Five-Year Review Report

Fourth Five-Year Review Report
for
Wamchem, Inc.
SCD037405362

Burton
Beaufort County, South Carolina

April 2014

United States Environmental Protection Agency
Region 4
Atlanta, Georgia

Approved by:

Franklin E. Hill
Director, Superfund Division

Date: 5/6/14

Fourth Five-Year Review Report
for
Wamchem, Inc.
Indol Road
Burton
Beaufort County, South Carolina

Tables

Figures

List of Acronyms

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
AWQC	Ambient Water Quality Criteria
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
COC	Contaminant of Concern
EPA	United States Environmental Protection Agency
ERM	Environmental Resources Management
FYR	Five-Year Review
IC	Institutional Control
MCL	Maximum Contaminant Level
µg/L	Micrograms Per Liter
mg/kg	Milligrams Per Kilogram
mg/L	Milligrams Per Liter
MLC	M. Lowenstein Corporation
NCP	National Contingency Plan
NPDES	National Pollutant Discharge Elimination System
NPL	National Priorities List
O&M	Operation and Maintenance
PRG	Preliminary Remediation Goals
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
ROD	Record of Decision
RPM	Remedial Project Manager
SCDHEC	South Carolina Department of Health and Environmental Control
VISL	Vapor Intrusion Screening Level
VOC	Volatile Organic Compound

Executive Summary

The 25-acre Wamchem, Inc. Superfund site (the Site) is located in the rural area of Burton, Beaufort County, South Carolina. A facility on site produced dye products from the 1950s to 1982. Facility operations and waste handling practices contaminated soil and ground water. EPA placed the Site on the Superfund program's National Priorities List (NPL) in 1984. In 1988, EPA issued a Record of Decision (ROD), selecting a remedy for the Site. The cleanup plan included:

- Using low-level heat to pull contamination from soil.
- Using a pump-and-treat system to address contaminated ground water.
- Discharging treated ground water to McCalley's Creek.

Under the ROD, in 1993, Springs Industries, the Site's potentially responsible party (PRP), dug up and treated about 2,669 tons of contaminated soil on site. The PRP also conducted follow-up sampling to confirm that the treated soil met cleanup goals. In 1996, the PRP put in a five-well ground water pump-and-treat system. Ground water treatment is ongoing. The triggering action for this five-year review (FYR) was the signing of the previous FYR on April 29, 2009.

The remedy at the Site currently protects human health and the environment. Contaminated soils were treated and contaminated ground water is currently being treated. For the remedy to be protective over the long term, institutional controls governing ground water should be considered.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Wamchem, Inc.		
EPA ID: SCD037405362		
Region: 4	**State:** SC	**City/County:** Burton/Beaufort
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Johnny Zimmerman-Ward and Melissa Oakley (Reviewed by EPA)		
Author affiliation: Skeo Solutions		
Review period: 11/06/2013 – 04/29/2014		
Date of site inspection: 01/15/2014		
Type of review: Policy		
Review number: 4		
Triggering action date: 04/29/2009		
Due date *(five years after triggering action date)*: 04/29/2014		

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: There are no institutional controls in place to prevent access to contaminated ground water.			
	Recommendation: Assess the Site to determine if institutional controls are needed to prevent potential future exposure to contaminated ground water.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	04/01/2015

Sitewide Protectiveness Statement

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

Protectiveness Statement:
The remedy at the Site currently protects human health and the environment. Contaminated soils were treated and contaminated ground water is currently being treated. For the remedy to be protective over the long term, institutional controls governing ground water should be considered.

Five-Year Review Summary Form (continued)

Environmental Indicators
- Current human exposures at the Site are under control. *- Current ground water migration is under control.*

Are Necessary Institutional Controls in Place?
☐ All ☐ Some ☒ None *The Site needs further evaluation to determine whether institutional controls are necessary.*

Has EPA Designated the Site as Sitewide Ready for Anticipated Use?
☐ Yes ☒ No

Has the Site Been Put into Reuse?
☐ Yes ☒ No

Fourth Five-Year Review Report
for
Wamchem, Inc. 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. FYR reports document FYR methods, findings and conclusions. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The United States Environmental Protection Agency 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 5 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 action no less often than every five years after 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 Wamchem, Inc. Superfund site (the Site) in Burton, Beaufort County, South Carolina. EPA's contractor conducted this FYR from November 2013 to April 2014. EPA is the lead agency for developing and implementing the remedy for the potentially responsible party (PRP)-financed cleanup at the Site. The South Carolina Department of Health and Environmental Control (SCDHEC), as the support agency representing the State of South Carolina, has reviewed all supporting documentation and provided input to EPA during the FYR process.

This is the fourth FYR for the Site. The triggering action for this policy review is the signature date of the third FYR. The FYR is required because hazardous substances, pollutants or contaminants

remain at the Site above levels that allow for unlimited use and unrestricted exposure. This FYR Report addresses the entire Site.

2.0 Site Chronology

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

Table 1: Chronology of Site Events

Event	Date
Beaufort Chemical and Research Company built a dye manufacturing facility at the site property	Late 1950s
Beaufort Chemical and Research Company operated at the Site	Late 1950s-1972
M. Lowenstein Corporation (MLC) acquired the site property and began facility operations	1972
SCDHEC conducted a surface water investigation	August 1977
MLC ceased facility operations	1982
EPA finalized the Site on the National Priorities List (NPL)	September 21, 1984
State Support Agency Cooperative Agreement entered	April 15, 1986
PRP, Springs Industries, entered Administrative Order on Consent (AOC) Agreement	April 16, 1986
MLC completed remedial investigation	April 21, 1987
EPA issued a Record of Decision (ROD) for site cleanup	June 30, 1988
PRP signed Consent Decree	January 17, 1990
PRP completed remedial design for soil remedy	December 4, 1992
PRP began soil remedial action	June 25, 1993
PRP completed soil remedial action	August 11, 1993
PRP completed remedial design for ground water remedy	July 27, 1995
PRP completed Operation and Maintenance (O&M) Manual for ground water treatment system	September 1995
PRP began construction of ground water treatment system	February 5, 1996
EPA performed construction completion inspection for ground water treatment system	May 1, 1996
Ground water recovery system became operational	September 1996
EPA issued a Preliminary Close-out Report	September 30, 1997
EPA signed the Site's first FYR	April 6, 1999
EPA signed the Site's second FYR	April 29, 2004
Springs Industries issued Ground Water Recovery Treatment System Reconfiguration Report	December 2006
PRP altered ground water pump-and-treat system to include only one tower with no blowers	April 2008
EPA signed the Site's third FYR	April 28, 2009

3.0 Background

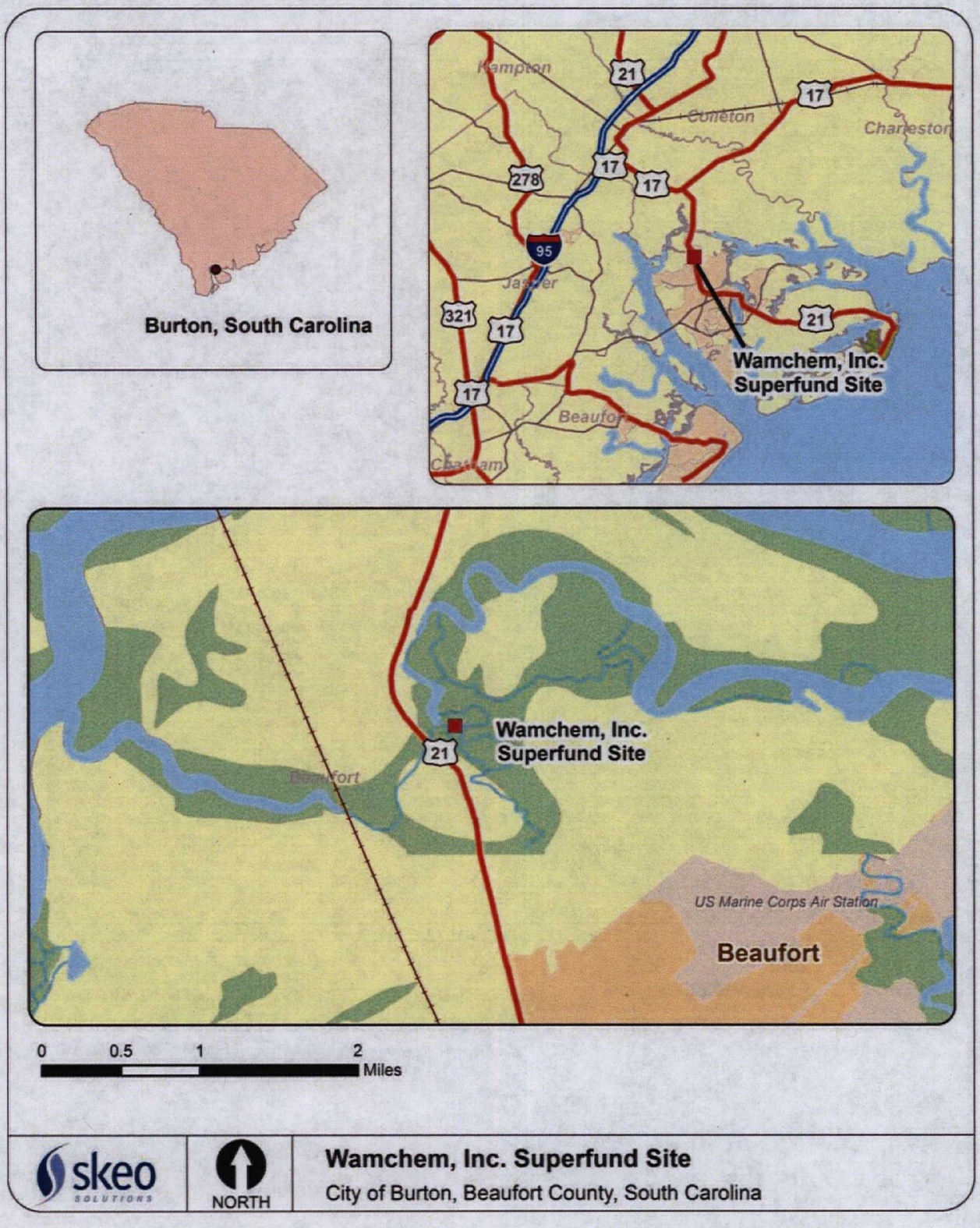
3.1 Physical Characteristics

The 25-acre site is located in Burton, Beaufort County, South Carolina, in a rural area northwest of Beaufort. The Site is situated on a small island in the midst of a salt marsh near the upper reach of McCalley's Creek. The Site includes a large storage building, a small office and a large concrete pad where buildings once stood. Original site features included two spray fields, holding ponds, a waste lagoon and a trash disposal area. Beaufort County parcel identifier numbers for the three parcels associated with the Site are: R100 015 000 0061 0000, R100 015 000 061A 0000 and R100 015 000 061B 0000.

The shallow water table underlying the Site ranges from surface grade to about three feet deep. The water table aquifer at the Site is composed predominately of sands. No distinct confining unit separates the water table aquifer from the underlying Floridan aquifer. However, the difference in hydraulic conductivity between the water table aquifer and the Floridan aquifer results in partial confinement of the Floridan aquifer by the water table aquifer. Remedial investigation field studies verified a consistently positive (upward) vertical hydraulic gradient between the two aquifers, indicating that the Site is in a zone of discharge for the Floridan aquifer. Horizontal hydraulic gradients in the water table aquifer are such that ground water will flow from the Site in a northeastern direction toward McCalley's Creek during both high tide and low tide. Horizontal hydraulic gradients in the Floridan aquifer near the Site are such that the horizontal component of the ground water flow is to the northwest.

