the surrounding community. The former Chevron property is in active use as a recycling center for scrap iron.

3. What is your assessment of the current performance of the remedy in place at the Site?

   The F&G system is meeting objectives and appears to be a satisfactory solution in limiting downgradient migration of impacted groundwater. The system will require continued operation for a while.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?

   No

5. Do you feel well-informed regarding the Site's activities and remedial progress?

   Yes. If not, how might EPA convey site-related information in the future?

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?

   The remedy gap that still needs to be closed is the property restriction and access on the Slack's property. This may be difficult to obtain due to the required language of any such restriction and the willingness of the Slack family to approve such restrictions.

Marzone/Chevron Chemical Co. Superfund Site **Five-Year Review Interview Form**

Site Name: Marzone Superfund Site **EPA ID No.:** GAD991275686
Interviewer Name: NA **Affiliation:** NA
Subject Name: Allen Just **Affiliation:** ARCADIS U.S., Inc.
Subject Contact Information: Allen.Just@arcadis-us.com / 714.508.2677
Time: 6:00 pm **Date:** 12/01/11
Interview Location: NA

Interview Format (circle one): In Person Phone Mail Other:

Interview Category: O&M Contractor

1. What is your overall impression of the project; including cleanup, maintenance, and reuse activities (as appropriate)?

   Chevron property is currently occupied by metal recycling facility. The system and Slack property are maintained on a quarterly basis. Trees and brush adjacent to the collection and barrier walls are removed, as needed. The Slack property looks much like it did five years ago.

2. What is your assessment of the current performance of the remedy in place at the Site?

   The system appears to meeting the objective of the remedy; limiting downgradient migration of COCs in groundwater.

3. What are the findings from the monitoring data?

   The MNA data collected from wells MW-5D, MW-10S, MW-12, and AP-03 indicates limited microbial activity in groundwater at these locations. What are the key trends in contaminant levels that are being documented over time at the Site? Concentrations of the COCs in groundwater at the Site are generally decreasing or stable. BHC concentrations in well AP-03 appear to be trending slightly upward, but significant decreases were observed during the 2Q 2011 monitoring event.

4. Is there a continuous on-site O&M presence? Not required since remedy is gravity fed system. If so, please describe staff responsibilities and activities. Alternatively, please describe staff responsibilities and the frequency of site inspections and activities if there is not a continuous on-site O&M presence.

   O&M of the system is performed on a quarterly basis. Routine O&M activities include gauging depth to water, measuring system flow rate, verifying automated flushing system is operating properly, and manually flushing portions of the groundwater treatment system, as needed. Wells AP-03, MW-5D, MW-10S, and MW-12 are sampled on an annual basis.

Samples are collected from the treatment system (primary reactor, series reactor, and system piezometers SP-01, and SP-02) on a semi-annual basis.

5. Have there been any significant changes in site O&M requirements, maintenance schedules or sampling routines since start-up or in the last five years? If so, do they affect the protectiveness or effectiveness of the remedy? Please describe changes and impacts

   No significant changes to the O&M requirements, maintenance schedule, or sampling routines over the past five years..

6. Have there been unexpected O&M difficulties or costs at the Site since start-up or in the last five years? If so, please provide details.

   Nothing significant. The automated flushing system has required some maintenance and repairs but were completed at minimal cost. The repairs included replacing the battery and pump for the automated flushing system.

7. Have there been opportunities to optimize O&M activities or sampling efforts? Please describe changes and any resulting or desired cost savings or improved efficiencies.

   Yes for both. O&M: Conduct pilot test to evaluate remedial option for source reduction to shorten project life. Sampling: See answer below (Question 8). Potentially shorten project life and significantly reduce sampling costs.

8. Do you have any comments, suggestions or recommendations regarding O&M activities and schedules at the Site?

   ARCADIS recommends revising the current monitoring plan (see below).

   The revised monitoring plan would include discontinuing monitored natural attenuation (MNA) sampling at the Site. ARCADIS proposes discontinuing monitoring for the following MNA parameters:

   - Dissolved gases (Microseeps)
   - Daughter products (Websar)
   - Inorganics (laboratory and field measurements)

   In order to monitor the groundwater and system conditions, ARCADIS proposes to continue the following under the existing monitoring plan:

   - Collect groundwater samples from wells MW-5D, MW-10S, MW-12, and AP-03 on an annual basis.
   - Collect water samples from the primary reactor, series reactor, SP-01, and SP-02 on a

semi-annual basis.

- Analyze all groundwater samples for:
  - Organochlorine pesticides
  - Organophosphorus pesticides
  - Volatile organic compound (VOCs)

- Conduct quarterly site visits to verify the automated flushing system is working properly. The system will also be flushed manually the site visits, as warranted.

- Measure the flow of water through the system on a quarterly basis.

- Gauge depth to water in the system (primary reactor, series reactor, SP-01, SP-02, SP-03, and SP-04) and 13 wells (AP-01, AP-02, AP-03, AP-04, AP-05, AP-06, MW-3S, MW-5D, MW-5H, MW-10S, MW-12, MW-13, and MW-14) on a quarterly basis.

- Submit system performance monitoring reports on a semi-annual basis.

- Submit site status update reports on a semi-annual basis.

- In lieu of the MNA monitoring, ARCADIS proposes performing concentration trend analysis using the Mann-Kendall Test. The trend analysis would be performed every five year in preparation for the Five-Year review process. The objective of these analyses is to determine if statistically significant concentration trends exist for the potential COCs in monitoring wells currently being sampled. ARCADIS believes information obtained through the trend analysis would be more valuable than the MNA data currently being collected since the data indicates limited microbial activity.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site name: Marzone/Chevron Chemical Co.	**Date of inspection: 10/19/2011**
Location and Region: Tifton, GA, Region 4	**EPA ID: GAD991275686**
Agency, office, or company leading the five-year review: EPA	**Weather/temperature: Overcast and windy, 72°F**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☒ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other _____
- ☒ Monitored natural attenuation
- ☒ Groundwater containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (Check all that apply)

1. **O&M site manager** Allen Just (Name) | Project Manager (Title) | 12/01/2011 (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. 714 508 2677
   Problems, suggestions; ☒ Report attached X

2. **O&M staff** _____ (Name) | _____ (Title) | mm/dd/yyyy (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone no. _____
   Problems, suggestions; ☐ Report attached _____

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 EPA
Contact Robenson Joseph | RPM | 10/19/2011 | 404-562-8891
Name | Title | Date | Phone No.
Problems; suggestions; ☒ Report attached

Agency GaEPD
Contact Yi Lu | PM | 10/19/2011 | 404 657 8626
Name | Title | Date | Phone No.
Problems; suggestions; ☒ Report attached X

Agency _____
Contact _____ | _____ | _____ | _____
Name | Title | Date | Phone No.
Problems; suggestions; ☐ Report attached

Agency _____
Contact _____ | _____ | _____ | _____
Name | Title | Date | Phone No.
Problems; suggestions; ☐ Report attached

Agency _____
Contact _____ | _____ | _____ | _____
Name | Title | Date | Phone No.
Problems; suggestions; ☐ Report attached

4. **Other interviews** (optional) ☐ Report attached

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☐ O&M manual	☐ 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: _____

2. **Site-Specific Health and Safety Plan** ☒ Readily available ☐ Up to date ☐ N/A
☐ Contingency plan/emergency response plan ☐ Readily available ☐ Up to date ☒ N/A
Remarks: _____

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks: _____

4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Groundwater Monitoring Records**	☒ Readily available	☐ Up to date	☐ N/A
	Remarks:			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: _____			

IV. O&M COSTS

1.	**O&M Organization**	
	☐ State in-house	☐ Contractor for State
	☐ PRP in-house	☒ Contractor for PRP
	☐ Federal Facility in-house	☐ Contractor for Federal Facility
	☐ _____	

2. **O&M Cost Records**

☒ Readily available ☐ Up to date

☐ Funding mechanism/agreement in place ☐ Unavailable

Original O&M cost estimate ☐ Breakdown attached

Total annual cost by year for review period if available

From		To		☐ Breakdown attached
	Date		Date	Total cost
From		To		☐ Breakdown attached
	Date		Date	Total cost
From		To		☐ Breakdown attached
	Date		Date	Total cost
From		To		☐ Breakdown attached
	Date		Date	Total cost
From		To		☐ Breakdown attached
	Date		Date	Total cost

3. **Unanticipated or Unusually High O&M Costs During Review Period**

Describe costs and reasons: _____

V. ACCESS AND INSTITUTIONAL CONTROLS ☒ Applicable ☐ N/A

A. Fencing

1. **Fencing damaged** ☐ Location shown on site map ☒ Gates secured ☐ N/A

Remarks: Fencing surrounds OU-1.

B. Other Access Restrictions

1. **Signs and other security measures** ☐ Location shown on site map ☐ N/A

Remarks: Signage is appropriate

C. Institutional Controls (ICs)

1. **Implementation and enforcement**

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by) _____

Frequency _____

Responsible party/agency

Contact _____ mm/dd/yyyy _____

Name Title Date Phone no.

Reporting is up-to-date ☐ Yes ☐ No ☒ N/A

Reports are verified by the lead agency ☐ Yes ☐ No ☒ N/A

Specific requirements in deed or decision documents have been met ☐ Yes ☐ No ☒ N/A

Violations have been reported ☐ Yes ☐ No ☒ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☐ ICs are adequate ☒ ICs are inadequate ☐ N/A

Remarks: Not all ICs have been implemented as required by the remedy.

D. General

1. **Vandalism/trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks: _____

2. **Land use changes on site** ☒ N/A

Remarks:

3. **Land use changes off site** ☒ N/A

Remarks: _____

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

1. Roads damaged ☐ Location shown on site map ☐ Roads adequate ☒ N/A

Remarks:

B. Other Site Conditions

Remarks:

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

A. Landfill Surface

1.	**Settlement** (Low spots)	☐ Location shown on site map	☐ Settlement not evident
	Arial extent _____		Depth _____
	Remarks: _____		
2.	**Cracks**	☐ Location shown on site map	☐ Cracking not evident
	Lengths _____	Widths _____	Depths _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Arial extent _____		Depth _____
	Remarks:		
4.	**Holes**	☐ Location shown on site map	☐ Holes not evident
	Arial extent _____		Depth _____
	Remarks: _____		
5.	**Vegetative Cover**	☐ Grass	☐ Cover properly established
	☐ No signs of stress	☐ Trees/Shrubs (indicate size and locations on a diagram)	
	Remarks:		
6.	**Alternative Cover** (armored rock, concrete, etc.)		☐ N/A
	Remarks:		
7.	**Bulges**	☐ Location shown on site map	☐ Bulges not evident
	Arial extent _____		Height _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☐ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Arial extent _____
	☐ Ponding	☐ Location shown on site map	Arial extent _____
	☐ Seeps	☐ Location shown on site map	Arial extent _____
	☐ Soft subgrade	☐ Location shown on site map	Arial extent _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☐ No evidence of slope instability		
	Arial extent _____		
	Remarks: _____		
B. Benches		☐ Applicable	☒ N/A
	(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.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		

2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	***Bench Overtopped***	☐ *Location shown on site map*	☐ *N/A or okay*
	Remarks: _____		
C. Letdown Channels		☐ Applicable	☒ N/A
	(Channel lined with erosion control mats, riprap, grout bags, or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement** (Low spots)	☐ Location shown on site map	☐ No evidence of settlement
	Arial extent _____		Depth _____
	Remarks: _____		
2.	**Material Degradation**	☐ Location shown on site map	☐ No evidence of degradation
	Material type_____		Arial extent _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ No evidence of erosion
	Arial extent _____		Depth _____
	Remarks: _____		
4.	**Undercutting**	☐ Location shown on site map	☐ No evidence of undercutting
	Arial extent _____		Depth _____
	Remarks: _____		
5.	**Obstructions**	Type _____	☐ No obstructions
	☐ Location shown on site map	Arial extent _____	
	Size _____		
	Remarks: _____		
6.	**Excessive Vegetative Growth**	Type _____	
	☐ No evidence of excessive growth		
	☐ Vegetation in channels does not obstruct flow		
	☐ Location shown on site map	Arial extent _____	
	Remarks: _____		
D. Cover Penetrations		☐ Applicable	☒ N/A
1.	**Gas Vents**	☐ Active	☐ Passive
	☐ Properly secured/locked	☐ Functioning	☐ Routinely sampled ☐ Good condition
	☐ Evidence of leakage at penetration		☐ Needs Maintenance ☐ N/A
	Remarks: _____		

2. **Gas Monitoring Probes**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks: _____

3. **Monitoring Wells** (within surface area of landfill)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks: _____

4. **Extraction Wells Leachate**

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☐ Good condition

☐ Evidence of leakage at penetration ☐ Needs Maintenance ☐ N/A

Remarks: _____

5. **Settlement Monuments** ☐ Located ☐ Routinely surveyed ☐ N/A

Remarks: _____

E. Gas Collection and Treatment ☐ Applicable ☒ N/A

1. **Gas Treatment Facilities**

☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

☐ Good condition ☐ Needs Maintenance

Remarks: _____

2. **Gas Collection Wells, Manifolds and Piping**

☐ Good condition ☐ Needs Maintenance

Remarks: _____

3. **Gas Monitoring Facilities** (e.g., gas monitoring of adjacent homes or buildings)