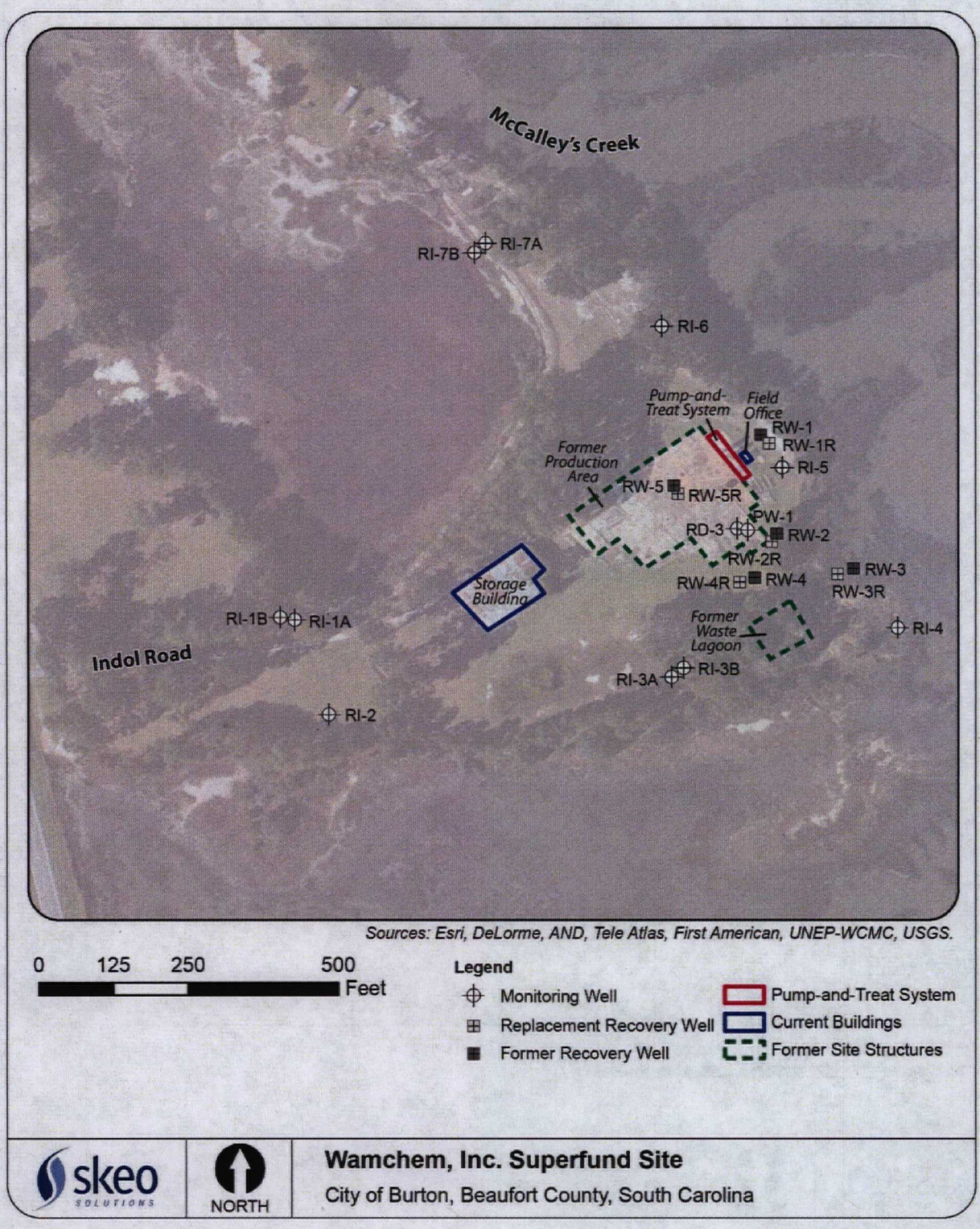
All surface water drainage from the Site is within the confines of the McCalley's Creek Basin. Surface water moves primarily from McCalley's Creek to Whale Branch and the Coosaw River. Site terrain is flat with no discernible slope or relief.

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.

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.

3.2 Land and Resource Use

The Site property has remained unused since the closure of the dye manufacturing facility in 1982. A residential property borders the Site to the North. A Marine Corps air station borders the Site to the south. A salt marsh is located along the eastern boundary of the Site. U.S. Highway 21 runs along the Site's western boundary.

The Town of Burton is sparsely populated. Area land uses include residential, commercial and industrial properties. A crab shop is located directly across U.S. Highway 21 from the Site. A few mobile homes are located one mile north of the Site. Property development in this part of Beaufort has largely remained unchanged since the 1990s.

McCalley's Creek is used for recreational fishing and commercial shellfish harvesting. The upper unit of the Floridan aquifer is the principal aquifer in the region. It supplies most of the water used in Beaufort County.

Nearby residents obtain water through a public water supply system. There are no ground water supply wells on the site property.

3.3 History of Contamination

The Beaufort Chemical and Research Company originally built the facility in the late 1950s. It operated there until 1972, when the M. Lowenstein Corporation (MLC), currently Springs Industries, acquired the site property. MLC continued dye product manufacturing and solvent recovery and recycling operations at the facility until its closure in 1982. A 1978 Toxic Substances Control Act inventory determined that facility activities included the use and manufacture of a wide variety of chemicals.

3.4 Initial Response

An August 1977 investigation of the surrounding surface water by SCDHEC revealed the presence of chromium and lead in ground water seepage adjacent to McCalley's Creek. When MLC closed the facility in 1982, the company submitted a closure plan for hazardous waste treatment and storage operations to SCDHEC. Sampling investigations in 1982 by SCDHEC verified that site activities resulted in the contamination of site soil and ground water. Contaminants discovered included toluene, benzene, chlorobenzene, chromium and lead. Based on these results, EPA placed the Site on the Superfund program's National Priorities List (NPL) in September 1984.

3.5 Basis for Taking Action

In April 1986, EPA entered into an Administrative Order on Consent (AOC) with MLC to perform a remedial investigation. MLC completed the investigation in April 1987. Investigation results indicated that soil and ground water contaminant concentrations presented unacceptable risk to human health and the environment. The pathways included exposure to contaminated ground water through both dermal adsorption and ingestion. The

remedial investigation also determined that soil contaminant concentrations existed at levels that would allow potential leaching of contaminants into the ground water.

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 are:

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

4.1 Remedy Selection

EPA selected the Site's remedy in the Site's June 1988 Record of Decision (ROD). The ROD listed the following remedial action objectives (RAOs):

- Protect human health and the environment from exposure to contaminated on-site soils through inhalation, direct contact or the leaching of contaminants into ground water.
- Restore contaminated ground water to levels protective of human health and environment.

The selected remedy, as stated in the ROD, consisted of:

- Air stripping and carbon adsorption of contaminated ground water.
- Low temperature thermal aeration of contaminated soil.

The ROD identified nine contaminants of concern (COCs) for site soil and ground water (Table 2). The ROD selected cleanup goals for soil based on their potential for leaching to ground water. The ROD based ground water cleanup goals on EPA Ambient Water Quality Criteria (AWQCs) for protection of salt water aquatic life. Ground water cleanup goals were set to AWQC values because the water table aquifer at the Site discharges into McCalley's Creek.

Table 2: 1988 Site COCs and Cleanup Goals

COC	Soil Cleanup Goal (mg/kg)	Ground Water Cleanup Goal (mg/L)
Acetone	97.81	1,000[a]
Benzene	2.43	0.70

COC	Soil Cleanup Goal (mg/kg)	Ground Water Cleanup Goal (mg/L)
1,2-Dichlorobenzene	33.43	1.97
1,4-Dichlorobenzene	38.06	1.97
2,4-Dinitrotoluene	3.62	0.37
Naphthalene	74.57	2.35
Toluene	34.47	5.00
1,2,4-Trichlorobenzene	4.23	0.129[a]
Total Xylenes	67.58	2.0

Notes:
[a] No AWQC available. Goal based on a general aquatic rating assigned by the Registry of Toxic Effects of Chemical Substances.
Mg/kg – Milligrams per kilogram
Mg/L – Milligrams per liter

The ROD stated that surface water in McCalley's Creek was not contaminated. While contaminant levels in the sediment were very low and not a cause for concern, EPA anticipated that remediation of the contaminant source would further reduce contaminant levels. The ROD concluded that direct remediation of surface water and sediment was not necessary.

The ROD stated that treated ground water would be discharged to McCalley's Creek pursuant to state water pollution control requirements. Under the National Pollutant Discharge Elimination System (NPDES), the Site's treated water discharge must comply with all effluent limit requirements in its NPDES permit.

4.2 Remedy Implementation

The Site PRP, Springs Industries, entered into a Consent Decree with EPA in January 1990 for the Site's remedial design and remedial action. The PRP began the remedial design in January 1989. EPA approved the remedial design reports for soil and ground water in December 1992 and July 1995, respectively. Soil remedial action began in June 1993. It ended in August 1993.

Cleanup activities included the excavation of 2,669 tons of soil from the area next to the former holding pond. The PRP treated excavated soil in a mobile thermal desorption unit on site. Treatment activities included analysis to make sure processed soils met cleanup goals in the ROD. The PRP also performed confirmatory sampling in the excavation areas to make sure those soils met required soil cleanup goals. Soil cleanup goals were established to prevent leaching that would result in future exceedances of AWQC values in ground water. These goals are more stringent than the current EPA preliminary remediation goals (PRGs) for residential soils (Table 6). Analysis results for both the processed soils and from confirmatory samples from the excavation areas indicated that contaminant concentrations met cleanup goals. The PRP backfilled the excavation area with treated soil, compacted the soil, covered the area with clean topsoil and seeded the area.

Construction of the Site's ground water pump-and-treat system began in February 1996. Recovered ground water is treated by air stripping to reduce the concentrations of COCs to meet the discharge limits in the Site's NPDES permit No. SC0046701. Treated ground

water is then discharged to McCalley's Creek in accordance with the terms of the NPDES permit.

EPA performed a construction completion inspection in May 1996. During this inspection, minor items needing repair were noted and addressed. After operating the system for about five months, the PRP noticed that well yields had decreased in all five recovery wells. A review of each well's operational data, well construction information, and ground water characteristics indicated that the well screens were beginning to clog due to the minerals present in the shallow ground water in the area. The slots used in the recovery well screens were too small.

As a result of the decline in well yields, which reduced the system's ability to maintain the necessary ground water capture, the PRP elected to replace all five recovery wells. EPA approved the shutdown of the ground water recovery and treatment system in March 1997 to allow for installation of five new recovery wells. The ground water recovery and treatment system started operating again in July 1997. It has run continuously since that time.

EPA issued the Site's Preliminary Close-Out Report, documenting the successful completion of remedy construction, in September 1997.

4.3 Operation and Maintenance (O&M)

The Site's 1995 O&M Plan provides direction on how to maintain the ground water pump-and-treat system, as well as how to adhere to the NPDES permit. The guidance is outdated; it references the permit that expired in 1998. The PRP's contractor, Environmental Resources Management (ERM), visits the Site weekly and monthly and performs ground water monitoring annually. The PRP inspects the Site quarterly.

The 1988 ROD indicated that EPA would use AWQCs to establish NPDES limits for the Site's COCs. The Site's initial NPDES permit, effective as of February 1, 1995, contained effluent limits for various metals, volatile organic compounds (VOCs), semi-volatile organic compounds, biochemical oxygen demand, and chronic and acute toxicity. SCDHEC issued the Site's second NPDES permit in October 2000. At that time, SCDHEC determined that the additional parameters included in the initial permit showed no reasonable potential to exceed water quality standards. Therefore, in October 2000, SCDHEC reduced effluent limit requirements to include only 1,2,4-trichlorobenzene.

As required by the Site's most recent NPDES permit, which expired in August 2013, the PRP samples and analyzes the Site's ground water treatment system effluent. They also sample and analyze recovered ground water prior to its discharge to the air strippers as a means of monitoring the efficiency of the treatment system. The PRP submits the effluent data to SCDHEC each month in discharge monitoring reports, and influent and effluent monitoring data to SCDHEC and EPA in quarterly reports.

The PRP submitted their NPDES permit renewal package to SCDHEC on February 25, 2013. Following initial review and comments by the agency, the PRP submitted a revised NPDES permit renewal to SCDHEC on April 1, 2013. They currently operate under the expired permit while awaiting approval of the new permit.

In 2006, the PRP conducted a comparison of the 1,2,4-trichlorobenzene influent monitoring data to NPDES effluent limits. This comparison showed that all 1,2,4-trichlorobenzene concentrations detected in influent to the stripping towers since the system began operating in 1996 had been well below the effluent discharge limits. An additional comparison of the historical influent monitoring data for VOC and semi-volatile organic compounds originally included in the system's NPDES permit, including benzene, toluene, total xylenes, 1,4-dichlorobenzene, 2,4-dinitrotoluene, naphthalene, and total phenol, found they were also well below their respective effluent discharge limits.

Based on this comparison, the PRP approached EPA and SCDHEC concerning the possibility of reconfiguring the ground water treatment system to bypass the air strippers. Influent monitoring data indicated that the concentrations of the COCs were well below the effluent discharge limits and that treatment of the recovered ground water prior to discharge to McCalley's Creek was not necessary to meet NPDES effluent limits. EPA approved the temporary reconfiguration for 90 days in April 2008. This reconfiguration coincided with maintenance of the towers. The PRP reconfigured the ground water treatment system to allow influent to freefall through only one tower without the use of blowers. According to the Site's Fourth Quarter 2013 System Monitoring and O&M report, operation of the ground water recovery and treatment system in this mode will continue until a final decision on operation has been reached in agreement with Springs Industries and EPA.

The Beaufort Group personnel conduct comprehensive maintenance activities at the Site on a monthly basis. According to the Site's Fourth Quarter 2013 System Monitoring and O&M report, all maintenance activities between 2009 and the fourth quarter of 2013 were performed in accordance with the requirements of the Site's O&M Manual. The Beaufort Group's certified operator also visits the Site daily to check the overall operation of the ground water recovery and treatment system and perform minor maintenance corrections if a problem is identified. Beaufort Group personnel also visit the Site every two weeks to acid wash the stripping tower and perform routine maintenance. ERM personnel visit the Site once per week to overview the system O&M activities, conduct additional minor maintenance, and call for assistance from the Beaufort Group personnel if a major problem is identified. Beaufort Group and ERM personnel also conduct quarterly maintenance activities at the Site to ensure the ground water recovery and treatment system continues to operate at its maximum potential.

The 1988 ROD reported that long-term O&M of the remedy will not be required following the successful completion of the remedy. However, until all ground water cleanup goals are met, ground water monitoring is necessary to ensure the effectiveness of the remedy. The ROD estimated the annual O&M cost of operating the ground water treatment system at

$155,100 (1988 dollars), which would include sampling and analysis. O&M costs from the previous five years are unavailable for comparison to the ROD-estimated cost.

5.0 Progress Since the Last Five-Year Review

The protectiveness statement from the 2009 FYR for the Site stated:

The remedy at the Wamchem, Inc. site currently protects human health because contaminated ground water is not being used for potable purposes and soils have been cleaned to protect the ground water. However, in order for the Site to be protective in the long-term, the following actions need to be taken:

- *Determine the cause for fluctuating ground water contaminant concentrations.*
- *Locate the deed for the 14-acre portion of the Site that is missing.*
- *Secure all ground water monitoring wells.*
- *Evaluate the Site to determine if ground water institutional controls may be appropriate.*
- *Continue optimization of the ground water pump and treat system.*
- *Analyze effluent for 1,2-dichlorobenzene.*

The 2009 FYR included seven issues and recommendations. This report summarizes each recommendation and its current status below.

Table 3: Progress on Recommendations from the 2009 FYR

Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Submit current site documents to the designated site repository.	PRP	10/31/2009	None taken	Incomplete
Determine the cause for fluctuating ground water contaminant concentrations.	PRP	10/31/2009	Springs Industries has implemented several procedures to minimize external influence as a potential contributor to fluctuations of COC concentrations: • Conduct annual monitoring as closely to same calendar date as possible. • Conduct annual monitoring during similar tidal conditions. • Conduct annual monitoring to avoid recent substantial rainfalls or periods of drought. • Use same field personnel and laboratory. • Implement quarterly maintenance work on system as a means to optimize performance.	Ongoing

Recommendations	Party Responsible	Milestone Date	Action Taken and Outcome	Date of Action
Locate deed of 14-acre parcel of property.	PRP	06/31/2009	Skeo Solutions staff visited the County Deeds Office and found a 1975 deed document pertaining to the site property. This deed document recorded the merger of Beaufort Chemical and Research Company and the Magnolia Holding Company into Indol Chemical Co. Inc.	01/15/2014
Secure all ground water monitoring wells.	PRP	06/31/2009	Springs Industries secured all wells by either installing new locks on the exterior of the lockable steel casing or on the lockable well plug on the interior of the steel casing.	12/12/2008
Evaluate the Site to determine if ground water institutional controls may be appropriate.	PRP	10/31/2009	The Site has not yet been evaluated to determine if ground water institutional controls should be put in place.	Incomplete
Continue optimization of the ground water pump-and-treat system.	PRP	10/31/2009	Springs Industries continuously optimizes the O&M of the ground water recovery system. The maintenance plan for the Site was modified following the previous FYR with the addition of a quarterly maintenance step for the system and wells to ensure the system operates at its maximum potential.	Ongoing
Analyze effluent for 1,2-dichlorobenzene.	PRP	10/31/2009	1,2-Dichlorobenzene was removed from the NPDES permit. It has generally been in decline at the recovery wells (see Appendix H for additional details).	Considered and not implemented

6.0 Five-Year Review Process

6.1 Administrative Components

EPA Region 4 initiated the FYR in November 2013 and scheduled its completion for April 2014. The EPA remedial project manager (RPM) Michael Townsend led the EPA site review team, which also included the EPA site attorney Stedman Southall, the EPA community involvement coordinator (CIC) L'Tonya Spencer and contractor support provided to EPA by Skeo Solutions. The review schedule established 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 April 2014, EPA published a public notice in the *Beaufort Gazette* newspaper announcing the commencement of the FYR process for the Site, providing contact information for RPM Michael Townsend and CIC L'Tonya Spencer and inviting community participation. The press notice is available in Appendix B. No one contacted EPA as a result of the advertisement.

EPA will make the final FYR Report available to the public. Upon completion of the FYR, EPA will place copies of the document in the designated site repository: Beaufort County Library, located at 311 Scott Street in Beaufort, South Carolina.

6.3 Document Review

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 more stringent than federal requirements may be applicable or relevant and appropriate.

- To-Be-Considered criteria are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary remedial action. For example, To-Be-Considered criteria 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 discharged to, the ambient environment. Examples of chemical-specific ARARs include maximum contaminant levels (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 ground water 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.

Ground Water ARARs

Under Section 304(a) of the Clean Water Act, the 1988 ROD established AWQCs as ground water ARARs. The ROD states that federal MCLs are not applicable at the Site. There are no current AWQCs for the Site's ground water COCs (Table 4).

Table 4: Previous and Current ARARs for Ground Water COCs

COC[a]	1988 ARAR (mg/L)[b]	AWQC (mg/L) as of 2014[c]	ARAR Changes
Acetone	NA[e]	NA	NA
Benzene	0.70	NA	NA
1,2-Dichlorobenzene	1.97	NA	NA

COC[a]	1988 ARAR (mg/L)[b]	AWQC (mg/L) as of 2014[c]	ARAR Changes
1,4-Dichlorobenzene	1.97	NA	NA
2,4-Dinitrotoluene	0.37	NA	NA
Napthalene	2.35	NA	NA
Toluene	5.00	NA	NA
1,2,4-Trichlorobenzene	NA[e]	NA	NA
Total Xylene	2.0	NA	NA

Notes:
[a] COCs as identified in the 1988 ROD.
[b] Goals based on 1986 EPA AWQCs for aquatic organisms: http://water.epa.gov/scitech/swguidance/standards/upload/2009_01_13_criteria_goldbook.pdf.
[c] Current Aquatic Life AWQC values: http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm.
[e] No AWQC available. Cleanup goal for acetone (1,000 mg/L) and 1,2,4-trichlorobenzene (2.0 mg/L) based on general aquatic ratings assigned by the Registry of Toxic Effects of Chemical Substances, 1982.
NA – Not applicable

Soil ARARs

The 1988 ROD established site-specific soil cleanup goals. It did not identify soil ARARs. Soil cleanup goals were established so that COCs in soil would not result in future exceedances of AWQC values in ground water at the source area due to leaching of soil contaminants.

Institutional Control Review

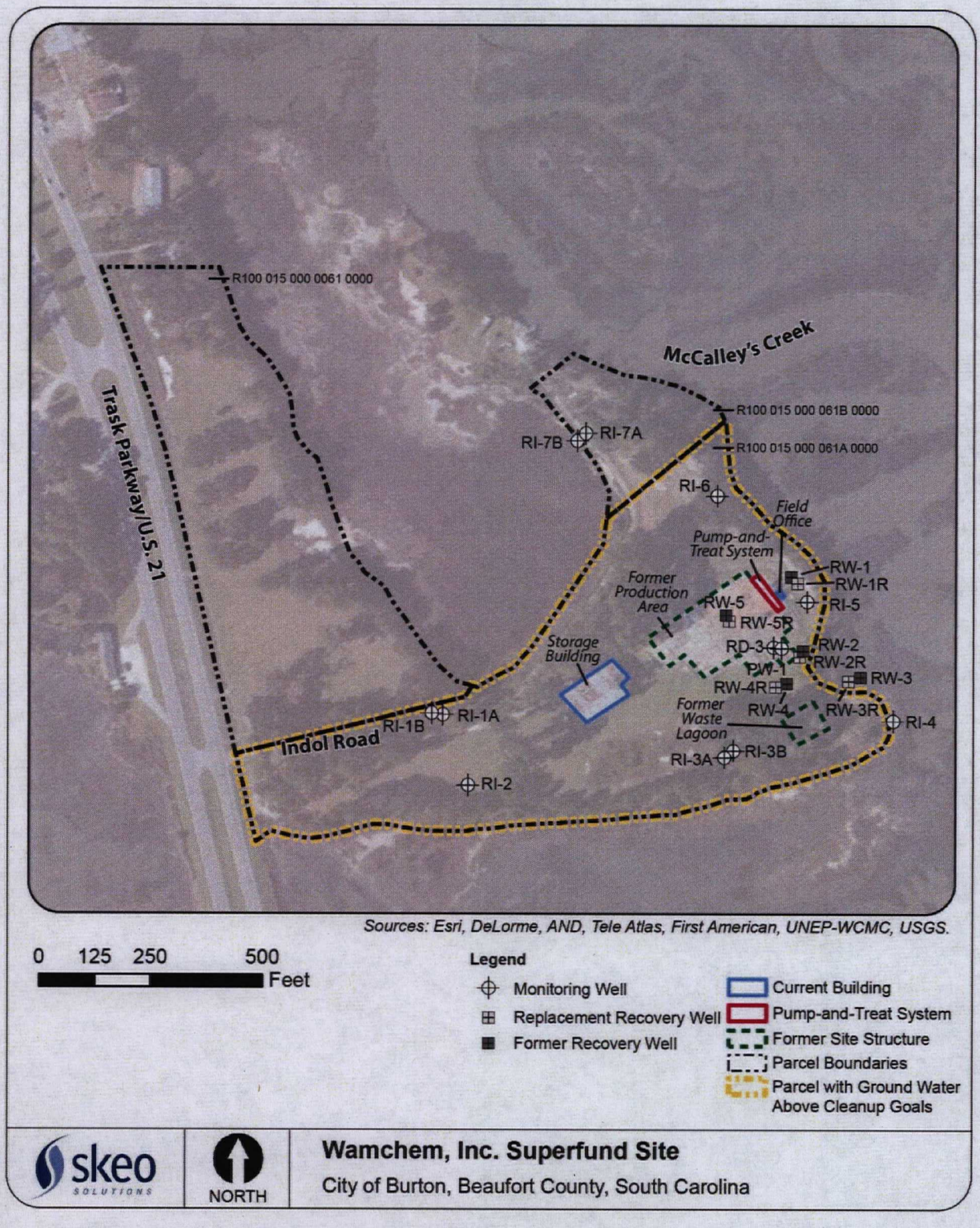
In January 2014, Skeo Solutions staff visited the Beaufort County Public Records Office and found no recorded institutional controls for site properties. The Beaufort County parcel identifier numbers for the Site are: RI00 015 000 0061 0000, RI00 015 000 061B 0000 and RI00 015 000 061A 0000.