☐ Good condition ☐ Needs Maintenance ☐ N/A

Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

1. **Outlet Pipes Inspected** ☐ Functioning ☐ N/A

Remarks: _____

2. **Outlet Rock Inspected** ☐ Functioning ☐ N/A

Remarks: _____

G. Detention/Sedimentation Ponds ☐ Applicable ☒ N/A

1. **Siltation** Area extent _____ Depth _____ ☐ N/A

☐ Siltation not evident

Remarks: _____

2.	**Erosion**	Area extent _____	Depth _____
	☐ Erosion not evident		
	Remarks: _____		
3.	**Outlet Works**	☐ Functioning	☐ N/A
	Remarks: _____		
4.	**Dam**	☐ Functioning	☐ N/A
	Remarks: _____		
H. Retaining Walls		☐ Applicable	☒ N/A
1.	**Deformations**	☐ Location shown on site map	☐ Deformation not evident
	Horizontal displacement _____		Vertical displacement _____
	Rotational displacement _____		
	Remarks: _____		
2.	**Degradation**	☐ Location shown on site map	☐ Degradation not evident
	Remarks: _____		
I. Perimeter Ditches/Off-Site Discharge		☒ Applicable	☐ N/A
1.	**Siltation**	☐ Location shown on site map	☒ Siltation not evident
	Area extent _____		Depth _____
	Remarks: _____		
2.	**Vegetative Growth**	☐ Location shown on site map	☐ N/A
	☒ Vegetation does not impede flow		
	Area extent _____		Type _____
	Remarks: There is some vegetative growth in ditch, but does not appear to impede flow.		
3.	**Erosion**	☐ Location shown on site map	☐ Erosion not evident
	Area extent _____		Depth _____
	Remarks: _____		
4.	**Discharge Structure**	☐ Functioning	☒ N/A
	Remarks: _____		
VIII. VERTICAL BARRIER WALLS		☒ Applicable	☐ N/A
1.	**Settlement**	☐ Location shown on site map	☐ Settlement not evident
	Area extent _____		Depth _____
	Remarks: _____		

2. **Performance Monitoring** Type of monitoring _____

☐ Performance not monitored

Frequency _____ ☐ Evidence of breaching

Head differential _____

Remarks: _____

IX. GROUNDWATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A

A. Groundwater Extraction Wells, Pumps, and Pipelines ☒ Applicable ☐ N/A

1. **Pumps, Wellhead Plumbing, and Electrical**

☐ Good condition ☐ All required wells properly operating ☐ Needs Maintenance ☒ N/A

Remarks:

2. **Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☒ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

1. **Collection Structures, Pumps, and Electrical**

☐ Good condition ☐ Needs Maintenance

Remarks: _____

2. **Surface Water Collection System Pipelines, Valves, Valve Boxes, and Other Appurtenances**

☐ Good condition ☐ Needs Maintenance

Remarks: _____

3. **Spare Parts and Equipment**

☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: _____

C. Treatment System ☒ Applicable ☐ N/A

1. **Treatment Train** (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☐ Bioremediation

☐ Air stripping ☒ Carbon adsorbers

☐ Filters _____

☐ Additive (e.g., chelation agent, flocculent) _____

☒ Others Gravity-fed filter with flush system

☒ Good condition ☐ Needs Maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of groundwater treated annually _____

☐ Quantity of surface water treated annually _____

Remarks: _____

2. **Electrical Enclosures and Panels** (properly rated and functional)

☒ N/A ☐ Good condition ☐ Needs Maintenance

Remarks: _____

3. **Tanks, Vaults, Storage Vessels**

☐ N/A ☒ Good condition ☐ Proper secondary containment ☐ Needs Maintenance

Remarks: _____

4. **Discharge Structure and Appurtenances**

☐ N/A ☒ Good condition ☐ Needs Maintenance

Remarks: _____

5. **Treatment Building(s)**

☒ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

☐ Properly secured/locked ☐ Functioning ☐ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks: Many wells are not locked or secured and labels such as FD are difficult to read.

D. Monitoring Data

1. **Monitoring Data**

☐ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring data suggests:**

☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

1. **Monitoring Wells** (natural attenuation remedy)

☐ Properly secured/locked ☐ Functioning ☒ Routinely sampled ☒ Good condition

☐ All required wells located ☐ Needs Maintenance ☐ N/A

Remarks: The wells observed were not locked and were missing clear labels.

X. OTHER REMEDIES

If there are remedies applied at the site and 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

A. 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 F&G system to remediate the ground water plume in OU1 appears to be in good condition. The flushing system that was added to reduce air locks in the F&G system appears to be working. CCC staff reported that the carbon has not needed changing as frequently as anticipated and hypothesize that contaminants of concern are being broken down by the carbon.

Monitored natural attenuation (MNA) is being used to reduce ground water contamination in OU2.

B. 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.

The PRP is conducting O&M and no issues with O&M were observed.

C. Early Indicators of Potential Remedy Problems

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.

Residual contamination appears to be present at OU2. COC concentrations in some wells are marginally decreasing or fluctuating.

D. Opportunities for Optimization

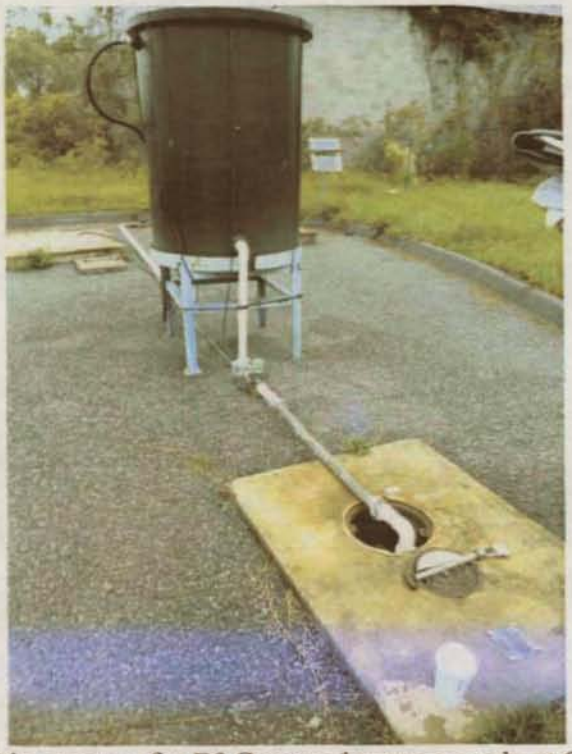
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

For OU1, the collected ground water monitoring data indicate limited microbial activity, resulting in limited COC natural attenuation. Remedy optimization is recommended to enhance COC degradation.

For OU2, sampling data showed COC concentrations are generally decreasing or fluctuating indicating the potential presence of residual contamination that could be addressed by active remedial measures. EPA is evaluating potential remedial technologies to enhance/optimize the remedy.

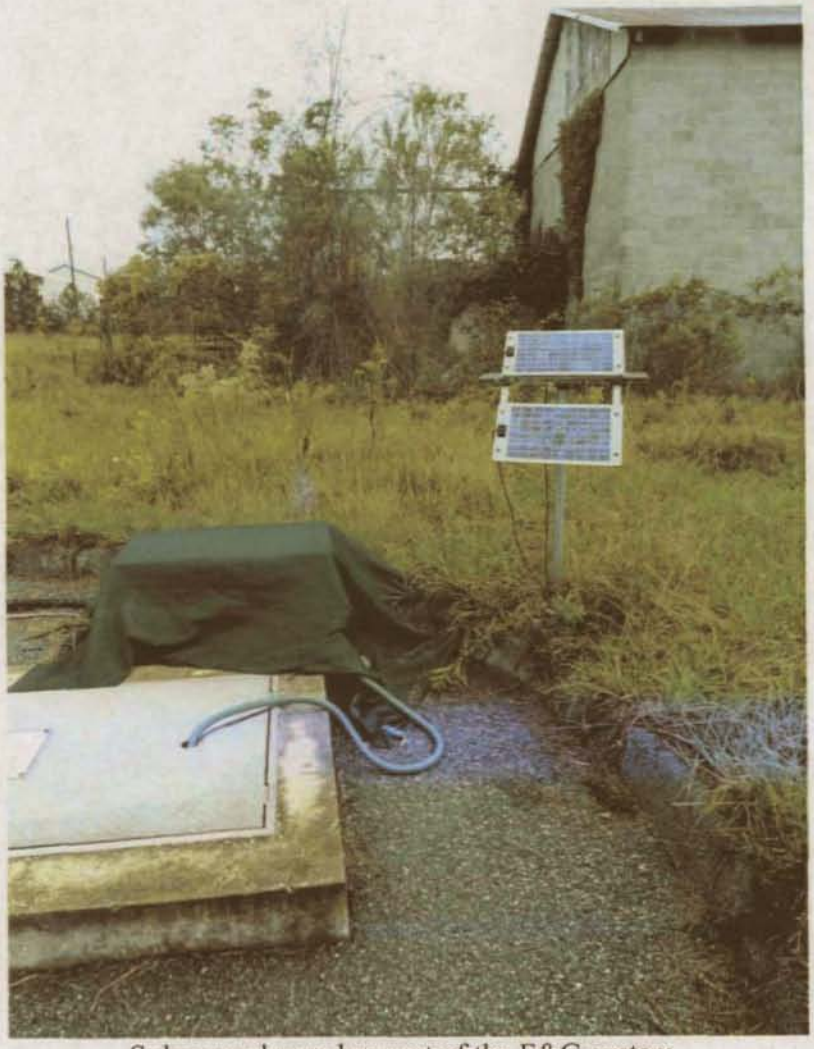
Site Inspection Team:
Robenson Joseph, EPA
Lawrence Bradford, EPA
Yi Lu, GA EPD
John MacLeod, CCC, PRP
Christy Fielden, Skeo Solutions
Kirby Webster, Skeo Solutions

Appendix E: Photographs from Site Inspection Visit



Flushing system for F&G ground water remedy at OU1.

Underground barrier and trench for collection of ground water in the F&G system.



Solar panels used as part of the F&G system.

No trespassing sign at OU1.

Ditch along OU1 where soil removal was conducted.

Ditch and erosion along railroad tracks.

Monitoring wells for MNA at OU2.

Unlabeled, unlocked monitoring well for MNA at OU2.

Appendix F: Ground Water Contaminants at OU1 from 2007-2011

		Pesticides						VOCs	
Sample	Date	alpha-BHC	beta-BHC	gamma-BHC	4,4'-DDD	4,4'-DDT	Methyl Parathion	Ethylbenzene	Xylenes
	MCL (µg/L)	0.03	0.1	0.2	0.77	0.54	3.9	700	10,000
Primary Reactor	6/12/07	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	0.43 J
Primary Reactor	12/19/07	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Primary Reactor	6/11/08	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	0.24 I	1.1 I
Primary Reactor	12/18/08	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Primary Reactor	6/15/09	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Primary Reactor	12/16/09	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Primary Reactor	6/22/10	<0.0023	<0.0030	0.012	<0.0016	<0.002	<0.05	<0.20	<0.40
Primary Reactor	12/20/10	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Primary Reactor	06/14/11	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	0.23 I	2.4
Series Reactor	6/12/07	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	0.7	3.6
Series Reactor	12/18/07	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Series Reactor	6/11/08	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	0.84 I
Series Reactor	12/18/08	<0.0023	0.0035 I	<0.0024	<0.0016	<0.002	<0.05	0.33 I	0.59 I
Series Reactor	6/15/09	0.0064 I	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Series Reactor	12/16/09	0.0049 I	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Series Reactor	6/21/10	0.0074 I	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
Series Reactor	12/20/10	<0.0023	<0.0030	<0.0024	0.0042 I	<0.002	<0.05	<0.20	0.92 I
Series Reactor	06/14/11	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	0.096 I	<0.20	<0.40
SP-01	6/12/07	**0.16**	*<0.006*	**1.3**	0.58	<0.004	<0.05	<0.20	<0.40
SP-01	12/19/07	**0.13**	**0.21**	<0.0048	<0.0032	<0.004	<0.05	<0.20	<0.40
SP-01	6/11/08	**0.12**	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
SP-01	12/18/08	**0.19**	<0.0030	0.13	<0.0016	<0.002	<0.05	120	410
SP-01	6/15/09	**0.25**	**0.16**	<0.0024	0.44	<0.002	<0.05	62	470
SP-01	12/16/09	**0.17**	**0.11**	<0.0024	<0.0016	<0.002	<0.05	26	28
SP-01	6/22/10	**0.23**	0.068	**0.46**	<0.0016	<0.002	<0.05	<0.20	<0.40
SP-01	12/20/10	**0.14**	<0.0030	<0.0024	0.24	<0.002	<0.05	<0.20	<0.40
SP-01	06/14/11	**0.32**	**0.38**	<0.0024	0.61	0.16	<0.05	40	370
SP-02	6/12/07	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	0.89	3.8
SP-02	12/18/07	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
SP-02	6/11/08	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	0.52	2.3
SP-02	12/18/08	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	0.29 I	0.52 I
SP-02	6/15/09	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
SP-02	12/16/09	0.0035 I	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
SP-02	6/21/10	<0.0023	<0.0030	<0.0023	<0.0016	<0.002	<0.05	<0.20	<0.40
SP-02	12/20/10	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40