The Site's 1990 Consent Decree required the implementation of deed restrictions for site parcels, though none have been put in place. The Consent Decree requires that Springs Industries implement the deed restrictions and that the restrictions inform potential property purchasers of the Site's history and prohibit land uses that could disturb any part of the selected remedy. Confirmatory soil sampling following soil treatment and excavation indicated that contaminant concentrations met cleanup goals. Therefore, soil use restrictions are not required. Ground water contamination remains on site; therefore, ground water use restrictions should be implemented. However, only ground water COC concentrations associated with parcel RI00 015 000 061A 0000 exceed the Site's cleanup goals; therefore, only that parcel would be subject to ground water use restrictions. Table 5 lists the institutional controls associated with areas of interest at the Site. Figure 3 shows the location of the parcel boundaries associated with the Site.

Table 5: Institutional Control (IC) Summary Table

Area of Interest – Wamchem, Inc. (R100 015 000 061A 0000)					
Media	**ICs Needed**	**ICs Called for in the Decision Documents**	**Impacted Parcel**	**IC Objective**	**Instrument in Place**
Ground Water	Yes	No	R100 015 000 061A 0000	Restrict access to contaminated ground water	None
Soil	No	No	None	N/A	N/A

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.

6.4 Data Review

Ground Water

Site contractors collected ground water samples annually from eight wells on site for laboratory analysis of VOCs and semi-volatile organic compounds. Select samples were also analyzed for calcium, magnesium, potassium, sodium, bicarbonate, carbonate, chloride and sulfate to monitor changes in the aquifer geochemistry. Of the nine COCs identified in the ROD, only three (1,2-dichlorobenzene, 1,2,4-trichlorobenzene, and 2,4-dinitrotoluene) were detected in ground water above cleanup goals between 2009 and 2013. Concentrations of 1,2-dichlorobenzene consistently exceeded the cleanup goal of 1,970 micrograms per liter (µg/L) in well RW-4/4R. The maximum detected concentration of 1,2-dichlorobenzene was 13,000 µg/L during the 2009 sampling event.

Concentrations of 1,2,4-trichlorobenzene exceeded the cleanup goal of 129 µg/L in wells RW-2/2R, RW-4/4R and RW-5/5R with a maximum detected concentration of 1,800 µg/L in RW-4/4R during the 2009 sampling event. Concentrations of 1,2,4-trichlorobenzene in well RW-5/5R only exceeded the cleanup goal once during the last five years, with a result of 160 µg/L in 2009. The cleanup goal for 2,4-dinitrotoluene (370 µg/L) was exceeded once during the past five years at a concentration of 500 µg/L, reported in well RW-4/4R during the 2009 sampling event. Table F-1 in Appendix F summarizes annual ground water monitoring data for COCs between 2009 and 2013. During the most recent sampling event in 2013, 1,2,4-trichlorobenzene was the only COC detected above cleanup goals.

In general, COC concentrations at the Site are stable or decreasing in most wells. COC concentrations in well RW-4/4R, including concentrations of 1,2,4-trichlorobenzene and 1,2-dichlorobenzene, are stable or have decreased since the last FYR period (Figures 4 and 5). Although a significant increase in 1,2-dichlorobenzene was reported in 2009 in well RW-4/4R, this result appears anomalous. The concentration dropped significantly the following year and has continued to decline since that time. During the 2013 sampling event, 1,2-dichlorobenzene was below the cleanup goal in well RW-4/4R.

In well RW-2/2R, concentrations of 1,2-dichlorobenzene and 1,2,4-trimethylbenzene are generally consistent with concentrations detected during the previous FYR period, as shown in Figure 4 and Figure 5 below. COC concentrations in well RW-2/2R are generally stable.

Figure 4: 1,2,4-Trichlorobenzene Concentrations Over Time in Select Wells

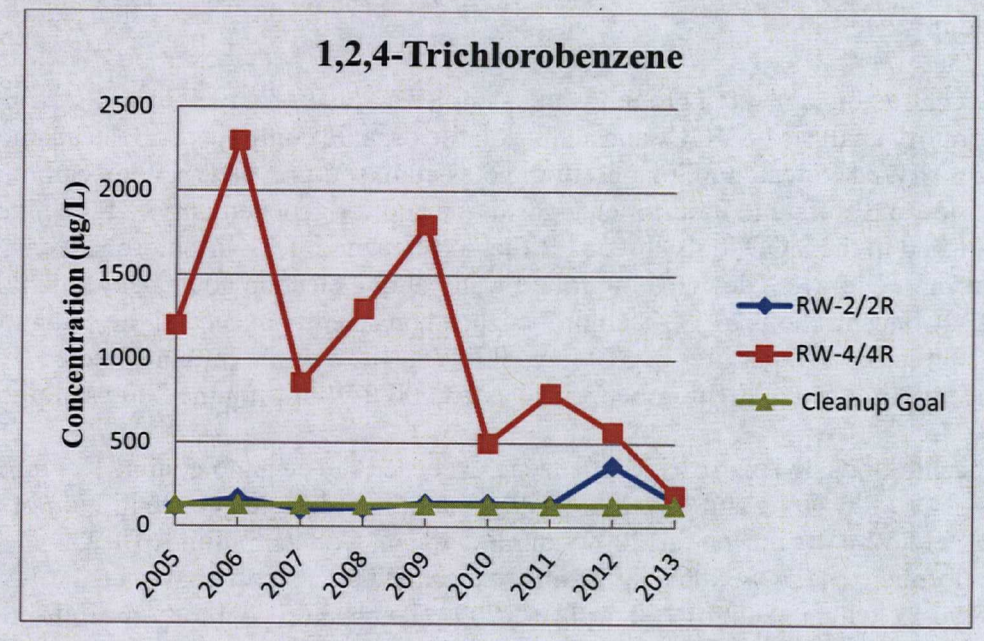
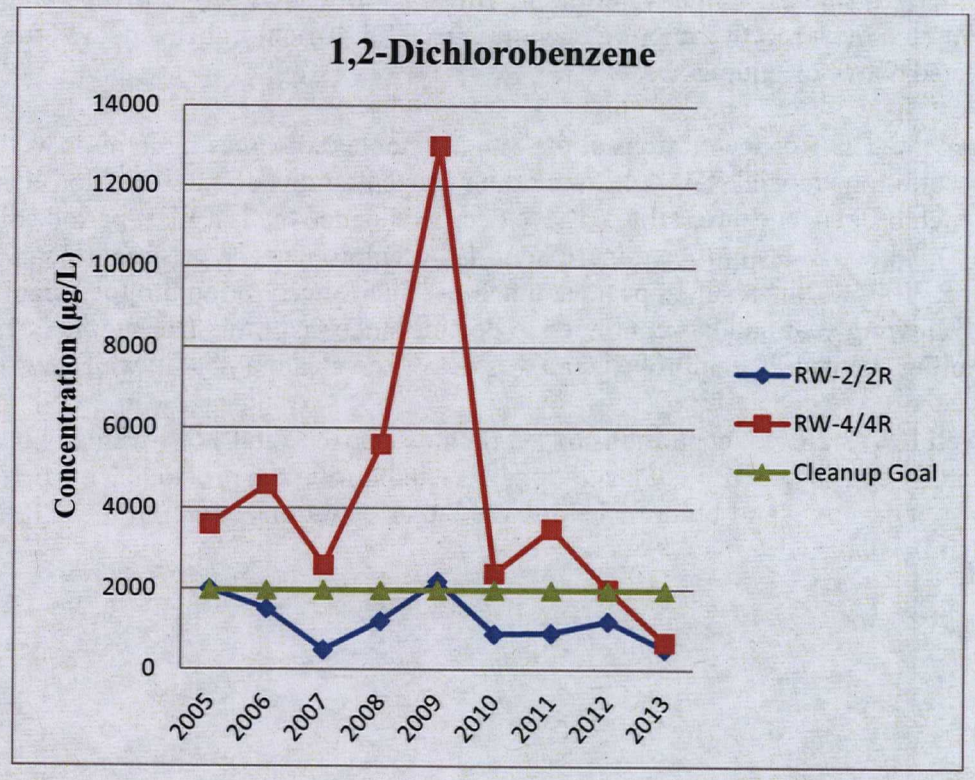


Figure 5: 1, 2-Dichlorobenzene Concentrations Over Time in Select Wells



Wells closest to McCalley's Creek (RW-1R, RW-3R and RI-5) consistently reported COCs below cleanup goals between 2009 and 2013. Well RI-5 previously reported some of the highest concentrations of COCs prior to the installation of the ground water

recovery system. In 1986 prior to system installation, well RI-5 reported concentrations of acetone at 68,000 µg/L, benzene at 2,100 µg/L, 1,2-dichlorobenzene at 3,900 µg/L and total xylenes at 4,500 µg/L. In 2013, only 1,2-dichlorobenzene and 1,4-dichlorobenzene were detected in RI-5 at a concentration well below its cleanup goal; acetone, benzene and total xylenes were not detected above the method detection limits. The ground water recovery system appears to be capturing the contaminant plume at the Site.

Soil

Soil remediation activities at the Site started and finished in 1993. No new soil data were collected during the past five years.

6.5 Site Inspection

On January 15, 2014, the following participants performed the site inspection: Michael Townsend, EPA; Greg Cassidy and Kayse Jarman, SCDHEC; Nick Odom, Springs Industries; Robert Gossett, ERM; Bob Gross, The Beaufort Group; and Treat Suomi and Johnny Zimmerman-Ward, Skeo Solutions.

Participants toured the Site and observed the ground water pump-and-treat system, site office, recovery wells, monitoring wells and the discharge point. Monitoring wells were all secured and labeled. The ground water pump-and-treat system is in good working order. The Site is well maintained. The completed site inspection checklist is included in Appendix D. Photographs from the inspection are included in Appendix E.

On January 15, 2014, Skeo Solutions staff visited the designated site repository, Beaufort County Library, 311 Scott Street, Beaufort, South Carolina, as part of the site inspection. Staff determined that site documents after 1995 were not available.

6.6 Interviews

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

Michael Townsend: Michael Townsend is the EPA Remedial Project Manager for the Site. Mr. Townsend completed his interview on March 20, 2014, via email. Overall, EPA has a positive impression of the Site, stating that the remedy is effectively containing and treating the COCs. In general, the COCs have steadily decreased since 2009, with only one contaminant reporting above its remediation goal in 2013. Mr. Townsend stated that the PRPs have been good site stewards. EPA is not aware of any complaints or inquiries regarding the Site, and believes that overall, the Site has had little to no impact on the

surrounding community. EPA is aware that institutional controls are not yet in place at the Site.

R. Nick Odom, Jr.: R. Nick Odom, Jr. is the Springs Industries representative for the Site. Mr. Odom completed his interview on January 20, 2014, via email. Overall, Mr. Odom has a positive impression of the Site, stating that the remedy is protective of human health and the environment, and meets or exceeds the remedial standards. He stated that from the start, the PRP and regulating agencies have worked well together to successfully manage the project.

Kayse Jarman: Kayse Jarman is the SCDHEC representative for the Site. Ms. Jarman completed her interview on February 3, 2014, via email. SCDHEC believes that cleanup and maintenance is going very well, and that the current system is operating effectively and successfully reducing contaminant levels. However, she indicated that SCDHEC would like to put deed restrictions in place at the Site.

Robert E. Gossett: Robert Gossett is the O&M contractor (ERM) representative for the Site. Mr. Gossett completed his interview on January 20, 2014, via email. Overall, ERM has a positive impression of the cleanup project. The system is operating as designed and achieving the cleanup goals as established in the ROD. The Site operator has a daily on-site O&M presence, with additional O&M site checks and maintenance performed at routine intervals by ERM and Beaufort Group personnel. SCDHEC reduced the effluent sampling requirements to once per month with the 2009 NPDES permit renewal. The reduction in effluent monitoring requirements has resulted in savings of approximately $18,000 per year. Operation of the treatment system without the blowers on the stripping towers has reduced the maintenance requirements for the towers and the packing considerably since EPA allowed Springs to implement the modified mode of operation in July 2008. Cost savings associated with this modified mode of operation have been approximately $5,000 to $8,000 per year.

7.0 Technical Assessment

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

The review of documents, ARARs, risk assumptions and the site inspection indicate that the remedy is functioning as intended by the 1988 ROD. Contaminated soils were dug up, processed in the mobile thermal unit and analyzed to make sure they met cleanup goals in the ROD. Analysis for both the processed soils from the thermal desorption unit and from confirmation samples from the excavation areas revealed that contaminant concentrations met the cleanup goals established for the Site.

Processed soils were backfilled in the excavation area and compacted. The area was then covered with topsoil and seeded. The ground water is being treated through a pump-and-treat system and discharged into McCalley's Creek under an NPDES permit. The pump-and-treat system was reconfigured in April 2008 to one tower without the use of blowers. The system is effectively containing the contaminant plume. The Site should be assessed to determine if institutional controls are needed to restrict ground water use, as contamination remains on site.

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?

There have been no changes to exposure assumptions, toxicity data or RAOs at the Site. Soil cleanup goals were established to prevent leaching that would result in future exceedances of AWQC values in ground water. These goals are more stringent than the current EPA PRGs for residential soils (Table 6).

According to the 1988 ROD, cleanup goals for the nine ground water COCs were based on 1986 AWQC values for salt water aquatic organisms. As of 2014, EPA no longer maintains AWQCs for site COCs. The water is not potable in the portion of the shallow aquifer underlying the Site. Therefore, MCLs were not considered ARARs and were not incorporated into the cleanup goals. Regardless of contaminant concentrations, the application of MCLs as an ARAR were determined to be inappropriate for this portion of the aquifer and no more effective than using existing cleanup goals.

Table 6: Soil Cleanup Goals and Residential PRGs

COC	Soil Cleanup Goal (mg/kg)[a]	2014 PRG for Residential Soil (mg/kg)[b]
Acetone	97.81	61,000 (noncancer)
Benzene	2.43	12 (cancer) 86 (noncancer)
1,2-Dichlorobenzene	33.43	1,900 (noncancer)
1,4-Dichlorobenzene	38.06	2.4
2,4-Dinitrotoluene	3.62	1.6
Naphthalene	74.57	3.6
Toluene	34.47	5,000 (noncancer)
1,2,4-Trichlorobenzene	4.23	22 (cancer)

COC	Soil Cleanup Goal (mg/kg)[a]	2014 PRG for Residential Soil (mg/kg)[b]
		62 (noncancer)
Total Xylenes	67.58	630 (noncancer)

Notes:

a. Based on leaching to ground water

b. Unless noted, value is for carcinogenic risk of 1 x 10^{-6}

Although VOCs are present in the ground water, there are no inhabited structures located above the plume. Therefore, vapor intrusion does not currently pose a threat to human health. If site conditions are expected to change, the vapor intrusion pathway should be reassessed to ensure no unacceptable exposures. Appendix G includes the detailed vapor intrusion screening level assessment conducted as part of this FYR.

1,4-Dioxane is a manmade, highly soluble VOC used as a solvent stabilizer that prevents the breakdown of chlorinated solvents. It is also used in the formulation of dyes. The former site facility manufactured dyes; therefore, it is possible that elevated 1,4-dioxane concentrations exist in site ground water. Current ground water monitoring does not include analysis of this compound. Being that this compound readily dissolves in water, it can also be found in ground water plumes far in advance of other solvents. To rule out that elevated concentrations of the compound exist on site, it is recommended that sampling be performed to determine if 1,4-dioxane is present in the Site's ground water.

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 review of documents, ARARs, risk assumptions and the site inspection indicate that the remedy is functioning as intended by the 1988 ROD. Contaminated soils were dug up, processed in the mobile thermal unit and analyzed to make sure they met ROD cleanup goals. The ground water pump-and-treat system is effectively containing the contaminant plume and treating contaminated water. Ground water institutional controls should be considered for the Site.

8.0 Issues

Table 7 summarizes the current site issues.

Table 7: Current Site Issues

Issue	Affects Current Protectiveness?	Affects Future Protectiveness?
There are no institutional controls in place to prevent access to contaminated ground water.	No	Yes

9.0 Recommendations and Follow-up Actions

Table 8 provides recommendations to address the current site issues.

Table 8: Recommendations to Address Current Site Issues

Issue	Recommendation/ Follow-Up Action	Party Responsible	Oversight Agency	Milestone Date	Affects Protectiveness?	
					Current	Future
There are no institutional controls in place to prevent access to contaminated ground water.	Assess the Site to determine if institutional controls are needed to prevent potential future exposure to contaminated ground water.	PRP	EPA and State	04/01/2015	No	Yes

The following items, though not expected to affect protectiveness, warrant additional follow-up:

- If site conditions are expected to change, the vapor intrusion pathway should be reassessed to ensure no unacceptable exposures.
- Update the Site's O&M Plan to reference the newest NPDES permit.
- Verify that site information is properly maintained and accessible in the information repository.
- To rule out that elevated concentrations of 1,4-dioxane exist on site, perform sampling to determine if the compound is present in the Site's ground water.

10.0 Protectiveness Statements

The remedy at the Site currently protects human health and the environment. Contaminated soils were treated and contaminated ground water is currently being treated. For the remedy to be protective over the long term, institutional controls governing ground water should be considered.

11.0 Next Review

The next FYR will be due within five years of the signature/approval date of this FYR.

Appendix A: List of Documents Reviewed

2003 Isoconcentration Maps for Springs Industries, Wamchem Site. Prepared by Cooper Environmental.

2004 Isoconcentration Maps for Wamchem Site. Prepared by ESP Associates, Pennsylvania.

2005 Isoconcentration Maps for Wamchem Site. Prepared by ESP Associates, Pennsylvania.

2006 Isoconcentration Maps for Wamchem Site. Prepared by ESP Associates, Pennsylvania.

2007 Isoconcentration Maps for Wamchem Site. Prepared by ESP Associates, Pennsylvania.

2008 Isoconcentration Maps for Wamchem Site. Prepared by ESP Associates, Pennsylvania.

Administrative Order on Consent, In the Matter of Wamchem Site, Beaufort, South Carolina and M. Lowenstein Corporation, Lyman, South Carolina. U.S. EPA Docket No. 86-10-C. April 16, 1986.

Community Relations Plan for the Wamchem Site, Beaufort, South Carolina, Prepared by Ebasco Services Incorporated for EPA Region 4. August 1986.

Consent Decree. United States of America v. Springs Industries, Inc. Civil Action No. D:89-1900-8. January 17, 1990.

EPA Superfund Record of Decision: Wamchem, Inc. OU1. Prepared by EPA Region 4. June 30, 1988.

Final Remedial Investigation Report, Wamchem Site, Beaufort, South Carolina. Prepared by Dames & Moore for M. Lowenstein Corporation. April 21, 1987.

First Five-Year Review Report for Wamchem Superfund Site, Beaufort, Beaufort County, South Carolina. Prepared by EPA Region 4. April 6, 1999.

First Quarter 2009 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. April 6, 2009.

First Quarter 2010 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. April 9, 2010.

First Quarter 2011 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. April 12, 2011.

First Quarter 2012 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. April 13, 2012.

First Quarter 2013 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. April 10, 2013.

Fourth Quarter 2009 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. January 13, 2010.

Fourth Quarter 2010 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. January 11, 2011.

Fourth Quarter 2011 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. January 6, 2012.

Fourth Quarter 2012 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. January 9, 2013.

Fourth Quarter 2013 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Spring Industries, Inc. for EPA Region 4. January 7, 2014.

Groundwater Recovery and Treatment System Monitoring and Operational Data for the Third Five-Year Review of the Wamchem NPL Site. Prepared by Environmental Resources Management. December 2008.

Groundwater Recovery Treatment System Reconfiguration Report for Wamchem NPL Site. Prepared by Environmental Resources Management for Spring Industries, Inc. December 2006.

NPDES Permit Renewal Application, Spring Industries, Wamchem NPL Site, NPDES Permit No. SC0046701. February 25, 2013.

Remedial Design Report: Groundwater Design, Wamchem Site, Beaufort, South Carolina. Prepared by Universal Engineering Sciences, Inc. and RMT/Hydroscience, Inc. June 9, 1995.

Remedial Design Report: Soil Design, Wamchem Site, Beaufort, South Carolina. Prepared by Universal Engineering Sciences, Inc. and Hydroscience, Inc. August 6, 1992.

Response to 2009 Five Year Review Recommendations, Wamchem NPL Site. Prepared by Spring Industries, Inc. January 22, 2014.

Second Five-Year Review Report for Wamchem Superfund Site, Beaufort, Beaufort County, South Carolina. Prepared by EPA Region 4. April 29, 2004.

Second Quarter 2009 O&M Data and Annual Ground Water Monitoring Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. July 13, 2008.

Second Quarter 2010 O&M Data and Annual Ground Water Monitoring Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. July 13, 2010.

Second Quarter 2011 O&M Data and Annual Ground Water Monitoring Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. July 11, 2011.

Second Quarter 2012 O&M Data and Annual Ground Water Monitoring Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. July 12, 2012.

Second Quarter 2013 O&M Data and Annual Ground Water Monitoring Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. July 10, 2013.

Springs Industries, Inc. Wamchem Superfund Site Groundwater Remediation Operations and Maintenance Manual. September 1995.

State Primary Drinking Water Regulations: R.61-58. Prepared by the South Carolina Department of Health and Environmental Control, Bureau of Water. Effective April 25, 2008.

Third Five-Year Review Report for Wamchem, Inc., Beaufort, Beaufort County, South Carolina. Prepared by E^2, Inc. for EPA Region 4. April 29, 2009.

Third Quarter 2009 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. October 14, 2009.

Third Quarter 2010 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. October 8, 2010.

Third Quarter 2011 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. October 10, 2011.

Third Quarter 2012 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. October 10, 2012.

Third Quarter 2013 System Monitoring and O&M Data, Wamchem NPL Site, Beaufort, South Carolina. Prepared by Springs Industries, Inc. for EPA Region 4. October 3, 2013.

Wamchem Superfund Site Fact Sheet. Prepared by Springs Industries. July 28, 1986.

Appendix B: Press Notice

The U.S. Environmental Protection Agency, Region 4 Announces the Fourth Five-Year Review for the Wamchem, Inc. Superfund Site, Burton, Beaufort County, South Carolina

Purpose/Objective: EPA is conducting a Five-Year Review of the remedy for the Wamchem, Inc. Superfund site (the Site) in Beaufort County, South Carolina. The purpose of the Five-Year Review is to make sure the selected cleanup actions effectively protect human health and the environment.