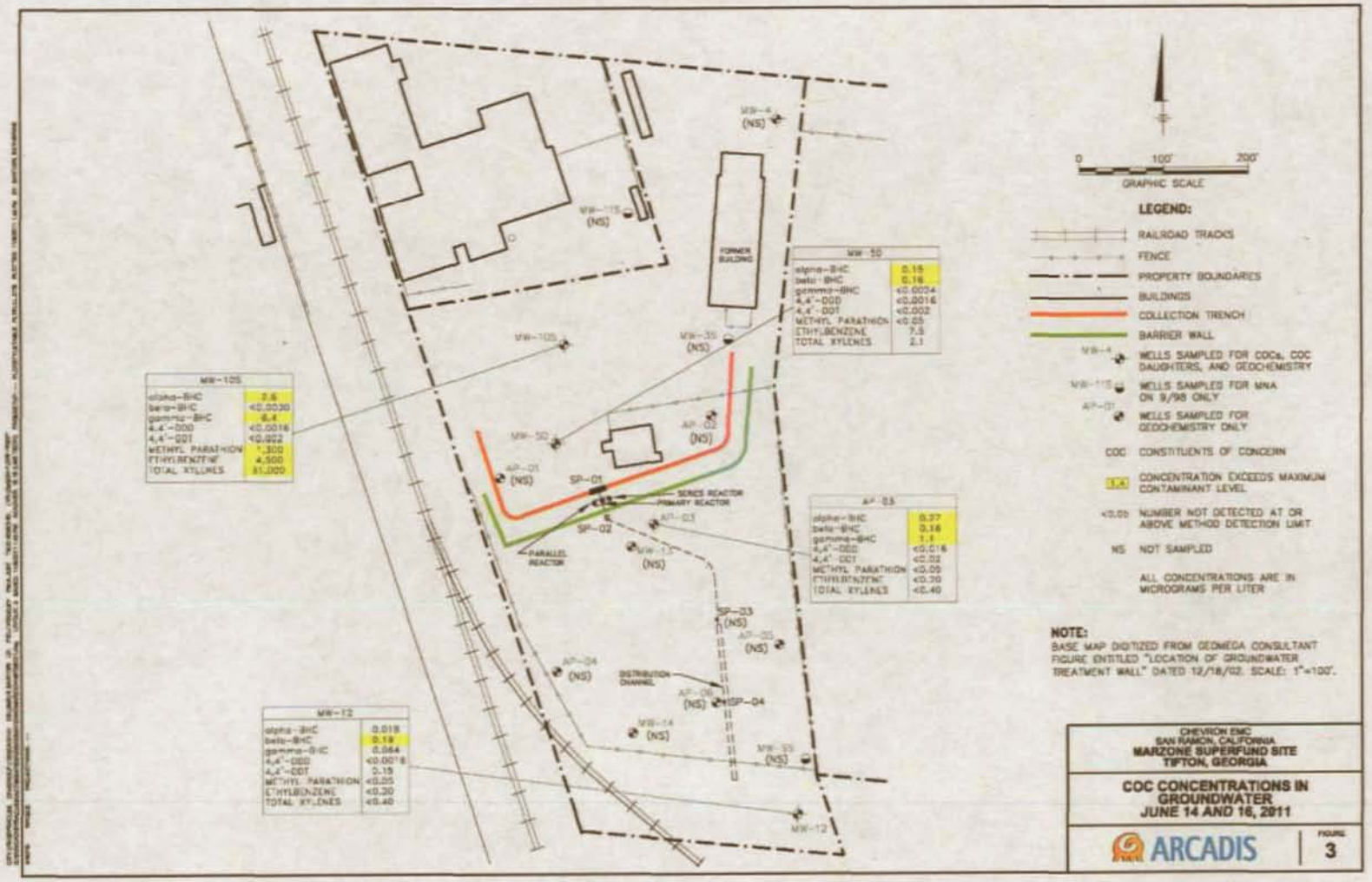
	Pesticides							VOCs	
Sample	Date	alpha-BHC	beta-BHC	gamma-BHC	4,4'-DDD	4,4'-DDT	Methyl Parathion	Ethylbenzene	Xylenes
	MCL (µg/L)	**0.03**	**0.1**	**0.2**	**0.77**	**0.54**	**3.9**	**700**	**10,000**
SP-02	06/14/11	<0.0023	<0.0030	<0.0024	<0.0016	<0.002	1.2	<0.20	<0.40
AP-03	6/12/07	**1.4**	**0.59**	**3.9**	<0.016	<0.02	<0.05	0.2 J	0.74 J
AP-03	12/18/07	NS	NS	NS	NS	NS	NS	NS	NS
AP-03	6/12/08	**1.6**	<0.0030	**4.4**	<0.0016	<0.002	<0.05	0.45 I	2.1
AP-03	12/18/08	NS	NS	NS	NS	NS	NS	NS	NS
AP-03	6/15/09	**1.4**	**0.39**	**3.3**	<0.0016	<0.002	<0.05	<0.20	<0.40
AP-03	12/16/09	NS	NS	NS	NS	NS	NS	NS	NS
AP-03	6/21/10	**2.6**	**0.76**	**4.2**	<0.0016	<0.002	<0.05	<0.20	<0.40
AP-03	12/20/10	NS	NS	NS	NS	NS	NS	NS	NS
AP-03	06/16/11	**0.27**	**0.16**	**1.1**	<0.016	<0.02	<0.05	<0.20	<0.40
MW-5D	6/12/07	0.011	<0.0030	<0.0023	<0.0016	<0.002	<0.05	1	2.5
MW-5D	12/18/07	NS	NS	NS	NS	NS	NS	NS	NS
MW-5D	6/11/08	**0.13**	<0.0030	0.034	<0.0016	<0.002	<0.05	3	4.5
MW-5D	12/18/08	NS	NS	NS	NS	NS	NS	NS	NS
MW-5D	6/16/09	**0.13**	<0.0030	<0.0024	<0.0016	<0.002	<0.05	15	18
MW-5D	12/16/09	NS	NS	NS	NS	NS	NS	NS	NS
MW-5D	6/21/10	**0.28**	<0.0030	**0.9**	<0.0016	<0.002	<0.05	27	2.7
MW-5D	12/20/10	NS	NS	NS	NS	NS	NS	NS	NS
MW-5D	06/14/11	**0.15**	**0.16**	<0.0024	<0.0016	<0.002	<0.05	7.5	2.1
MW-10S	6/12/07	**2**	<0.03	**7.7**	<0.016	<0.02	**130**	**2,900**	**30,000**
MW-10S	12/18/07	NS	NS	NS	NS	NS	NS	NS	NS
MW-10S	6/11/08	**2**	<0.06	**5.5**	<0.0016	<0.002	**150**	**4,100**	**42,000**
MW-10S	12/18/08	NS	NS	NS	NS	NS	NS	NS	NS
MW-10S	6/16/09	**1.9**	<0.15	**5.5**	<0.0016	<0.002	**540**	**4,300**	**39,000**
MW-10S	12/16/09	NS	NS	NS	NS	NS	NS	NS	NS
MW-10S	6/21/10	**3.4**	<0.003	**1.6**	<0.0016	<0.002	**95**	**4,100**	**38,000**
MW-10S	12/20/10	NS	NS	NS	NS	NS	NS	NS	NS
MW-10S	06/14/11	**2.6**	<0.0030	**6.4**	<0.0016	<0.002	**1,300**	**4,500**	**31,000**
MW-12	6/12/07	0.022	**0.91**	<0.0096	<0.0064	<0.008	<0.05	0.27 J	1.2 J
MW-12	12/18/07	NS	NS	NS	NS	NS	NS	NS	NS
MW-12	6/12/08	0.0062 I	**0.11**	<0.0024	<0.0016	0.19	<0.05	0.49 I	2.5
MW-12	12/18/08	NS	NS	NS	NS	NS	NS	NS	NS
MW-12	6/15/09	0.029	**0.18**	0.031	<0.0016	<0.002	<0.05	<0.20	<0.40
MW-12	12/16/09	NS	NS	NS	NS	NS	NS	NS	NS
MW-12	6/21/10	**0.032**	**0.1**	0.14	<0.0016	<0.002	<0.05	<0.20	<0.40
MW-12	12/20/10	NS	NS	NS	NS	NS	NS	NS	NS
MW-12	06/14/11	0.018	**0.19**	0.064	<0.0016	0.15	NA	NA	NA
SP-01 Duplicate	6/12/07	**0.16**	<0.006	**1.3**	0.58	<0.004	<0.05	<0.20	<0.40
	6/12/07	**0.2**	<0.0030	<0.0024	0.62	<0.002	<0.05	<0.20	<0.40
SP-01 Duplicate	12/19/07	**0.13**	**0.21**	<0.0048	<0.0032	<0.004	<0.05	<0.20	<0.40
	12/19/07	**0.1**	**0.16**	<0.0024	<0.0016	<0.002	<0.05	<0.20	<0.40
SP-01 Duplicate	12/18/08	**0.19**	<0.0030	0.13	<0.0016	<0.002	<0.05	120	410
	12/18/08	**0.2**	<0.0030	0.11	<0.0016	<0.002	<0.05	120	410
SP-01	6/15/09	**0.25**	**0.16**	<0.0024	0.44	<0.002	<0.05	62	470

	Pesticides							VOCs	
Sample	Date	alpha-BHC	beta-BHC	gamma-BHC	4,4'-DDD	4,4'-DDT	Methyl Parathion	Ethylbenzene	Xylenes
	MCL (µg/L)	**0.03**	**0.1**	**0.2**	**0.77**	**0.54**	**3.9**	**700**	**10,000**
Duplicate									
	6/15/09	**0.19**	**0.13**	<0.0024	0.41	<0.002	<0.05	62	660
SP-01 Duplicate	12/16/09	**0.17**	**0.11**	<0.0024	<0.0016	<0.002	<0.05	26	28
	12/16/09	**0.17**	**0.1**	<0.0024	<0.0016	<0.002	<0.05	26	29
SP-01 Duplicate	6/22/10	**0.23**	0.068	0.46	<0.0016	<0.002	<0.05	<0.20	<0.40
	6/22/10	**0.21**	0.07	0.57	<0.0016	<0.002	<0.05	<0.20	<0.40
SP-01 Duplicate	12/20/10	**0.14**	<0.0030	<0.0024	0.24	<0.002	<0.05	<0.20	<0.40
	12/20/10	**0.11**	<0.0030	<0.0024	0.22	<0.002	<0.05	<0.20	<0.40
MW-10S	06/14/11	**2.6**	<0.0030	**6.4**	<0.0016	<0.002	**1,300**	**4,500**	**31,000**
Duplicate	06/14/11	**2.7**	<0.0030	**9.5**	<0.0016	<0.002	**1,300**	**5,100**	**32,000**

VOCs – volatile organic compounds
Gamma-BHC – Lindane
MCL – maximum contaminant level
<Number – not detected at or above this stated laboratory reporting limit
NA – Not analyzed / available
NS – Well was not sampled
J – Value is between laboratory detection limit and laboratory reporting limit
I – Value is between laboratory method detection limit and practical quantitation limit
B – Analyte was also found in associated blank

Results in bold font indicate the concentration exceeds the MCL for that specific compound.

Appendix G: June 2011 Map of OU1 COC Concentrations in Ground Water



Appendix H: OU2 Data Tables: Data Evaluation Report February 2011

OU2 Sample Location Map

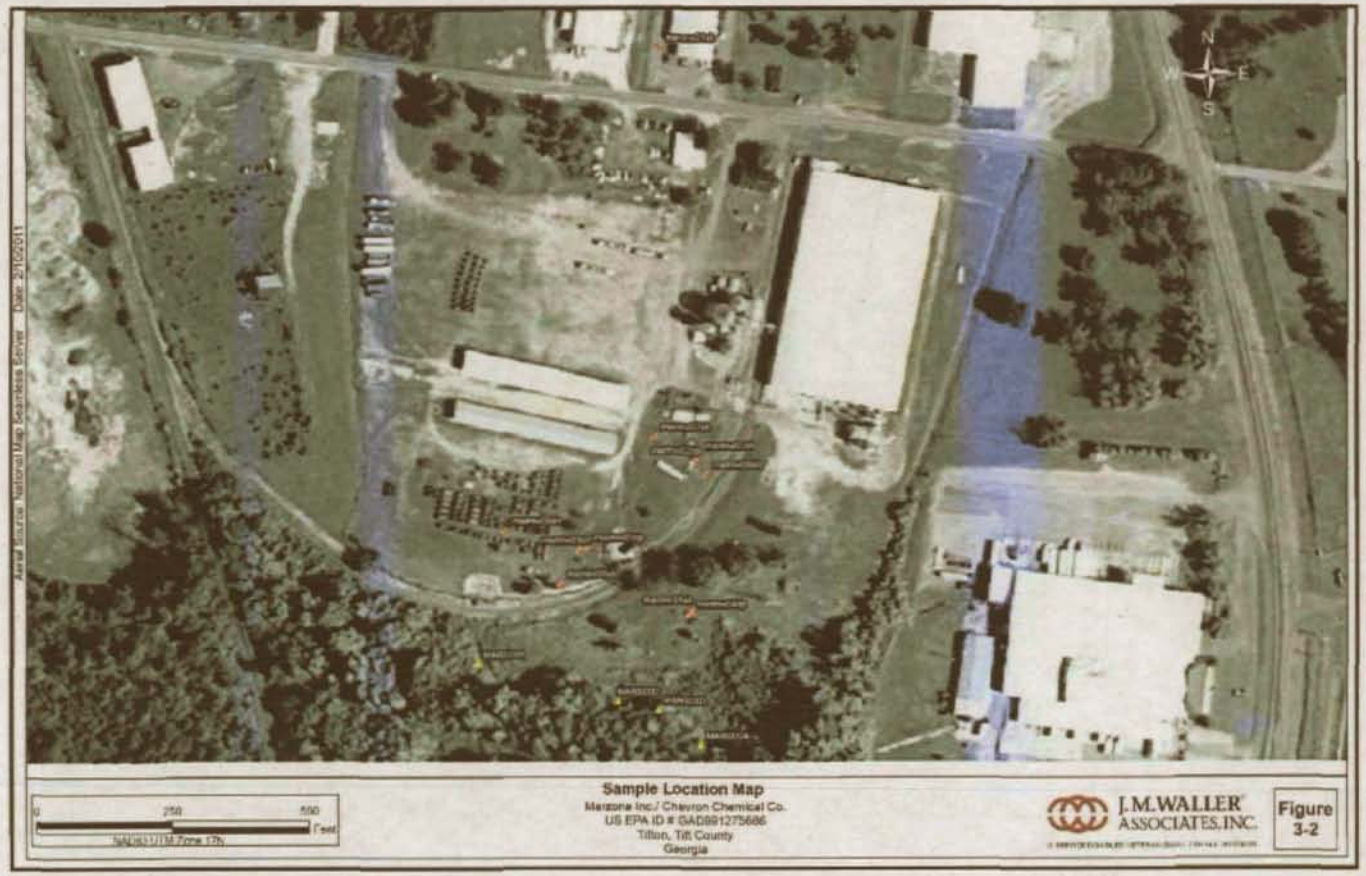


Table 3-2
Groundwater Analytical Results, November 2010
Marzone Inc./ Chevron Chemical Company Site OU#2, Tifton, Georgia