Site Background: The 25-acre Site is located in a rural area northwest of Beaufort. The Site is part of a small island in a salt marsh near the upper reach of McCalleys Creek. The Wamchem, Inc. plant was a dye products research and production facility. It operated from 1950 to 1982. Facility operations also included solvent recovery and recycling. Liquid wastes were discharged to a drainage ditch, unlined holding ponds, an unlined lagoon, and later to two spray fields and a concrete-lined holding pond. Plant operations resulted in the contamination of site soil and ground water with volatile organic compounds (VOCs). EPA placed the Site on the Superfund program's National Priorities List (NPL) in September 1984.

Cleanup Actions: EPA selected the Site's remedy in the Site's June 1988 Record of Decision (ROD). Soil cleanup began in June 1993 and finished in August 1993. It included the excavation and treatment of contaminated soil, backfilling of the area with treated soil, and seeding of the area. Construction of the ground water pump-and-treat system began in February 1996 and finished in September 1996. Recovered ground water is discharged to McCalleys Creek after treatment via air stripping. Ground water treatment and monitoring are ongoing. EPA documented the completed construction of the Site's remedy in September 1997. The Site's potentially responsible party cleaned up the Site, with EPA oversight.

Five-Year Review Schedule: The National Contingency Plan requires review of remedial actions that result in any hazardous substances, pollutants or contaminants remaining at the Site above levels that allow for unlimited use and unrestricted exposure every five years to ensure the protection of human health and the environment. The fourth of the Five-Year Reviews for the Site will be completed by April 2014.

EPA Invites Community Participation in the Five-Year Review Process: The EPA is conducting this Five-Year Review to evaluate the effectiveness of the Site's remedy and to ensure that the remedy remains protective of human health and the environment. As part of the Five-Year Review process, EPA staff is available to answer any questions about the Site. Community members who have questions about the Site or the Five-Year Review process, or who would like to participate in a community interview, are asked to contact:

Michael Townsend, EPA Remedial Project Manager
Phone: (404) 562-8813
Email: townsend.michael@epa.gov

L'Tonya Spencer, EPA Community Involvement Coordinator
Phone: (434) 562-8463
Email: spencer.latonya@epa.gov

Mailing Address: U.S. EPA Region 4, 61 Forsyth Street, S.W., 11th Floor, Atlanta, GA 30303-8960

Additional site information is available at the Site's local document repository, located at the Beaufort County Library, 311 Scott Street, Beaufort, South Carolina, 29902, and online at:
http://www.epa.gov/region4/superfund/sites/npl/southcarolina/wachemsc.html.

Appendix C: Interview Forms

Wamchem, Inc. Superfund Site **Five-Year Review Interview Form**

Site Name:	Wamchem, Inc.	**EPA ID No.:**	SCD037405362
Subject Name:	R. Nick Odom, Jr.	**Affiliation:**	Springs Industries, Inc.
Subject Contact Information:	nick.odom@springs.com		
Time:	9:00 A.M.	**Date:**	01/20/2014
Interview Location:	Office		
Interview Format (circle one):	In Person	Phone	Mail Other: Email
Interview Category:	Potentially Responsible Parties (PRPs)		

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

   Protective of human health and the environment and meeting or exceeding the remedial standards.

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

   There have never been any negative or problematic community issues. The remedial activities at the Site have enhanced the overall community as a result of the remedial work and commitment to achieve the standards.

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

   It is effective to meet the standards and to remediate the matter.

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

   None.

5. Do you feel well informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

   Very well informed.

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

Current remedial activity as now configured is generating the expected outcomes as regards the standards and the day-to-day NPDES compliance process with SCDHEC. From the start, this project has been a clear demonstration of the collaborative management process between the PRP and the regulator. In fact, I recall that EPA Region 4, in the early days, called out this project as a model of how remedial processes can be worked out between the parties to achieve the best result to protect human health and the environment.

Site Name:	**Wamchem, Inc.**	**EPA ID #:**	**SCD037405362**
Subject Name:	**Kayse Jarman**	**Affiliation:**	**SCDHEC**
Subject Contact Information:	**2600 Bull Street, Columbia, SC 29201. (803) 898-0832. jarmankb@dhec.sc.gov**		
Time:		**Date:**	**2/3/2014**
Interview Format (circle one):	**In Person**	**Phone**	**Mail** **Other: Email**

Interview Category: State Agency

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

   Cleanup and maintenance is going very well at the Site with no issues. Reuse activities have not been discussed.

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

   The current system is working well and reducing contaminant levels.

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

   No.

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?

   SCDHEC would like to put deed restrictions in place at the Site.

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?

   No.

Site Name:	**Wamchem, Inc.**	**EPA ID No.:**	**SCD037405362**
Subject Name:	**Robert E. Gossett**	**Affiliation:**	**ERM**
Subject Contact Information:	**(843) 416-5100. Robert.gossett@erm.com.**		
Time:	**9:00 A.M.**	**Date:**	**1/20/2014**
Interview Location:	**ERM Office**		

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

Interview Category: O&M Contractor

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

   General overall impression of the cleanup project for the Wamchem NPL Site is very good. The system is operating as designed and achieving the cleanup goals as established in the ROD. Springs has an excellent maintenance program implemented at the site, which allows the groundwater recovery and treatment system to operate at its maximum potential. Springs insists that the system remain in operation at all times. Any maintenance problems are addressed immediately by the local maintenance operations subcontractor The Beaufort Group, LLC (Beaufort Group).

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

   The system is operating as designed and achieving the cleanup goals as established in the ROD. In 2012, only two of the nine constituents of concern (COCs) were above their respective cleanup goals at two of the recovery wells. In 2013, only one COC, 1,2,4-trichlorobenzene, was detected above the site cleanup goal at two of the recovery wells.

3. What are the findings from the monitoring data? What are the key trends in contaminant levels that are being documented over time at the Site?

   The ground water monitoring data for the Wamchem NPL site indicate that the ground water recovery and treatment system is achieving the cleanup goals as established in the ROD. Since 2003, only two COCs (1,2,4-trichlorbenzene and 1,2-dichlorobenzene) have been detected above their established cleanup goals of 129 and 1,970 µg/L, respectively. 1,2-Dichlorobenzene was detected above the cleanup goal at RW-2R until 2009 and at RW-4R until 2012. Both wells have continued to show decreasing concentrations in 1,2-dichlorobenzene in follow-up ground water monitoring events. In the last 10 years, 1,2,4-trichlorobenzene has been detected above the cleanup goal of 129 µg/L in three recovery wells (RW-2R, RW-4R, and RW-5R) at the site. 1,2,4-Trichlorobenzne has not been detected above the cleanup goal at RW-5R since 2009 and has shown decreasing concentrations in both RW-2R and RW-4R with concentrations of 150 and 190 µg/L, respectively, being detected in 2013.

4. Is there a continuous on-site O&M presence? 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.

There is not a continuous on-site O&M presence at the Wamchem NPL Site. However, the site operator visits the site once a day, seven days per week to check the overall operation of the ground water recovery and treatment system, perform minor maintenance corrections if a problem is identified, and call for maintenance assistance from the operations and maintenance group (Beaufort Group) if a major problem occurs. Beaufort Group personnel also visit the site every two weeks to acid wash the stripping tower and perform routine maintenance. ERM personnel visit the site once per week to overview the system operation and maintenance activities, conduct additional minor maintenance, and call for assistance from the Beaufort Group personnel if a major problem is identified. Beaufort Group and ERM personnel also conduct quarterly maintenance activities at the site to ensure the ground water recovery and treatment system continues to operate at its maximum potential. All site visits and maintenance activities performed are noted in the site log book and in the Quarterly O&M Report submitted to USEPA.

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.

   In the last five years, Springs has added a quarterly step to the site's established maintenance program as a means to maintain the protectiveness and effectiveness of the groundwater recovery and treatment system at the site. Once per quarter, Springs conducts regular maintenance of the groundwater recovery wells and treatment system as needed or justified as shown by well yields on the well flow tubes and flow through the treatment system. Maintenance may include cleaning well pumps, acid wash of the well casing, cleaning and or replacement of the well transfer lines, cleaning the Influent Collection Tank, cleaning the PVC influent lines located between the Influent Collection Tank and the stripping towers, cleaning the PVC discharge lines between the stripping tower and the Effluent Collection/Recirculation Wetwell, cleaning the wetwell, and cleaning the effluent discharge line to McCalleys Creek. All maintenance activities performed are noted in the site log book and in the Quarterly O&M Reports submitted to USEPA.

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.

   No unexpected O&M difficulties have been identified in the last five years. Springs has implemented the extra quarterly maintenance activities as described in Question 5 as a means to ensure the protectiveness and effectiveness of the operation of the ground water recovery and treatment 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.

   Annual ground water sampling of the eight selected wells and monthly sampling of the treatment system's influent and effluent streams are currently performed. Quarterly sampling Ground water monitoring was conducted at the site for the first five years of operation of the groundwater recovery and treatment system. In accordance with the site's approved Groundwater Monitoring Plan, which is presented in the "Project Operation Plan; Implementation of Groundwater Remedial Design for the Wamchem Site – Report No. 5045" (Universal Engineering Sciences; September, 1995), annual groundwater sampling is to be performed from year six through 20 for operation of the system. Annual groundwater

sampling at the Wamchem NPL Site was implemented in 2003 and has resulted in a savings of approximately $16,000 per year. The site's initial NPDES permit required weekly sampling of the ground water treatment system's effluent discharge to McCalleys Creek. When SCDHEC renewed the Wamchem NPL Site's NPDES permit in 2000, the effluent sampling requirements were reduced to twice per month and the list of parameters was reduced from nine to one constituent. SCDHEC reduced the effluent sampling requirements to once per month with the 2009 NPDES permit renewal. The reduction in effluent monitoring requirements has resulted in savings of approximately $18,000 per year. Operation of the system without the blowers on the stripping towers has reduced the maintenance requirements for the towers and the packing considerably since USEPA allowed Springs to implement the modified mode of operation in July 2008. After Springs submitted substantial historical operational and influent/effluent monitoring data to USEPA for the groundwater recovery and treatment system that clearly showed the Wamchem NPL Site's recovered groundwater could meet the NPDES discharge limits without the use of the stripping towers, USEPA allowed Springs to shut down the blowers on the towers. In its current mode of operation, the recovered groundwater is pumped from the Influent Collection Tank to the top of Tower #1 and allowed to fall through the unpacked tower. The discharge from Tower #1 drains to the Effluent Collection/Recirculation Wetwell and then overflows to the parshall flume and discharges to McCalleys Creek. During the stripping tower maintenance activities in 2008, new packing was placed in Tower #2 and both blowers for the towers are still maintained in operational condition, if needed. Springs reviews all of the results of the NPDES permit monitoring for the influent and effluent discharges to the treatment system for any potential problems with meeting the permit limits. If any potential problems are identified, then the influent to the stripping towers can be redirected to Tower #2 and the blowers placed back in operation within minutes. Since implementing the modified mode of operation in 2008, both the influent and effluent data have shown concentrations of the permit parameter orders of magnitude below the NPDES permit limit. Cost savings associated with this modified mode of operation have been approximately $5,000 to $8,000 per year.

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

   The current O&M program and schedule that Springs has implemented for the Wamchem NPL Site is quite sufficient to maintain the protectiveness and effectiveness of the groundwater recovery and treatment system.

Site Name:	**Wamchem, Inc.**	**EPA ID No.:**	**SCD037405362**
Subject Name:	**Michael Townsend**	**Affiliation:**	**Remedial Project Manager**
Subject Contact Information:	**(404) 562-8813, townsend.michael@epa.gov**		
Time:	**N/A**	**Date:**	**3/20/2014**
Interview Location:	**N/A**		
Interview Format (circle one):	**In Person**	**Phone**	**Mail** **Other: Email**

Interview Category: EPA Remedial Project Manager

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

   The PRPs have been good stewards at this Site. The remedy is effectively containing and treating the contaminants of concern.