Constituent	Federal MCL (µg/L)	ROD Remediation Performance Standards	MARMW01SH					MARMW02SH					MARMW02SHD/ MARMW92 (duplicate of MARMW02SH)				MARMW02DP		MARMW03SH					MARMW03DP				
			4/14/09	7/13/09	10/27/09	1/25/10	11/8/10	4/16/09	7/15/09	10/28/09	1/25/10	11/9/10	4/16/09	7/15/09	10/28/09	1/25/10	1/25/10	11/9/10	4/15/09	7/14/09	10/27/09	1/25/10	11/9/10	4/17/09	7/15/09	10/29/09	1/25/10	11/9/10
Field Temp and Measurements																												
Temperature (°C)	-	-	21.78	28.12	26.07	17.30	26.38	17.75	25.04	25.19	15.29	25.25	NA	NA	NA	NA	23.23	24.84	20.13	27.04	22.72	13.54	22.80	22.33	24.71	23.41	21.68	22.95
Spec. Conductance (us/cm)	-	-	0.082	0.132	0.124	0.167	0.085	0.631	0.747	0.822	0.834	0.981	NA	NA	NA	NA	0.148	0.051	0.327	0.319	0.353	0.168	0.468	0.081	0.083	0.098	0.060	0.057
pH	-	-	5.57	5.50	5.56	5.32	5.23	3.28	3.14	3.27	3.53	3.24	NA	NA	NA	NA	6.05	5.03	5.90	6.22	6.37	6.61	6.20	5.91	6.09	5.97	5.66	4.96
ORP (mV)	-	-	68.2	NA	-4.4	288.4	38.4	484.7	NA	499.9	90.7	398.7	NA	NA	NA	NA	169.7	-105.1	102.2	NA	164.2	255.3	115.7	108.7	NA	188.2	339.1	-104.6
DO (mg/L)	-	-	5.1	0.64	0.37	4.19	2.46	1.87	0.38	0.74	2.24	0.47	NA	NA	NA	NA	5.80	3.28	1.9	0.1	0.16	3.55	0.5	5.1	3.43	0.81	1.50	1.02
Turbidity (NTU)	-	-	24	3.23	5.84	6.60	2.50	1.9	3.12	3.10	10.97	2.92	NA	NA	NA	NA	147.0	145	45	14.30	28.20	31.20	10.8	400	4.58	4.21	180	81
Alkalinity (mg/L)	-	-	42.5	34	20.4	6.8	153	0.0	0.0	0.0	6.8	0	NA	NA	NA	NA	13.6	85	20.4	20.4	27.2	51.0	204	34.0	20.4	40.8	34.0	34
Sulfide (mg/L)	-	-	0.02	0.03	0.01	0.00	0.00	0.01	0.00	0.12	0.01	0	NA	NA	NA	NA	0.05	0	0.07	0.03	0.07	0.00	0	0.80	0.04	0.0	0.45	0
Sulfate (mg/L)	-	-	15	48	0.0	8.0	0.0	80	80	80	80	80	NA	NA	NA	NA	0.0	7	56	40	46	46	73	80	3	0.80	3	1
Chloride (mg/L)	-	-	10	10	10	5	45	10	5	5	10	15	NA	NA	NA	NA	5.0	10	25	15	20	25	30	15	5	20	10	15
Ferrous Iron (mg/L)	-	-	1.29	3.30	2.88	1.57	3.30	0.39	0.48	0.01	0.71	1.07	NA	NA	NA	NA	0.12	0.69	0.03	0.09	0.01	0.00	0.02	3.30	0.15	0.0	0.7	0.5
Organochlorine Pesticides (ug/L)																												
4,4'-DDD (p,p'-DDD)	-	-	0.10U	0.48U	0.1U	0.047 U	0.1U	0.10U	0.51U	0.1U	0.19 U	0.7U,O	0.10U	0.53U	0.1U	0.21 U	0.039 U	0.1U	0.060NJ	0.49U	0.1U	0.04 U	0.1U	0.10U	0.51U	0.24	0.04 U	0.1U
4,4'-DDE (p,p'-DDE)	-	-	0.10U	0.48U,J	0.1U	0.023 U	0.1U	0.10U	0.51U,J	0.1U	0.48 U	0.1U	0.10U	0.53U,J	0.1U	0.59 U	0.02 U	0.1U	0.10U	0.49U,J	0.1U	0.029 U	0.17N	0.10U	0.51U,J	0.1U	0.02 U	0.1U
4,4'-DDT (p,p'-DDT)	-	-	0.10U	0.48U	0.1U	0.058 U	0.1U	0.10U	0.51U	0.1U	0.48 U	0.1U	0.10U	0.53U	0.1U	0.62 U	0.049 U	0.1U	0.10U	0.49U	0.1U	0.05 U	0.1U	0.10U	0.51U	33N,CLP	0.05 U	0.1U
Aldrin	-	-	0.050U	0.48U	0.05U	0.023 U	0.05U	0.050U	0.51U	0.05U	0.096 U	0.05U	0.050U	0.53U	0.05U	0.1 U	0.02 U	0.05U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.050U	0.51U	0.05U	0.02 U	0.05U
alpha-BHC	-	0.03	0.050U	0.48U	0.05U	0.012 U	0.03U	0.050U	0.51U	0.05U	0.019 J	0.032J	0.050U	0.53U	0.05U	0.022 J	0.0098 U	0.03U	0.050U	0.49U	0.05U	0.01 U	0.03U,J	0.050U	0.51U	0.05U	0.01 U	0.03U
alpha-Chlordane	-	-	0.050U	0.48U	0.05U	0.023 U	0.05U	0.050U	0.51U	0.05U	0.13 J	0.05U	0.050U	0.53U	0.05U	0.15 J	0.02 U	0.05U	0.050U	0.49U	0.05U	0.024 U	0.29	0.050U	0.51U	0.05U	0.02 U	0.05U
beta-BHC	-	-	0.050U	0.48U	0.05U	0.023 U	0.05U	0.050U	0.51U	0.05U	0.024 U	0.05U	0.050U	0.53U	0.05U	0.04 U	0.02 U	0.05U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.050U	0.51U	0.05U	0.02 U	0.05U
delta-BHC	-	-	0.050U	0.48U	0.05U	0.023 U	0.05U	0.050U	0.51U	0.05U	0.019 U	0.05U	0.050U	0.53U	0.05U	0.1 U	0.02 U	0.05U	0.050U	0.49U	0.05U	0.02 U	0.09	0.050U	0.51U	0.05U	0.02 U	0.05U
Dieldrin	-	-	0.10U	0.48U	0.1U	0.023 U	0.1U	0.10U	0.12J	0.1U	0.17 J	0.1U	0.10U	0.53U	0.1U	0.22 J	0.02 U	0.1U	0.10U	0.49U	0.1U	0.061 U	0.1U	0.10U	0.51U	0.1U	0.02 U	0.1U
Endosulfan I (alpha)	-	-	0.050U	0.48U	0.05U	0.023 U	0.05U	0.050U	0.51U	0.05U	0.49 U	0.05U	0.050U	0.53U	0.05U	0.61 U	0.061	0.05U	0.050U	0.49U	0.05U	0.02 U	0.11	0.050U	0.51U	0.05U	0.02 U	0.05U
Endosulfan II (beta)	-	-	0.10U	0.48U	0.1U	0.047 U	0.1U	0.10U	0.51U	0.1U	0.52 U	0.78U	0.10U	0.53U	0.1U	0.68 J	0.039 U	0.1U	0.10U	0.49U	0.1U	0.079 J	0.1U	0.10U	0.51U	0.1U	0.04 U	0.1U
Endosulfan Sulfate	-	-	0.10U	0.48U	0.1U	0.058 U	0.1U	0.10U	0.51U	0.1U	0.85 U	0.1U	0.10U	0.53U	0.1U	0.69 U	0.049 U	0.1U	0.10U	0.49U	0.1U	0.05 U	0.1U	0.10U	0.51U	0.1U	0.05 U	0.1U
Endrin	-	2	0.10U	0.48U	0.1U	0.047 U	0.1U	0.10U	1.0	0.1U	0.55	0.84	0.10U	0.90	0.1U	0.69	0.039 U	0.1U	0.10U	1.4	0.1U	0.23	0.86	0.10U	0.51U	0.1U	0.04 U	0.1U
Endrin aldehyde	-	-	0.10U	0.48U	0.1U	0.068	0.1U	0.10U	0.51U	0.1U	0.47	0.73U	0.10U	0.53U	0.1U	0.65	0.051	0.1U	0.10U	0.49U	0.1U	0.062	0.23N	0.10U	0.51U	0.1U	0.05 U	0.1U
Endrin ketone	-	-	0.10U	0.48U	0.1U	0.058 U	0.1U	0.10U	27	0.1U	20	24	0.10U	27	0.1U	28	0.049 U	0.1U	0.10U	0.73	0.1U	0.2	0.3N	0.10U	0.51U	0.1U	0.05 U	0.1U
gamma-BHC (Lindane)	-	0.2	0.050U	0.48U	0.05U	0.012 U	0.05U	0.050U	0.51U	0.05U	0.032 J	0.05U	0.050U	0.53U	0.05U	0.03	0.0098 U	0.05U	0.050U	0.49U	0.05U	0.01 U	0.05U	0.050U	0.51U	0.05U	0.01 U	0.05U
gamma-Chlordane	-	-	0.050U	0.48U	0.05U	0.023 U	0.05U	0.050U	0.51U	0.05U	0.12	0.05U	0.050U	0.53U	0.05U	0.15	0.02 U	0.05U	0.050U	0.49U	0.05U	0.031	0.14	0.050U	0.51U	0.05U	0.02 U	0.05U
Heptachlor	-	-	0.050U	0.48U	0.05U	0.017 U	0.05U	0.050U	0.51U	0.05U	0.072 U	0.05U	0.050U	0.53U	0.05U	0.21 U	0.015 U	0.05U	0.050U	0.49U	0.05U	0.015 U	0.05U	0.050U	0.51U	0.05U	0.015 U	0.05U
Heptachlor epoxide	-	-	0.050U	0.48U	0.05U	0.023 U	0.05U	0.050U	0.51U	0.05U	0.16	0.05U	0.050U	0.53U	0.05U	0.2	0.02 U	0.05U	0.050U	0.49U	0.05U	0.055 U	0.05U	0.050U	0.51U	0.05U	0.02 U	0.05U
Methoxychlor	-	-	0.50U	0.48U	0.5U	0.12 U	0.5U	0.50U	0.51U	0.5U	1.1	1.5U	0.50U	0.53U	0.5U	1.7	0.098 U	0.5U	0.50U	0.49U	0.5U	0.1 U	0.5U	0.50U	0.51U	0.5U	0.1 U	0.5U
Toxaphene	-	-	5.0U	9.7U	5U	2.3 U	5U	5.0U	10U	5U	19 U	15	5.0U	11U	5U	20 U	2 U	5U	5.0U	9.9U	5U	16 J,N	5.3	5.0U	10U	5U	2 U	5U
Dinoseb (ug/L)																												
Dinoseb		7	0.25U	0.25*U,J	0.25U,R	2.2U	0.25U	240	53 J	140J	240	190	280	100 J	120J	240	2.7U	0.14J,O	0.33	0.25U	0.25U,R	0.25U	0.093NJ	0.25U	0.13**	1.6J	13	2.6J

NOTES:

1 Drinking Water Regulations and Health Advisories, Maximum Contaminant Levels, Summer 2000.
DUP Field duplicate sample.
- Sample not detected
NE Not Established
NA Not analyzed.
ug/L micrograms per liter.
J The identification of the analyte is acceptable; the reported value is an estimate.
U The analyte was not detected at or above the reporting limit.
N There is presumptive evidence that the analyte is present, the analyte is reported as a tentative identification.
R The analyte was not detected at or above the reporting limit.
* Recommended holding time exceeded.
** Presumptive evidence that analyte is present; reported as a tenative identification with an estimated value.
Shading indicates the detected concentration exceeded the ROD Health Based Goals

Table 3-2 Continued Page 2 of 4
Groundwater Analytical Results, November 2010
Marzone Inc./ Chevron Chemical Company Site OU#2, Tifton, Georgia

Constituent	Federal MCL (µg/L)	ROD Remediation Performance Standards	MARMW04SH***				MARMW04DP					MARMW 94DP	MARMW05SH					MARMW06SH					MARMW07SH		MARMW08SH		RB-MAR-01				
			4/15/09	7/14/09	10/29/09	1/25/10	4/16/09	7/14/09	10/29/09	1/25/10	11/9/10	11/9/10	4/15/09	7/14/09	10/27/09	1/25/10	11/10/10	4/15/09	7/14/09	10/28/09	1/25/10	11/10/10	1/25/10	11/10/10	1/25/10	11/10/10	4/17/09	7/15/09	10/26/09	1/25/10	11/11/10
Temperature (°C)	-	-	17.15	26.23	25.04	14.80	20.23	20.22	21.42	20.63	21.25	NA	17.82	25.45	22.93	14.90	23.08	18.99	26.38	23.42	12.84	22.01	18.88	24.64	21.04	25.14	NA	NA	NA	NA	NA
Spec. Conductance (us/cm)	-	-	0.185	0.207	0.203	0.138	0.087	0.079	0.830	0.080	0.061	NA	0.375	0.803	0.878	0.254	0.861	0.230	0.234	0.220	0.323	0.116	0.187	0.092	3.998	3.010	NA	NA	NA	NA	NA
pH	-	-	4.44	4.31	4.76	4.50	4.80	5.05	4.91	4.94	4.35	NA	6.03	5.80	6.44	6.57	5.82	4.66	4.67	4.73	4.78	4.44	5.39	4.22	4.21	3.98	NA	NA	NA	NA	NA
ORP (mV)	-	-	272.6	NA	201.8	225.8	240.3	NA	233.8	231.7	-74.4	NA	125.9	NA	133.6	169.6	203.1	176.7	NA	232.2	288.9	227.7	320.1	25.1	313.4	335.2	NA	NA	NA	NA	NA
DO (mg/L)	-	-	1.2	0.9	1.71	2.51	5.1	4.0	3.95	5.15	6.00	NA	1.9	0.86	1.00	2.43	2.01	0.7	1.31	0.48	2.37	1.33	8.55	6.68	4.45	0.82	NA	NA	NA	NA	NA
Turbidity (NTU)	-	-	55	9.68	9.90	19.60	16	14.00	4.29	3.67	10.6	NA	95	27.50	5.32	33.3	453	15	14.10	3.71	6.31	44.6	1.08	0	1.24	0.39	NA	NA	NA	NA	NA
Alkalinity (mg/L)	-	-	6.8	6.8	13.6	6.8	6.8	6.8	13.6	6.8	34	NA	40.8	34.0	40.8	115.6	187	20.4	6.8	6.8	6.8	34.0	13.6	34	17.0	0	NA	NA	NA	NA	NA
Sulfide (mg/L)	-	-	0.11	0.03	0.1	0.06	0.15	0.12	0.48	0.00	0	NA	0.21	0.15	0.07	0.04	0	0.02	0.02	0.01	0.02	0	0	0	0	0	NA	NA	NA	NA	NA
Sulfate (mg/L)	-	-	19	3	0.9	15	0	13	0.8	0.0	0	NA	67	80	80	39	80	52	80	34	37	21	0	0	80	80	NA	NA	NA	NA	NA
Chloride (mg/L)	-	-	45	35	40	25	10	15	15	15	20	NA	15	10	10	20	35	30	10	5	20	30	15	15	15	35	NA	NA	NA	NA	NA
Ferrous Iron (mg/L)	-	-	0.13	0.16	0.1	0.04	0.16	0.60	0.0	0.06	0.13	NA	0.17	0.68	0.09	0.18	0.03	1.98	3.30	3.09	3.04	0.39	0.02	0	0.36	0.55	NA	NA	NA	NA	NA
Organochlorine Pesticides																															
4,4'-DDD (p,p'-DDD)	-	-	0.10U	0.48U	0.1U	0.04 U	0.10U	0.49U	0.1U	0.04 U	0.1U	0.1U	0.10U	0.48U	0.1U	0.2 U	0.1U	0.10U	0.48U	0.1U	0.058 J	0.1U	0.039 U	0.1U	0.43 U	0.1U	0.10U	0.50U	0.1U	0.04 U	0.1U
4,4'-DDE (p,p'-DDE)	-	-	0.10U	0.48U,J	0.1U	0.02 U	0.10U	0.49U,J	0.1U	0.02 U	0.1U	0.1U	0.10U	0.48U,J	0.1U	0.16	0.21N	0.10U	0.48U,J	0.1U	0.061	0.11U	0.019 U	0.1U	0.25 U	0.64N	0.10U	0.50U,J	0.1U	0.02 U	0.1U
4,4'-DDT (p,p'-DDT)	-	-	0.10U	0.48U	0.1U	0.05 U	0.10U	0.49U	0.1U	0.05 U	0.1U	0.1U	0.10U	0.48U	0.1U	1.3	0.1U	0.10U	0.48U	0.1U	0.063	0.1U	0.048 U	0.1U	0.5 U	0.1U	0.10U	0.50U	0.1U	0.05 U	0.1U
Aldrin	-	-	0.050U	0.48U	0.05U	0.02 U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.05U	0.050U	0.48U	0.05U	0.099 U	0.05U	0.050U	0.48U	0.05U	0.025 J	0.05U	0.019 U	0.05U	0.25 U	0.05U	0.050U	0.50U	0.05U	0.02 U	0.05U
alpha-BHC	-	0.03	0.050U	0.48U	0.05U	0.01 U	0.050U	0.49U	0.05U	0.01 U	0.03U	0.03U	0.050U	0.48U	0.05U	0.05 U	0.067J	0.050U	0.48U	0.05U	0.0098 U	0.011NJ	0.0097 U	0.03U	0.1 U	0.03U,J	0.050U	0.50U	0.05U	0.0099 U	0.03U
alpha-Chlordane	-	-	0.050U	0.48U	0.05U	0.02 U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.05U	0.050U	0.48U	0.05U	0.23	0.3N	0.050U	0.48U	0.05U	0.081 J	0.05U	0.019 U	0.05U	0.22	0.05U	0.050U	0.50U	0.05U	0.02 U	0.05U
beta-BHC	-	-	0.050U	0.48U	0.05U	0.02 U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.05U	0.050U	0.48U	0.05U	0.19	0.05U	0.050U	0.48U	0.05U	0.038	0.085U	0.019 U	0.05U	0.2 U	0.05U	0.050U	0.50U	0.05U	0.02 U	0.05U
delta-BHC	-	-	0.050U	0.48U	0.05U	0.02 U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.05U	0.050U	0.090J	0.05U	0.18	0.11U	0.050U	0.48U	0.05U	0.039	0.045NJ	0.019 U	0.05U	0.2 U	0.05U	0.050U	0.50U	0.05U	0.02 U	0.05U
Dieldrin	-	-	0.10U	0.48U	0.1U	0.02 U	0.10U	0.49U	0.1U	0.02 U	0.1U	0.1U	0.10U	0.48U	0.1U	0.32 U	0.1U	0.10U	0.48U	0.1U	0.046 U,J	0.1U	0.019 U	0.1U	0.32 J	0.1U	0.10U	0.50U	0.1U	0.02 U	0.1U
Endosulfan I (alpha)	-	-	0.050U	0.48U	0.05U	0.02 U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.05U	0.050U	0.48U	0.05U	0.15	0.05U	0.050U	0.48U	0.05U	0.036 U,J	0.056N	0.019 U	0.05U	0.2 U	0.05U	0.050U	0.50U	0.05U	0.02 U	0.05U
Endosulfan II (beta)	-	-	0.10U	0.48U	0.1U	0.04 U	0.10U	0.49U	0.1U	0.04 U	0.1U	0.1U	0.10U	0.48U	0.1U	0.2 U	0.1U	0.10U	0.48U	0.1U	0.13 J	0.1U	0.053 J	0.037NJ	0.58 J	1U	0.10U	0.50U	0.1U	0.04 U	0.1U
Endosulfan Sulfate	-	-	0.10U	0.48U	0.1U	0.05 U	0.10U	0.49U	0.1U	0.05 U	0.1U	0.1U	0.10U	0.48U	0.1U	0.25 U	0.1U	0.10U	0.48U	0.1U	0.049 U	0.1U	0.048 U	0.1U	0.5 U	0.1U	0.10U	0.50U	0.1U	0.05 U	0.1U
Endrin	-	2	0.10U	0.48U	0.1U	0.04 U	0.10U	0.49U	0.1U	0.04 U	0.022J	0.1U	0.10U	0.72	0.1U	0.43 U	1.8N	0.10U	0.48U	0.1U	0.055 U,J	0.12U	0.039 U	0.1U	0.4 U	1U	0.10U	0.50U	0.1U	0.04 U	0.1U
Endrin aldehyde	-	-	0.10U	0.48U	0.1U	0.05 U	0.10U	0.49U	0.1U	0.05 U	0.1U	0.1U	0.10U	0.48U	0.1U	0.25 U	0.17N	0.10U	0.48U	0.1U	0.19 U	0.15	0.09	0.1U	0.61 J	0.77N	0.10U	0.50U	0.1U	0.05 U	0.1U
Endrin ketone	-	-	0.10U	0.23J	0.1U	0.17	0.10U	0.49U	0.1U	0.05 U	0.1U	0.1U	0.10U	0.29J	0.1U	2.5	0.29N	0.10U	0.48U	0.1U	0.077	0.17N	0.37	0.36	6.5	7.3	0.10U	0.50U	0.1U	0.05 U	0.1U
gamma-BHC (Lindane)	-	0.2	0.050U	0.48U	0.05U	0.024	0.050U	0.49U	0.05U	0.01 U	0.05U	0.05U	0.050U	0.48U	0.26	1	0.05U	0.050U	0.48U	0.05U	0.0098 U	0.05U	0.0097 U	0.05U	0.1 U	0.05U	0.050U	0.50U	0.05U	0.0099 U	0.05U
gamma-Chlordane	-	-	0.050U	0.48U	0.05U	0.02 U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.05U	0.050U	0.48U	0.05U	0.18	0.2N	0.050U	0.48U	0.05U	0.074 J	0.062U	0.019 U	0.05U	0.33 U	0.05U	0.050U	0.50U	0.05U	0.02 U	0.05U
Heptachlor	-	-	0.050U	0.48U	0.05U	0.015 U	0.050U	0.49U	0.05U	0.015 U	0.05U	0.05U	0.050U	0.48U	0.05U	0.074 U	0.05U	0.050U	0.48U	0.05U	0.015 U	0.05U	0.018 U	0.05U	0.15 U	0.05U	0.050U	0.50U	0.05U	0.015 U	0.05U
Heptachlor epoxide	-	-	0.050U	0.48U	0.05U	0.02 U	0.050U	0.49U	0.05U	0.02 U	0.05U	0.05U	0.050U	0.48U	0.05U	0.12 U	0.05U	0.050U	0.48U	0.05U	0.22	0.05U	0.02 J	0.05U	0.44 U	0.05U	0.050U	0.50U	0.05U	0.02 U	0.05U
Methoxychlor	-	-	0.50U	0.48U	0.5U	0.1 U	0.50U	0.49U,J	0.5U	0.1 U	0.5U	0.5U	0.50U	0.48U	0.5U	0.5 U	0.5U	0.50U	0.48U	0.5U	0.13 U	0.5U	0.097 U	0.5U	1.3	1.3U	0.50U	0.50U	0.5U	0.099 U	0.5U
Toxaphene	-	-	5.0U	9.7U	5U	2 U	5.0U	9.8U	5U	2 U	5U	5U	5.0U	9.6U	5U	9.9 U	15	5.0U	9.6U	5U	2.7 J,N	3.8J	1.9 U	5U	20 U	15	5.0U	10U	5U	2 U	5U
Chlorophenoxy Herbicides																															
Dinoseb		7	0.97	0.25U	1.5N,J	0.25U	0.25U	0.25U	0.25U,R	0.25U	0.73	0.12J	0.42	0.25U	0.25U,R	0.25U	0.26N	0.25U	0.25U	0.25U,R	0.22J	0.25N	0.25U	0.25U	2000	940J	0.25U	0.25U	0.25U,R	2.4U	0.16NJ

NOTES:

1 Drinking Water Regulations and Health Advisories, Maximum Contaminant Levels, Summer 2000.
DUP Field duplicate sample.
- Sample not detected
NE Not Established
NA Not analyzed.
ug/L micrograms per liter.
J The identification of the analyte is acceptable; the reported value is an estimate.
U The analyte was not detected at or above the reporting limit.