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

   The site has had little to no impact on the surrounding community.

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

   I am not aware of any complaints or inquiries regarding the Site.

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

   The remedy has made good progress towards cleaning up the COCs. In general, the COCs have steadily decreased since 2009, and in 2013 there was only one contaminant reporting above its remediation goal.

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

   Institutional controls are not yet in place.

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

   There are no community concerns that have been brought to my attention.

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

   No.

Appendix D: Site Inspection Checklist

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Wamchem, Inc.	**Date of Inspection: January 15, 2014**
Location and Region: Beaufort, SC, Region 4	**EPA ID: SCD037405362**
Agency, Office or Company Leading the Five-Year Review: EPA Region 4	**Weather/Temperature: 65 and sunny**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☐ Institutional controls
- ☒ Ground water pump and treatment
- ☐ Surface water collection and treatment
- ☒ Other: Discharge of treated ground water to McCalley's Creek.
- ☐ Monitored natural attenuation
- ☐ Ground water containment
- ☐ Vertical barrier walls

Attachments: ☐ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** Robert E. Gossett (Name) | O&M Manager, ERM (Title) | 01/20/2014 (Date)
   Interviewed ☐ at site ☒ at office ☐ by phone Phone: ____
   Problems, suggestions ☐ Report attached: Section 6.6 includes summarized interview question responses.
2. **O&M Staff** ____ (Name) | ____ (Title) | mm/dd/yyyy (Date)
   Interviewed ☐ at site ☐ at office ☐ by phone Phone: ____
   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). Fill in all that apply.

Agency SCDHEC
Contact Kayse Jarman (Name) | Environmental Engineer (Title) | 02/03/2014 (Date) | (803) 898-0832 (Phone No.)
Problems/suggestions ☐ Report attached: Section 6.6 includes summarized interview question responses.

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: _____

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

4. **Other Interviews** (optional) ☐ Report attached: Section 6.6 includes summarized interview question responses.

R. Nick Odom, Jr., Springs Industries, Inc. Email: nick.odom@springs.com
Submitted interview responses via email on 01/20/2014.

Michael Townsend, EPA Remedial Project Manager Email: Townsend.michael@epa.gov
Submitted interview responses via email in 03/20/2014.

III. ON-SITE DOCUMENTS AND 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.	**Ground Water 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: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached
From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached
From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached
From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached
From: mm/dd/yyyy Date	To: mm/dd/yyyy Date	_____ Total cost	☐ Breakdown attached

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: _____

B. Other Access Restrictions

1. **Signs and Other Security Measures** ☐ Location shown on site map ☐ N/A

Remarks: _____

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: There are no institutional controls currently in place on the Site.

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. GROUND WATER/SURFACE WATER REMEDIES ☒ Applicable ☐ N/A

A. Ground Water 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: _____

☒ Good condition ☐ Needs maintenance

☐ Sampling ports properly marked and functional

☐ Sampling/maintenance log displayed and up to date

☐ Equipment properly identified

☐ Quantity of ground water 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: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☒ Ground water 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: _____

VIII. 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.

IX. 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 designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The remedy is effective and functioning as designed to remove contaminants from the ground water.

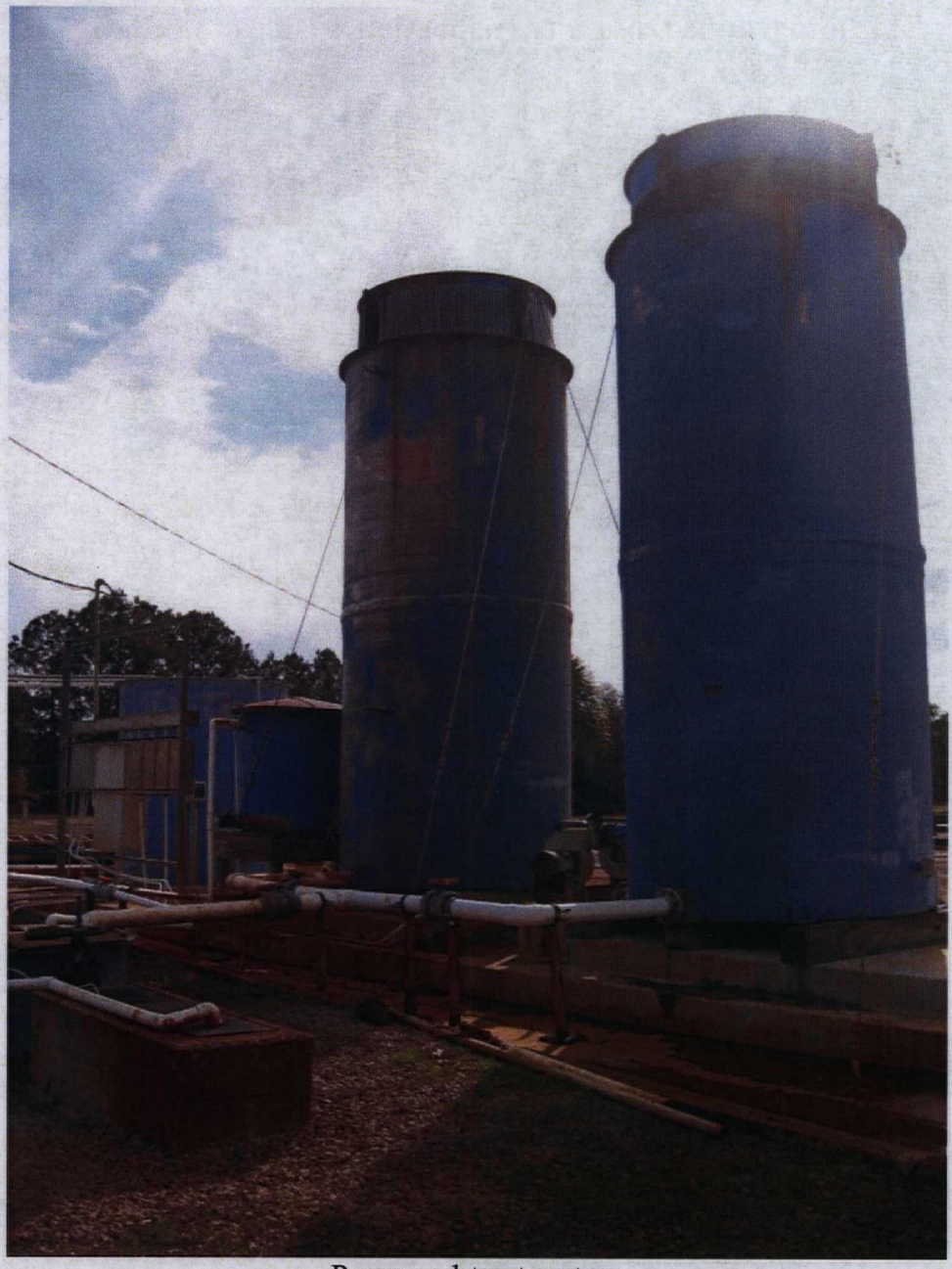
B. Adequacy of O&M

	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. There are no known O&M issues.
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. There are no known early indications of potential remedy problems.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. There are no known opportunities for optimization.