R The analyte was not detected at or above the reporting limit.
* Recommended holding time exceeded.
** Presumptive evidence that analyte is present; reported as a tenative identification with an estimated value.
Shading indicates the detected concentration exceeded the ROD Health Based Goals
*** MARMW04SH was dry upon arrival so no sample was collected during event 11/10

Table 3-2 Continued Page 3 of 4
Groundwater Analytical Results, November 2010
Marzone Inc./ Chevron Chemical Company Site OU#2, Tifton, Georgia

Constituent	Federal MCL[1] (ug/L)	Remediation Performance Standards	MARMW01SH					MARMW02SH					MARMW02SHD/ MARMW92 (duplicate of MARMW02SH)				MARMW02DP		MARMW03SH					MARMW03DP				
			4/14/09	7/13/09	10/27/09	1/25/10	11/8/10	4/16/09	7/15/09	10/28/09	1/25/10	11/9/10	4/16/09	7/15/09	10/28/09	1/25/10	1/25/10	11/9/10	4/15/09	7/14/09	10/27/09	1/25/10	11/9/10	4/17/09	7/15/09	10/29/09	1/25/10	11/9/10
Metals (ug/L)																												
Mercury		-	NA	0.10U	NA	NA	NA	NA	0.10U	NA	NA	NA	NA	0.10U	NA	NA	NA	NA	NA	0.10U	NA	NA	NA	NA	0.10U	NA	NA	NA
Aluminum	-	28,702	540	100U	100U	120	53J	31,000	39000	37000	30000	53000	21,000	42000	38000	31000	540	1300	1,700	720	1400	1200	530	11,000	270	100U	3900	3800
Antimony	6	-	-	1.0U	1U	1.0U	60U	-	1.0U	1.0U	1.0U	60U	-	1.0U	1.0U	1.0U	1.0U	60U	-	1.0U	1.0U	1.0U	60U	-	1.0U	1.0U	1.0U	60U
Arsenic	10	-	1.3	2.3	2.6	1.3	10U	-	1.0U	1.0U	1.0U	10U	-	1.0U	1.0U	1.0U	1.0U	10U	2.9	3.8	4.2	3.7	10U	-	1.0U	1.0U	1.0U	10U
Barium	2,000	-	21	24	30	28	200U	12	11	15	9.3	200U	17	11	13	8.9	81	200U	25	32	29	25	200U	190	120	110	110	200U
Beryllium	4	4	-	3.0U	3.0U	3.0U	5U	-	3.0U	3.0U	3.0U	3.4J	-	3.0U	3.0U	3.0U	3.0U	1.4J	-	3.0U	3.0U	3.0U	5U	-	3.0U	3.0U	3.0U	1.3J
Cadmium	5	5	-	0.50U	0.50U	0.50U	5U	2.5	2.5	2.3	2.0	2.5J	2.6	2.5	2.3	2.1	0.50U	5U	-	0.50U	0.50U	0.50U	5U	0.59	0.50.U	0.50.U	0.50U	5U
Calcium	-	-	6,900	7600	6600	7100	7800	28,000	25000	24000	25000	26000	27,000	26000	23000	26000	4400	7000	14,000	19000	15000	22000	12000	8,700	5900	6400	5000	4700J
Chromium	-	-	-	5.0U	5.0U	5.0U	10U	-	6.5J	6.9	7.4	13	-	6.8J	7.5	7.4	5.0U	10U	-	5.0U,J	5.0U	5.0U	10U	51	5.0U,J	17	13	23
Cobalt	-	-	-	5.0U	5.0U	5.0U	50U	9.5	12	12	11	18J	7.4	13	12	12	5.0U	2.5J	-	5.0U	5.0U	5.0U	50U	8.2	5.0U	5.0U	5.0U	3.8J
Copper	1,300	-	-	10U	10U	10U	25U	86	120	140	38	240	65	120	140	44	10U	25U	12	14	14	13	15J	-	10U	16	10U	6.9J
Iron	-	8,611	3,300	7700	9800	2300	11000	230	270	170	380	800	110	290	460	320	400	960	720	290	590	490	180	7,800	160	210	2800	2600
Lead	15	15	-	1.0U	1.0U	1.0U	10U	-	1.0U	1.0U	1.0U	10U	-	1.0U	1.0U	1.0U	1.7	10U	1.3	1.0U	1.0U	1.0U	10U	6.8	1.0U	1.0U	2.9	4.8J
Magnesium	-	-	810	760	870	910	1400J	3,000	3300	3100	2900	4000J	2,300	3400	3100	2900	1700	3000J	1,700	2200	2100	2500	2600J	4,700	2400	2600	2500	2400J
Manganese	-	660	20	23	26	20	65	620	750	720	630	1000	490	780	710	650	15	15J	8.2	30	41	5.0U	75	31	5.7	30	14	14J
Molybdenum	-	-	-	10U	10U	10U	NA	-	10U	10U	10U	NA	-	10U	10U	10U	10U	NA	-	10U	10U	10U	NA	-	10U	10U	10U	NA
Nickel	-	100	-	10U	10U	10U	40U	36	46	45	45	69	25	48	44	47	10U	2J	-	10U	10U	10U	3.8J	22	10U	10U	12	8.2J
Potassium	-	-	5,500	5900	5600	4700	5700	4,600	4000	3900	4000	3800J	4,800	3900	3800	4300	1100	1300J	20,000	19000	21000	16000	30000J	2,100	1600	2100	1500	1800J
Selenium	50	-	-	2.0U	2.0U	2.0U	35U	-	2.5	2.0U	2.0U	35U	-	2.4	2.U	2.0U	2.0U	35U	-	2.0U	2.0U	2.0U	35U	-	2.0U	2.0U	2.0U	35U
Silver	-	-	-	5.0U	5.0U	5.0U	10U,R	-	5.0U	5.0U	5.0U	10U	-	5.0U	5.0U	5.0U	5.0U	10U	-	5.0U	5.0U	5.0U	10U	-	5.0U	5.0U	5.0U	10U
Sodium	-	-	2,900	4300	4700	3700	5000U	19,000	11000	9400	6100	10000U	17,000	12000	9300	7600	3600	5500U	8,800	8100	12000	8000	15000	6,500	6500	8400	5500	6200U
Strontium	-	-	22	25	24	25	NA	36	21	16	26	NA	36	20	16	26	26	NA	51	66	55	69	NA	54	35	40	30	NA
Thallium	2	-	-	1.0U	1.0U	1.0U	25U	-	1.0U	1.0U	1.0U	25U	-	1.0U	1.0U	1.0U	1.0U	25U	-	1.0U	1.0U	1.0U	25U	-	1.0U	1.0U	1.0U	25U
Tin	-	-	-	15U	15U	15U	NA	-	15U	15U	15U	NA	-	15U	15U	15U	15U	NA	-	15U	15U	15U	NA	-	15U	15U	15U	NA
Titanium	-	-	-	5.0U	5.0U	5.0U	NA	-	5.0U	5.0U	5.0U	NA	-	5.0U	5.0U	5.0U	6.7	NA	9.9	6.9	7.8	8.1	NA	39J	5.0U	5.0U	18	NA
Vanadium	-	-	-	5.0U	5.0U	5.0U	50U	-	5.0U	5.0U	5.0U	50U	-	5.0U	5.0U	5.0U	5.0U	50U	6.1	7.9	6.6	5.8	50U	31	5.0U	5.0U	12	50U
Yttrium	-	-	-	3.0U	3.0U	3.0U	NA	33	41	36	29	NA	21	44	37	31	14	NA	-	3.0U	3.0U	3.0U	NA	52	3.0U	3.0U	26	NA
Zinc	-	-	47	10U	11	100	16J	440	560	550	530	700J	400	560	540	550	12	8.8J	35	22	27	22	23J	25	10U	250	12	11J
Natural Attenuation Compounds (ASB V100 Method) (mg/L)																												
Nitrate/ Nitrite		1.0	0.062	0.081	0.050U	0.050U	0.05U	18	20	22	18	19	18	21	22	18	0.050U	0.05U	2.9	4.0	5.1	1.8	2.9	0.11	1.1	1.4	0.63	1.20
TOC			3.7	6.3	7.7	4.7	6.5	2.5	3.7	3.4	2.3	3.9	2.6	3.6	3.5	2.3	1.0U	1.4	3.4	5.9	5.2	6.1	11.0	1 U	1.0U	1.0U	1.0U	1U

NOTES:

1 Drinking Water Regulations and Health Advisories, Maximum Contaminant Levels, Summer 2000.
DUP Field duplicate sample.
- Sample not detected
NE Not Established
NA Not analyzed.
ug/L micrograms per liter.
J The identification of the analyte is acceptable; the reported value is an estimate.
U The analyte was not detected at or above the reporting limit.
* Recommended holding time exceeded.
** Presumptive evidence that analyte is present; reported as a tenative identification with an estimated value.
Shading indicates the detected concentration exceeded the ROD Health Based Goals

Table 3-2 Continued Page 4 of 4
Groundwater Analytical Results, November 2010
Marzone Inc./ Chevron Chemical Company Site OU#2, Tifton, Georgia

Constituent	Federal MCL[1] (ug/L)	Remediation Performance Standards	MARMW04DP					MARMW 94DP	MARMW05SH					MARMW06SH					MARMW07SH		MARMW08SH		RB-MAR-01				
			4/16/09	7/14/09	10/29/09	1/25/10	11/9/10	11/9/10	4/15/09	7/14/09	10/27/09	1/25/10	11/10/10	4/15/09	7/14/09	10/28/09	1/25/10	11/10/10	1/25/10	11/10/10	1/25/10	11/10/10	4/17/09	7/15/09	10/26/09	1/25/10	11/11/10
Metals (ug/L)																											
Mercury		-	NA	0.10U	NA	NA	NA	NA	NA	0.10U	NA	NA	NA	NA	0.10U	NA	NA	NA	NA	NA	NA	NA	NA	0.10U	NA	NA	NA
Aluminum	-	28,702	680	620	190	220	750	380	5,600	5500	300	1700	2600	830	640	580	400	2000	100U	120J	27000	45,000	-	100U	100U	100U	200U
Antimony	6	-	-	1.0U	1.0U	1.0U	60U	60U	-	1.0U	1.0U	1.0U	60U	-	1.0U	1U	1.0U	60U	1.0U	60U	1.0U	60U	-	1.0U	1.0U	1.0U	60U
Arsenic	10	-	-	1.0U	1.0U	1.0U	10U	10U	6.7	6.1	20	8.7	10U	-	1.0U	1U	1.0U	10U	1.0U	10U	1.0U	54R	-	1.0U	1.0U	1.0U	10U
Barium	2,000	-	100	100	100	94	200U	200U	17	35	17	11	200U	79	78	71	69	200U	59	200U	71	200U	-	5.0U	5.0U	5.0U	200U
Beryllium	4	4	-	3.0U	3.0U	3.0U	0.64J	0.63J	-	3.0U	3.0U	3.0U	5U	-	3.0U	3.0U	3.0U	5U	3.0U	0.11J	3.0U	2.9J	-	3.0U	3.0U	3.0U	5U
Cadmium	5	5	-	0.50U	0.50U	0.50U	5U	5U	-	0.50U	0.50U	0.50U	5U	-	0.50U	0.50U	0.50U	5U	0.50U	5U	4	2.2J	-	0.50U	0.50U	0.50U	5U
Calcium	-	-	4,300	4100	4200	4100	5000	5100	16,000	3200	12000	28000	6900	15,000	14000	14000	16000	11000	4000	2400J	90000	86,000	-	250U	250U	250U	5000U
Chromium	-	-	6.6	5.0U,J	7.9	5.0U	4.8J	2.9J	-	5.0U,J	5.0U	5.0U	2.8J	-	5.0U,J	9.4	5.0U	12	5.0U	10U	5.0U	10U	-	5.0U,J	5.0U	5.0U	10U
Cobalt	-	-	-	5.0U	5.0U	5.0U	50U	50U	-	5.0U	5.0U	5.0U	50U	-	5.0U	5.0U	5.0U	50U	5.0U	50U	31	33J	-	5.0U	5.0U	5.0U	50U
Copper	1,300	-	-	10U	10U	10U	25U	25U	21	20	18	15	15J	-	10U	10U	10U	5.8J,O	10U	25U	10	12J	-	10U	10U	10U	25U
Iron	-	8,611	470	420	170	160	470	210	4,100	4700	180	1200	2000	2,400	5700	8100	3300	6000	100U	100U	200	59J	-	100U	100U	100U	100U
Lead	15	15	-	1.0U	1.0U	1.0U	10U	10U	6.4	3.9	1.0U	1.3	10U	-	5.6	6.7	1.0U	10U	1.0U	10U	9.5	26	-	1.0U	1.0U	1.0U	10U
Magnesium	-	-	2,000	1900	1900	1800	2300J	2300J	4,100	1300	3400	6000	2000J	4,000	3700	3700	4300	3000J,O	1700	1500J	43000	47,000	-	250U	250U	250U	5000U
Manganese	-	660	-	5.0U	5.0U	5.0U	7.6J	6.8J	180	93	160	190	180	840	910	870	930	390	44	5.9J	1100	1200	-	5.0U	5.0U	5.0U	15U
Molybdenum	-	-	-	10U	10U	10U	NA	NA	-	10U	17	10U	NA	-	10U	10U	10U	NA	10U	NA	10U	NA	-	10U	10U	10U	NA
Nickel	-	100	-	10U	10U	10U	40U	40U	-	10U	10U	10U	4.6J	17	10U	10U	10U	4.5J,O	10U	40U	51	59	-	10U	10U	10U	40U
Potassium	-	-	1,300	1300	1300	1400	1700J	1800J	19,000	49000	55000	23000	54000	14,000	14000	13000	10000	12000	1000U	870J	7000	8,800	-	1000U	1000U	1000U	5000U
Selenium	50	-	-	2.0U	2.0U	2.0U	35U	35U	-	2.6	2.0U	2.0U	35U	-	2.0U	2.0U	2.0U	35U	2.0U	35U	20	21J	-	2.0U	2.0U	2.0U	35U
Silver	-	-	-	5.0U	5.0U	5.0U	10U	10U	-	5.0U	5.0U	5.0U	10U	-	5.0U	5.0U	5.0U	10U	5.0U	10U	5.0U	20U	-	5.0U	5.0U	5.0U	10U
Sodium	-	-	6,500	6200	6800	6400	7000U	7400U	5,600	13000	20000	6100	14000	3,800	3800	4100	3500	5000U	9200	8100U	100000	120,000	-	1000U	1000U	1000U	5000U
Strontium	-	-	24	23	24	22	NA	NA	36	15	29	55	NA	35	33	32	36	NA	28	NA	510	NA	-	5.0U	5.0U	5.0U	NA
Thallium	2	-	-	1.0U	1.0U	1.0U	25U	25U	-	1.0U	1.0U	1.0U	25U	-	1.0U	1.0U	1.0U	25U	1.0U	25U	1.0U	25U	-	1.0U	1.0U	1.0U	25U
Tin	-	-	-	15U	15U	15U	NA	NA	-	15U	15U	15U	NA	-	15U	15U	15U	NA	15U	NA	15U	NA	-	15U	15U	15U	NA
Titanium	-	-	6.1	5.4	5U	5.0U	NA	NA	42	41	5.0U	12	NA	5.4	6.2	5.0U	5.0U	NA	5.0U	NA	5.0U	NA	-	5.0U	5.0U	5.0U	NA
Vanadium	-	-	-	5.0U	5.0U	5.0U	50U	50U	19	12	5	8.1	50U	-	5.0U	5.0U	5.0U	50U	5.0U	50U	5.0U	50U	-	5.0U	5.0U	5.0U	50U
Yttrium	-	-	7.9	9.2	3.4	3.0U	NA	NA	4.3	9.5	3	3.0U	NA	-	3.0U	3.0U	3.0U	NA	3.0U	NA	300	NA	-	3.0U	3.0U	3.0U	NA
Zinc	-	-	-	10U	10U	10U	2.9J	2.8J	89	99	67	35	140J	230	100	120	120	82J,O	10U	4.5J	250	240J	-	10U	10U	10U	60U
Natural Attenuation Compounds (ASB V100 Method) (mg/L)																											
Nitrate/ Nitrite		1.0	5.3	5.5	5.9	5.3	6.3	6.3	0.87	3.2	3.1	0.66	4.70	0.21	0.60	0.97	0.22	4.70	4.9	5.1O	140	190	-	-	-	-	-
TOC			1 U	1.0U	1.0U	1.0U	1U	1U	11	7.9	16.0	14.0	11.0	5.7	6.8	7.9	7.7	5.5	1.0U	1U,O	9.5	16.0	-	-	-	-	-

NOTES:

1 Drinking Water Regulations and Health Advisories, Maximum Contaminant Levels, Summer 2000.
DUP Field duplicate sample.
- Sample not detected
NE Not Established
NA Not analyzed.
ug/L micrograms per liter.
J The identification of the analyte is acceptable; the reported value is an estimate.
U The analyte was not detected at or above the reporting limit.
* Recommended holding time exceeded.
** Presumptive evidence that analyte is present; reported as a tentative identification with an estimated value.
Shading indicates the detected concentration exceeded the ROD Health Based Goals

Table 3-3 Page 1 of 2
Sediment Analytical Results, November 2010
Marzone Inc./ Chevron Chemical Company Site OU#2, Tifton, Georgia

Constituent	Remediation Performance Standards (ug/Kg)	MARSD01					MARSD02					MARSD05/ MARSD92 (duplicate of MARSD02)					MARSD03					MARSD04				
		4/16/2009	7/15/2009	10/26/2009	1/25/2010	11/11/10	4/16/2009	7/15/2009	10/26/2009	1/25/2010	11/11/10	4/16/2009	7/15/2009	10/26/2009	1/25/2010	11/11/10	4/16/2009	7/15/2009	10/26/2009	1/25/2010	11/11/10	4/16/2009	7/15/2009	10/26/2009	1/25/2010	11/11/10
Organochlorine Pesticides (ug/Kg)																										
4,4'-DDD (p,p'-DDD)	5000	5.4U	46	4.9U	65	6.2U	8.4U	160	5.4U	210	7.3U	7.9U	130	5.6U	300	7U	6.4U	260	4.9U	110	6.5U	12U	160	8.7U	330	4.2U
4,4'-DDE (p,p'-DDE)	5000	39	29J	42N,CLP1	28	6.2U	64	57J	5.4U	100 J	7.3U	71N	40J	5.6U	120	7U	46	81	24U,CLP1	39	6.5U	120	57J	63U,CLP1	100	4.2U
4,4'-DDT (p,p'-DDT)	5000	8.3N	65J	4.9U	47	6.2U	19	130	5.4U	170	7.3U	18N	110	5.6U	170	7U	21N	150	4.9U	43	6.5U	6.1U	75J	8.7U	92	4.2U
Aldrin	-	2.8U	46U	2.5U	1.2 U	3.2U	4.3U	63U	2.8U	11 U	3.8U	4.1U	70U	2.9U	29 U	3.6U	3.3U	66U	2.5U	6.7 U	3.3U	6.1U	110U	4.5U	13 U	2.1U
alpha-BHC	-	2.8U	46U	2.5U	0.61	3.2U	4.3U	63U	2.8U	2.8 U	3.8U	4.1U	70U	2.9U	2.9 U	3.6U	3.3U	66U	2.5U	0.89 J	3.3U	6.1U	110U	4.5U	1.5 J	2.1U
alpha-Chlordane	100	2.8U	26J	2.5U	42 J	3.2U	4.3U	73	2.8U	190 J	3.8U	58	58J	2.9U	210 J	3.6U	36	120	2.5U	67 J	3.3U	6.1U	81J	4.5U	210 J	2.1U
beta-BHC	-	2.8U	46U	2.5U	7.3	3.2U	4.3U	63U	2.8U	23	3.8U	4.1U	70U	2.9U	27	3.6U	3.3U	66U	2.5U	12	3.3U	6.1U	110U	4.5U	17	2.1U
delta-BHC	-	2.8U	46U	2.5U	5.5	3.2U,J,O	4.3U	63U	2.8U	18	3.8U,J,O	4.1U	70U	2.9U	21	3.6U,J,O	3.3U	66U	2.5U	6.1 J	3.3U,J,O	6.1U	110U	4.5U	18	2.1U,J,O
Dieldrin	-	5.4U	46U	4.9U	23 J	6.2U	8.4U	63U	5.4U	130 J	7.3U	7.9U	70U	5.6U	150 J	7U	6.4U	66U	4.9U	30 J	6.5U	12U	110U	8.7U	93 J	4.2U
Endosulfan I (alpha)	-	2.8U	46U	2.5U	12 U	3.2U	4.3U	49J	2.8U	75 J	3.8U	4.1U	70U	2.9U	82 J	7.5	3.3U	66U	2.5U	18 J	3.3U	6.1U	110U	4.5U	40 J	2.1U
Endosulfan II (beta)	-	5.4U	46U	4.9U	60 U	6.2U	8.4U	63U	5.4U	360 U	7.3U	7.9U	70U	5.6U	400 J	7U	6.4U	66U	4.9U	94	6.5U	12U	110U	8.7U	140 U	4.2U
Endosulfan Sulfate	-	5.4U	46U	4.9U	26 U	6.2U	8.4U	32J	5.4U	60	7.3U	7.9U	36J	5.6U	86	2.8J,O	6.4U	30J	4.9U	17 U	6.5U	12U	110U	8.7U	50 U	4.2U
Endrin	-	5.4U	46U	4.9U	12 U	6.2U	8.4N	63U	5.4U	59 U	7.3U	7.9U	70U	5.6U	72 U	7U	6.4U	66U	4.9U	63	6.5U	18N	110U	8.7U	69 U	4.2U
Endrin aldehyde	-	5.4U	46U	4.9U	37 U	6.2U	8.4U	63U	5.4U	200 U	7.3U	7.9U	70U	5.6U	240 U	7U	13N	66U	4.9U	57 U	6.5U	12U	110U	8.7U	66 U	4.2U
Endrin ketone	-	5.4U	46U	4.9U	43	6.2U	8.4U	120	5.4U	160	7.3U	7.9U	100	5.6U	190	7U	5.5J	130	4.9U	190	6.5U	12U	67J	8.7U	86	4.2U
gamma-BHC (Lindane)	-	2.8U	46U	2.5U	1.6 J	3.2U	4.3U	63U	2.8U	6.1 J	3.8U	4.1U	70U	2.9U	7.5 J	3.6U	3.3U	66U	2.5U	2.3 J	3.3U	6.1U	110U	4.5U	3.2 J	2.1U
gamma-Chlordane	100	2.8U	51	2.5U	49	3.2U	4.3U	120	2.8U	170	3.8U	4.1U	89	2.9U	200	3.6U	3.3U	220	2.5U	64	3.3U	6.1U	140	4.5U	220	2.1U
Heptachlor	-	2.8U	46U	2.5U	1.5 J	3.2U	4.3U	63U	2.8U	10	3.8U	4.1U	70U	2.9U	12	3.6U	3.3U	66U	2.5U	3.1 J	3.3U	6.1U	110U	4.5U	12 J	2.1U
Heptachlor epoxide	-	2.8U	46U	2.5U	6.8 U	3.2U	4.3U	63U	2.8U	42 U	3.8U	4.1U	70U	2.9U	47 U	3.6U	3.3U	66U	2.5U	16 U	3.3U	6.1U	110U	4.5U	30 U	2.1U
Methoxychlor	-	28U	46U	25U	29 U	32U	43U	63U	28U	83 U	38U	41U	70U	29U	120 U	36U	33U	66U	25U	33 U	33U	61U	110U	45U	67 U	21U
Toxaphene CLP lab	3000	NA	NA	360 D-1	NA	320U	NA	NA	690 D-1	NA	380U	NA	NA	810 D-1	NA	360U	NA	NA	450 D-1	NA	330U	NA	NA	1000 D-1	NA	210U
Toxaphene EPA lab	3000	280U	8,400	930J	6400 J,N	NA	430U	11,000	1600J	35000 J,N	NA	410U	14,000	2700J	36000 J,N	NA	330U	36,000	3500J	3900 J,N	NA	610U	52,000	1200J	35000 J,N	NA
Dinoseb (ug/Kg)																										
Dinoseb	-	-	-	12U,J	13U	16U	-	-	14U,J	13U	18U	-	-	17U,J	14U	17J,O	-	-	12U,J	17U	16U	-	-	22U,J	30U	11U

NOTES:

- \- Sample not detected
- NE Not Established
- NA Not analyzed.
- ug/Kg micrograms per kilogram.
- mg/Kg milligrams per kilogram.
- J The analyte was positively identified; the quantitation is an estimation.
- N There is presumptive evidence that the analyte is present.
- U The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

Shading indicates the detected concentration exceeded the ROD Health Based Goals

Table 3-3 Page 2 of 2
Sediment Analytical Results, November 2010
Marzone Inc./ Chevron Chemical Company Site OU#2, Tifton, Georgia

Constituent	Remediation Performance Standards (mg/Kg)	MARSD01					MARSD02					MARSD05 / MARSD92 (duplicate of MARSD02)					MARSD03					MARSD04				
		4/16/2009	7/15/2009	10/26/2009	1/25/10	11/11/10	4/16/2009	7/15/2009	10/26/2009	1/25/10	11/11/10	4/16/2009	7/15/2009	10/26/2009	1/25/10	11/11/10	4/16/2009	7/15/2009	10/26/2009	1/25/10	11/11/10	4/16/2009	7/15/2009	10/26/2009	1/25/10	11/11/10
Metals (mg/Kg)																										
Mercury	-	NA	0.051J	NA	NA	NA	NA	0.14	NA	NA	NA	NA	0.13	NA	NA	NA	NA	0.13	NA	NA	NA	NA	0.21	NA	NA	NA
Aluminum	-	2,200J	5000	4400	9200	10000R	9,700	22000	12000	10000	21000R	9,000	22000	13000	10000	22000R	6,700	11000	2900	32000	28000R	15,000	13000	13000	15000	10000R
Antimony	-	-	0.50U	0.2U	0.20U	9.2U	-	0.50U,J	0.2U,J	0.20U	11U	-	0.49U	0.2U	0.20U	12U	-	0.49U	0.2U	0.20U	12U	-	0.50U	0.33	0.20 U,J	8.6U
Arsenic	-	2.6	5.1	5.5	10	5.2O	7.0	19	13	16	13O	7.3	29	26	14	28O	6.6	5.8	7.1	11	38O	7.6	6.7	16	6.5	6.4O
Barium	-	13	27	29	65	31U	81	85	33	48	44	72	91	33	47	42	49	85	20	50	88	120	110	92	110	34
Beryllium	-	-	0.30U	0.3U	0.36	0.27J	0.48	1.1	0.56	0.45	0.92J	0.42	1.1	0.57	0.46	1.1	0.34	0.54	0.3U	1.2	0.89J	0.73	0.62	0.59	0.55	0.29J
Cadmium	-	-	0.25U	0.15	0.28	0.77U	0.61	0.55	0.21	0.38	0.94U	0.57	0.59	0.41	0.42	1U	0.25	0.6	0.19	0.7	0.5J	0.94	0.9	1.7	0.91	0.72U
Calcium	-	460	1000	1200	2600	990	3,700	2400	1600J	2500	1800	3,500	2500	1700	2500	1400	2,300	4600	1000	3000	3900	7,400	5500	4400	6200	1500
Chromium	-	2.2	4.6	4.6	11	9.4	11	17	9	11	15	10	17	8.9	11	16	6.2	13	3.1	18	22	17	16	14	20	11J
Cobalt	-	-	0.50U	0.5	1.3	0.88J	1.7	1.2	0.5U	1.1	1.2J	1.4	1.1	0.49U	1.3	1.4J	1.1	2.1	0.51	1.3	2.3J	2.8	2.7	2.2	3.6	0.86J
Copper	20	6.9	13	17	56	19	52	70	50	88	33	44	69	44	88	69	27	72	11	45	78	71	85	72	56	22
Iron	-	2,500J	5500	5400	12000	6400	10,000	14000	3400J	9600	7200	9,800	19000	3700	8800	11000	6,500	12000	2700	7100	19000	14,000	15000	11000	17000	6500
Lead	330	10	19	17	50	22J	36	56	20	40	25J	30	63	24	39	34J	21	44	16	32	50J	53	52	44	49	13J
Magnesium	-	52	110	130	320	770U	430	300	170	290	940U	390	320	190	280	1000U	200	520	100	350	970U	660	610	600	1100	720U
Manganese	-	30	36	50	180	30	140	110	39	230	56	110	120	39	230	150	200	340	61	110	340	310	310	200	510	89
Molybdenum	-	-	1.0U	1U	0.99U	NA	-	0.99U,J	0.99U,J	0.99U	NA	-	0.99U	0.98U	0.99U	NA	-	0.98U	0.98U	1.0U	NA	-	0.99U	1U	0.99U,J	NA
Nickel	-	1.0	2.1	2.1	4.0	4.1J	5.1	7.5	4.5	4.5	8.1	4.5	7.4	4.5	4.6	7.7J	3.0	5.9	1.5	12	11	8.2	7.2	7.1	7.9	4.2J
Potassium	-	-	100	100	220	770U	290	460	230	220	940U	290	460	240	230	1000U	160	440	98U	420	970U	460	420	340	560	720U
Selenium	-	-	1.0U	0.4U	0.40U	5.4U	-	0.99U,J	0.68	0.47	6.6U	-	0.99U	1.3	0.51	7.1U	-	0.98U	0.39U	1.1	6.8U	-	0.99U	1	0.59J	5U
Silver	-	-	0.50U	0.5U	0.50U	1.5U	-	0.50U	0.5U	0.50U	1.9U	-	0.49U	0.49U	0.50U	2U	-	0.49U	0.49U	0.50U	1.9U	-	0.50U	0.5	0.49U	1.4U,R
Sodium	-	-	100U	100U	99U	770U	-	99U	99U	99U	940U	-	99U	98U	99U	1000U	-	98U	98U	100U	970U	-	99U	100	110	720U
Strontium	-	2.1	5.5	8.3	11	NA	14	10	6.7	10	NA	13	11	6.8	10	NA	8.2	14	5.8	11	NA	22	20	24	27	NA
Thallium	-	-	0.50U	0.2U	0.20U	3.8U	-	0.50U	0.2U	0.20U	4.7U	-	0.49U	0.2U	0.20U	5.1U	-	0.49U	0.2U	0.20U	4.9U	-	0.50U	0.22	0.20U	3.6U
Tin	-	-	1.5U	1.5U	1.5U	NA	-	1.8	1.5U,J	1.5U	NA	-	1.9	1.5U	1.5U	NA	-	1.5U	1.5U	1.5U	NA	-	1.6	1.5U	1.5U,J	NA
Titanium	-	6.7	9.7	11	19	NA	24	22J	7.2J	17	NA	24	24	7.7	17	NA	15	34	7.4	13	NA	29	39	26	65J	NA
Vanadium	-	5.7	11	11	25	21	24	45	15	23	27	23	48	14	22	33	12	27	7.3	29	48	34	37	29	39	30J
Yttrium	-	0.89	2	1.9	4.4	NA	4.8	5.4	2.9	4.3	NA	4.3	5.5	2.9	4.2	NA	2.7	5.9	1	4.3	NA	7.2	6.8	6.1	7.6	NA
Zinc	100	44	90	97	200	120	330	290	130	240	160	310	290	140	250	140	160	360	69	540	290	510	540	440	510	100

NOTES:

- \- Sample not detected
- NE Not Established
- NA Not analyzed.
- ug/Kg micrograms per kilogram.
- mg/Kg milligrams per kilogram.
- J The analyte was positively identified; the quantitation is an estimation.
- N There is presumptive evidence that the analyte is present.
- U The analyte was analyzed for, but not detected. The associated numerical value is at or below the MDL.

Shading indicates the detected concentration exceeded the ROD Health Based Goals

Appendix I: Risk-Based Contaminants

OU1 Risk-Based Contaminants

	Carcinogenic toxicity changes						Non-carcinogenic toxicity changes					
	Oral Cancer Slope Factor			Inhalation Unit Risk			Oral Reference Dose			Inhalation RfC		
Contaminants	1994 ROD Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Change in Oral CSF	1994 ROD Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Inhalation Unit Risk Value $(\mu g/m^3)^{-1}$	Change in IUR	1994 ROD Oral RfD Value (mg/kg-d)	2012 Oral RfD Value (mg/kg-d)	Change in Oral RfD	1994 ROD Inhalation RfC Value (mg/kg-day)	2012 Inhalation RfC Value (mg/m^3)	Change in Inhalation RfC
Arsenic	1.75E+00	1.5E+00	Lower CSF	1.5E+01	4.3E-03	NA	3.0E-03	3.0E-04	Lower RfD	NA	1.5E-05	NA
Atrazine	2.22E-01	2.3E-01	Higher CSF	NA	NA	NA	5.0E-03	3.5E-02	Higher RfD	NA	NA	NA
Benzene	2.9E-02	5.5E-02	Higher CSF	2.91E-02	7.8E-06	NA	NA	4.0E-03	New RfD	NA	3.0E-02	NA
Alpha-BHC	6.3E+00	6.3E+00	No Change	6.3E+00	1.8E-03	NA	NA	8.0E-03	New RfD	NA	NA	NA
Beta-BHC	1.8E+00	1.8E+00	No Change	1.8E+00	5.3E-04	NA	NA	NA	NA	NA	NA	NA
Alpha-Chlordane	1.3E+00	3.5E-01	Lower CSF	1.3E+00	1.0E-04	NA	6.0E-05	5.0E-04	Higher RfD	NA	7.0E-04	NA
Gamma-Chlordane	1.3E+00	3.5E-01	Lower CSF	1.3E+00	1.0E-04	NA	6.0E-05	5.0E-04	Higher RfD	NA	7.0E-04	NA
Chromium (VI)	NA	5.0E-01	New CSF	4.2E+01	8.4E-02	NA	5.0E-03	3.0E-03	Lower RfD	5.71E-07	1.0E-04 (particulates)	NA
Copper	NA	NA	NA	NA	NA	NA	3.7E-02	4.0E-02	Higher RfD	NA	NA	NA
DDD	2.4E-01	2.4E-01	No Change	3.4E-01	6.9E-05	NA	5.0E-04	NA	RfD Removed	NA	NA	NA
DDE	3.4E-01	3.4E-01	No Change	3.4E-01	9.7E-05	NA	5.0E-04	NA	RfD Removed	NA	NA	NA
DDT	3.4E-01	3.4E-01	No Change	3.4E-01	9.7E-05	NA	5.0E-04	5.0E-04	No Change	NA	NA	NA
Dieldrin	1.6E+01	1.6E+01	No Change	1.6E+01	4.6E-03	NA	5.0E-05	5.0E-05	No Change	NA	NA	NA
Endosulfan I	NA	NA	NA	NA	NA	NA	5.0E-05	6.0E-03	Higher RfD	NA	NA	NA
Endosulfan II	NA	NA	NA	NA	NA	NA	5.0E-05	6.0E-03	Higher RfD	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	3.0E-04	3.0E-04	No Change	NA	NA	NA
Ethylbenzene	NA	1.1E-02	New CSF	NA	2.5E-06	NA	1.0E-01	1.0E-01	No Change	2.86E-01	1.0E+00	NA
Heptachlor Epoxide	9.1E+00	9.1E+00	No Change	9.1E+00	2.6E-03	NA	1.3E-05	1.3E-05	No Change	NA	NA	NA
Heptachlor	4.5E+00	4.5E+00	No Change	4.55E+00	1.3E-03	NA	5.0E-04	5.0E-04	No Change	NA	NA	NA
Lindane	1.3E+00	1.1E+00	Lower CSF	NA	3.1E-04	NA	3.0E-04	3.0E-04	No Change	NA	NA	NA
Methyl Parathion	NA	NA	NA	NA	NA	NA	2.5E-04	2.5E-04	No Change	NA	NA	NA
PCB-1260	7.7E+00	2.0E+00	Lower CSF	NA	5.7E-04	NA	NA	NA	NA	NA	NA	NA

Contaminants	Carcinogenic toxicity changes						Non-carcinogenic toxicity changes					
	Oral Cancer Slope Factor			Inhalation Unit Risk			Oral Reference Dose			Inhalation RfC		
	1994 ROD Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Change in Oral CSF	1994 ROD Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Inhalation Unit Risk Value $(\mu g/m^3)^{-1}$	Change in IUR	1994 ROD Oral RfD Value (mg/kg-d)	2012 Oral RfD Value (mg/kg-d)	Change in Oral RfD	1994 ROD Inhalation RfC Value (mg/kg-day)	2012 Inhalation RfC Value (mg/m^3)	Change in Inhalation RfC
Toxaphene	1.1E+00	1.1E+00	No Change	1.12E+00	3.2E-04	NA	NA	NA	NA	NA	NA	NA
Xylene (mixed)	NA	NA	NA	NA	NA	NA	2.0E+00	2.0E-01	Lower RfD	NA	1.0E-01	NA
Zinc	NA	NA	NA	NA	NA	NA	3.0E-01	3.0E-01	No Change	NA	NA	NA

OU2 Risk-Based Contaminants

Contaminants	Carcinogenic toxicity changes						Non-carcinogenic toxicity changes					
	Oral Cancer Slope Factor			Inhalation Unit Risk			Oral Reference Dose			Inhalation RfC		
	1999 ROD Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Change in Oral CSF	1999 ROD Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Inhalation Unit Risk Value $(\mu g/m^3)^{-1}$	Change in IUR	1999 ROD Oral RfD Value (mg/kg-d)	2012 Oral RfD Value (mg/kg-d)	Change in Oral RfD	1999 ROD Inhalation RfC Value (mg/kg-day)	2012 Inhalation RfC Value (mg/m^3)	Change in Inhalation RfC
1,1,2-trichloroethane	5.7E-02	5.7E-02	No Change	5.6E-02	1.6E-05	NA	4.0E-03	4.0E-03	No Change	NA	2.0E-04	NA
Alpha-BHC	6.3E+00	6.3E+00	No Change	6.3E+00	1.8E-03	NA	NA	8.0E-03	New RfD	NA	NA	NA
Alpha-chlordane	1.3E+00	3.5E-01	Lower CSF	1.3E+00	1.0E-04	NA	6.0E-05	5.0E-04	Higher RfD	2.00E-04	7.0E-04	NA
Aluminum	NA	NA	NA	NA	NA	NA	1.0E+00	1.0E+00	No Change	NA	5.0E-03	NA
Arsenic	1.5E+00	1.5E+00	No Change	1.5E+01	4.3E-03	NA	3.0E-04	3.0E-04	No Change	NA	1.5E-05	NA
Atrazine	2.20E-01	2.3E-01	Higher CSF	NA	NA	NA	3.5E-02	3.5E-02	No Change	NA	NA	NA
Beryllium	4.3E+00	NA	CSF Removed	8.4E+00	2.4E-03	NA	5.0E-03	2.0E-03	Lower RfD	6.0E-06	2.0E-05	NA
Cadmium	NA	NA	NA	6.3E+00	1.8E-03	NA	5.0E-04	5.0E-04 (water)	No Change	NA	2.0E-05	NA
Chloroform	6.1E-03	3.1E-02	Higher CSF	8.1E-02	2.3E-05	NA	1.0E-02	1.0E-02	No Change	NA	9.8E-02	NA
Chromium VI	NA	5.0E-01	New CSF	4.2E+01	8.4E-02	NA	5.0E-03	3.0E-03	Lower RfD	3.0E-05	1.0E-04 (particulates)	NA
Copper	NA	NA	NA	NA	NA	NA	4.0E-02	4.0E-02	No Change	NA	NA	NA
DDD	2.4E-01	2.4E-01	No Change	NA	6.9E-05	NA	NA	NA	NA	NA	NA	NA
DDE	3.4E-01	3.4E-01	No Change	NA	9.7E-05	NA	NA	NA	NA	NA	NA	NA

Contaminants	Carcinogenic toxicity changes						Non-carcinogenic toxicity changes					
	Oral Cancer Slope Factor			Inhalation Unit Risk			Oral Reference Dose			Inhalation RfC		
	1999 ROD Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Oral Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	Change in Oral CSF	1999 ROD Inhalation Cancer Slope Factor $(mg/kg\text{-}day)^{-1}$	2012 Inhalation Unit Risk Value $(\mu g/m^3)^{-1}$	Change in IUR	1999 ROD Oral RfD Value (mg/kg-d)	2012 Oral RfD Value (mg/kg-d)	Change in Oral RfD	1999 ROD Inhalation RfC Value (mg/kg-day)	2012 Inhalation RfC Value (mg/m^3)	Change in Inhalation RfC
DDT	3.4E-01	3.4E-01	No Change	3.4E-01	9.7E-05	NA	5.0E-04	5.0E-04	No Change	NA	NA	NA
Dinoseb	NA	NA	NA	NA	NA	NA	1.0E-03	1.0E-03	No Change	NA	NA	NA
Endrin	NA	NA	NA	NA	NA	NA	3.0E-04	3.0E-04	No Change	NA	NA	NA
Endrin ketone	NA	NA	NA	NA	NA	NA	3.0E-04	NA	RfD Removed	NA	NA	NA
Gamma-BHC (Lindane)	1.3E+00	1.1E+00	Lower CSF	NA	3.1E-04	NA	3.0E-04	3.0E-04	No Change	NA	NA	NA
Gamma-chlordane	1.3E+00	3.5E-01	Lower CSF	1.3E+00	1.0E-04	NA	6.0E-05	5.0E-04	Higher RfD	2.0E-04	7.0E-04	NA
Iron	NA	NA	NA	NA	NA	NA	3.0E-01	7.0E-01	Higher RfD	NA	NA	NA
Lead*	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	NA	NA	NA	NA	NA	NA	2.3E-02	2.4E-02	Higher RfD	1.43E-05	5.0E-05	NA
Nickel	NA	NA	NA	NA	2.6 E-04 (soluble salts)	NA	2.0E-02	2.0 E-02 (soluble salts)	No Change	NA	9.0E-05 (soluble salts)	NA
Nitrate/Nitrite	NA	NA	NA	NA	NA	NA	1.0E-01	1.6E+00 (nitrate), 1.0E-01 (nitrite)	No Change	NA	NA	NA
Toxaphene	1.1E+00	1.1E+00	No Change	1.1E+00	3.2E-04	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	7.0E-03	5.0E-03	Lower RfD	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	3.0E-01	3.0E-01	No Change	NA	NA	NA

*Lead is considered a probable human carcinogen: however no data on cancer slope factors are available.