Appendix E: Photographs from Site Inspection Visit

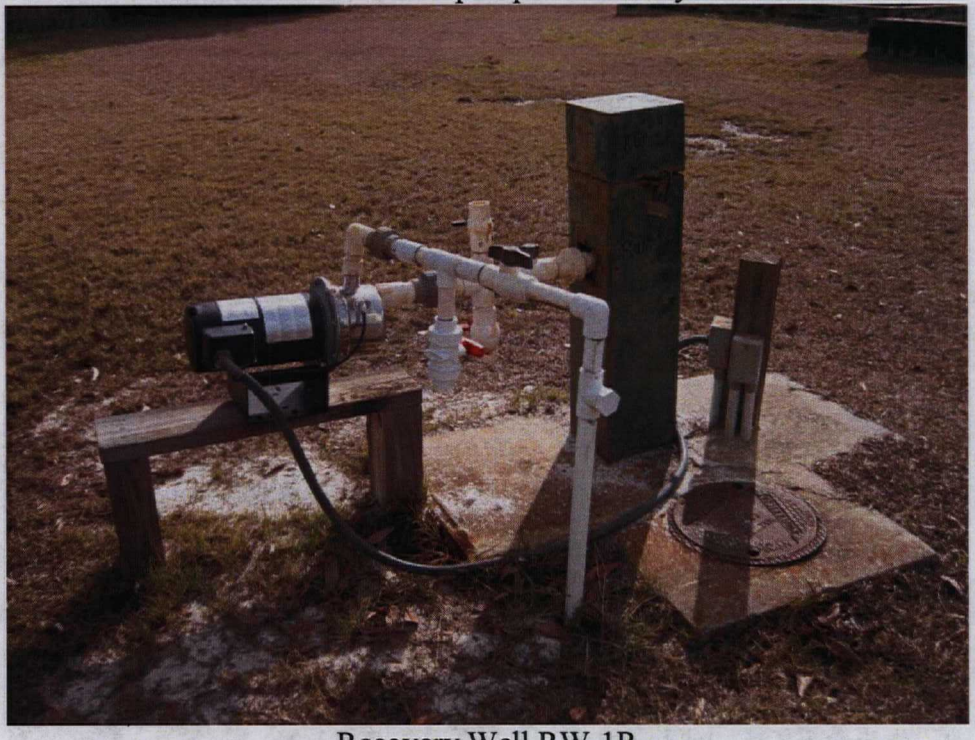
Entrance of site along Trask Parkway

Former building slabs in foreground and storage building in background

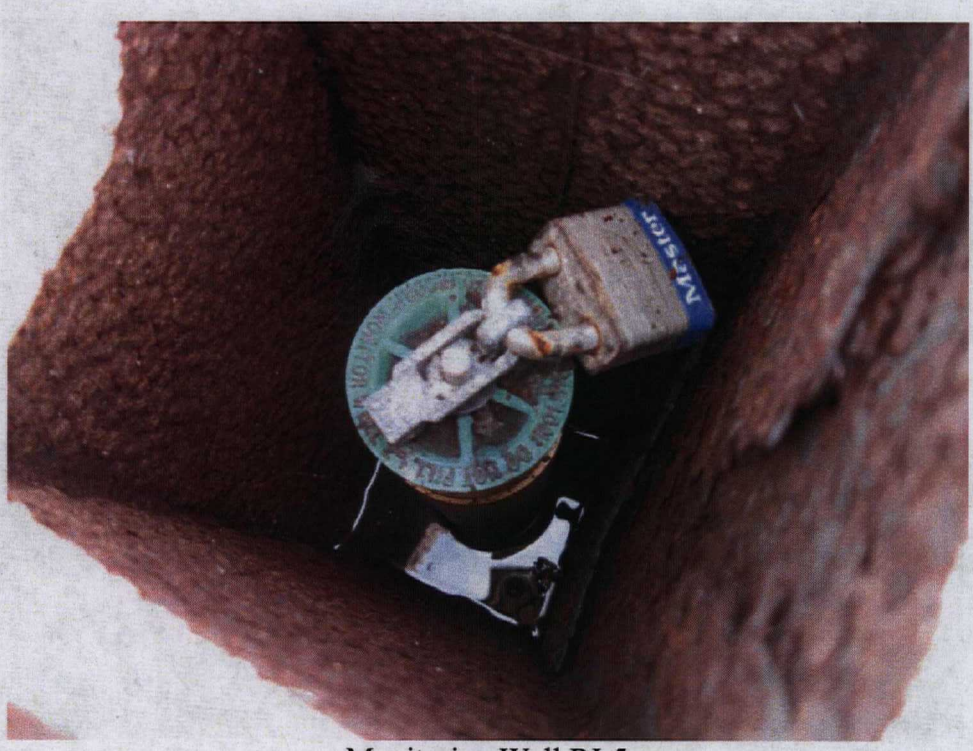


Pump-and-treat system

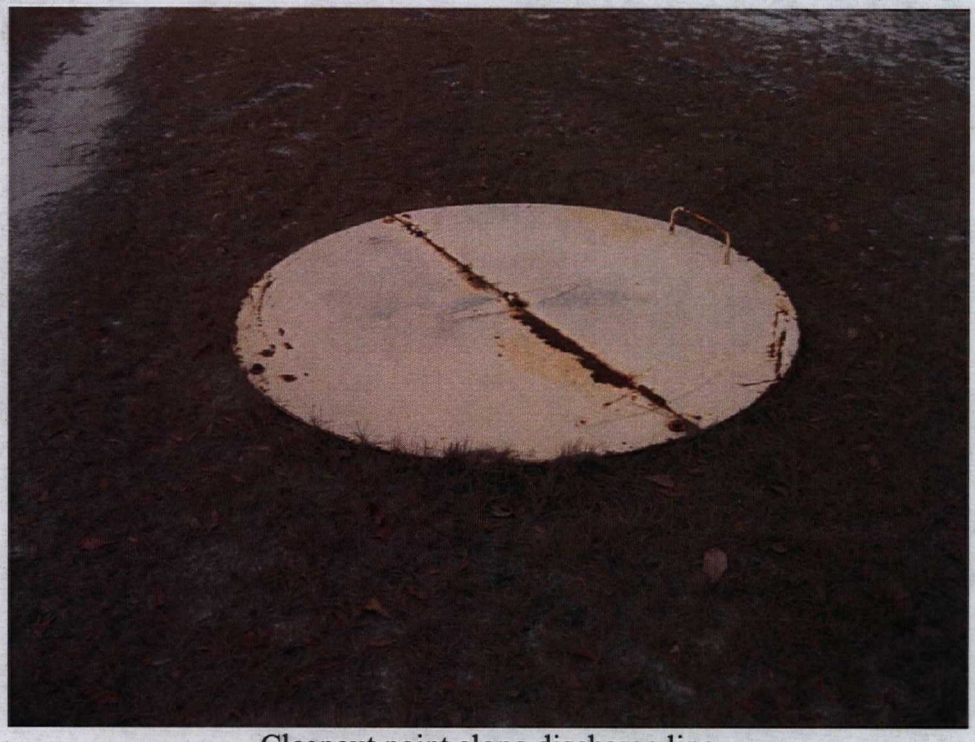
Site office behind pump-and-treat system



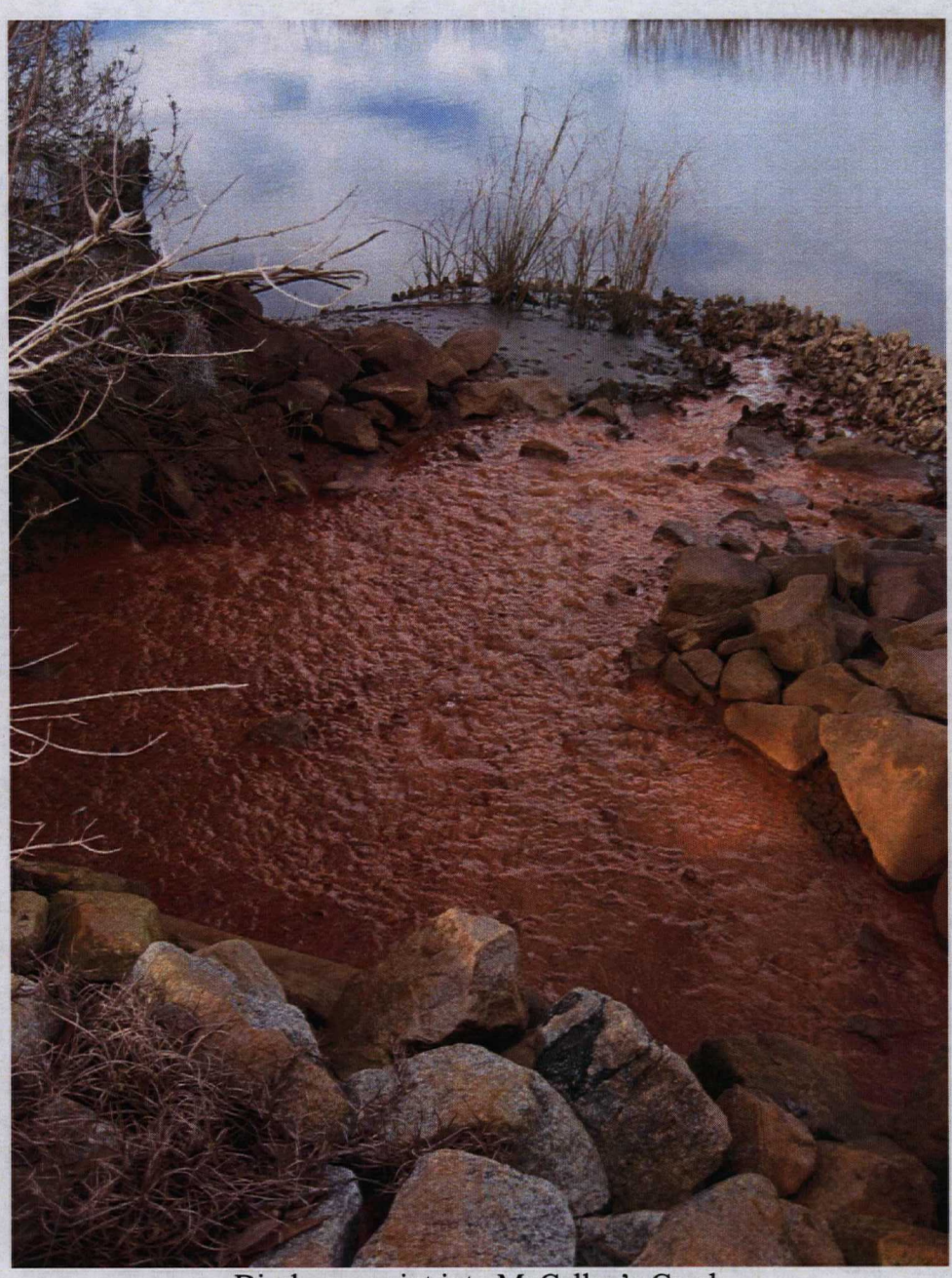
Recovery Well RW-1R



Monitoring Well RI-5



Cleanout point along discharge line



Discharge point into McCalley's Creek

Appendix F: Ground Water Monitoring Data 2009-2013

COC	Cleanup Goal (µg/L)	RW-1/1R					RW-2/2R					RW-3/3R				
		Apr-09	Apr-10	Apr-11	Apr-12	Apr-13	Apr-09	Apr-10	Apr-11	Apr-12	Apr-13	Apr-09	Apr-10	Apr-11	Apr-12	Apr-13
Acetone	1,000,000	<10	<10	<10	<40	<20	<100	<10	<40	<40	<20	<10	<10	<10	20	<20
Benzene	700	<1.0	<1.0	<1.0	<4.0	<1.0	<10	<1.0	<4.0	<4.0	<1.0	<1.0	1.3	<1.0	<1.0	1.6
1,2-Dichlorobenzene	1,970	74	800 E	750	130	370	2,200	880	910	1,200	510	84	12	12	8.1	16
1,4-Dichlorobenzene	1,970	5.9	52	56	8.5	27	330	190	160	220	100	27	16	14	10	21
2,4-Dinitrotoluene	370	<12	<11	<10	<11	<20	<11	<11	<10	<11	<20	<12	<12	<10	<13	<20
Naphthalene	2,350	<1.0	3	5.3	<4.0	<1.0	<10	<1.0	<4.0	<4.0	1.4	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	5,000	<1.0	2.4	2.8	<4.0	1.1	11	5.4	4.2	5.8	1.5	8.7	15	3.7	1.9	1.9
1,2,4-Trichlorobenzene	129	<0.5	33	50	8.3	24	140	140	130	370	150	9.4	5.9	1.9	2.3	5.3
Total Xylenes	2,000	9.2	52	17	30	6.7	94	32	19	30	9.2	26	47	40	11	63

µg/L - micrograms per liter

E - Quantitation of compound exceeded the calibration range

Bold and shaded result indicates value exceeds Cleanup Goal

If a chemical was analyzed by more than one method (e.g., 1,2-dichlorobenzene), the results by EPA Method 624 are provided in this table.

COC	Cleanup Goal (µg/L)	RW-4/4R					RW-5/5R					RI-3B				
		Apr-09	Apr-10	Apr-11	Apr-12	Apr-13	Apr-09	Apr-10	Apr-11	12-Apr	Apr-13	Apr-09	Apr-10	Apr-11	Apr-12	Apr-13
Acetone	1,000,000	<1,000	<100	<100	<100	<100	<10	<10	<10	<10	<20	<10	<10	<10	<10	<20
Benzene	700	<100	<10	<10	<10	<5.0	<1.0	1.9	2.9	1.7	6.2	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	1,970	**13,000**	**2,400**	**3,500**	**2,000**	680	87	12	12	26	5.9	<1.0	<1.0	<1.0	<1.0	<1.0
1,4-Dichlorobenzene	1,970	1,900	320	580	310	110	36	18	26	14	22	<1.0	<1.0	<1.0	<1.0	<1.0
2,4-Dinitrotoluene	370	**500**	41	98	55	39	<12	<12	<10	<12	<20	<10	<11	<11	<11	<20
Naphthalene	2,350	<1,000	<10	<10	<10	<5.0	<1.0	<1.0	<1.0	<1.0	1.2	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	5,000	2,000	170	450	160	65	<1.0	<1.0	<1.0	1.3	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	129	**1,800**	**500**	**800**	**570**	**190**	**160**	50	37	30	27	<0.5	1.4	<0.5	3	<1.0
Total Xylenes	2,000	1,000	140	290	160	47	<1.0	<1.0	<1.0	1.8	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

µg/L - micrograms per liter

Bold and shaded result indicates value exceeds Cleanup Goal

If a chemical was analyzed by more than one method (e.g., 1,2-dichlorobenzene), the results by EPA Method 624 are provided in this table.

COC	Cleanup Goal (µg/L)	RI-5					RI-6				
		Apr-09	Apr-10	Apr-11	Apr-12	Apr-13	Apr-09	Apr-10	Apr-11	Apr-12	Apr-13
Acetone	1,000,000	<10	<10	<10	<10	<20	<10	<10	<10	<10	<20
Benzene	700	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2-Dichlorobenzene	1,970	99	73	58	18	18	1.6	3.2	2.2	<1.0	<1.0
1,4-Dichlorobenzene	1,970	80	77	73	48	56	2.6	4.6	4.3	3.5	3.3
2,4-Dinitrotoluene	370	<12	<10	<11	<11	<20	<12	<14	<10	<12	<20
Naphthalene	2,350	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
Toluene	5,000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0
1,2,4-Trichlorobenzene	129	<0.5	0.66	<0.5	<0.5	<1.0	<0.5	<0.5	<0.5	<0.5	<1.0
Total Xylenes	2,000	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0	<1.0

µg/L - micrograms per liter

If a chemical was analyzed by more than one method (e.g., 1,2-dichlorobenzene), the results by EPA Method 624 are provided in this table.

Appendix G: Vapor Intrusion Screening-Level Assessment

Maximum contaminant concentrations detected in 2013 were entered into the most recent EPA vapor intrusion screening level (VISL) calculator, integrating the most recent toxicity data (Table G-1). The 2013 maximum concentrations of 1,2,4-trichlorobenzene exceed the 2013 VISLs and the calculated indoor air concentrations still exceed the non-carcinogenic hazard of 1.0 for commercial land use and residential land use (Table G-1). In addition, the 2013 concentrations are the lowest detected in the past five years, down from a maximum of 1,800 µg/L in 2009. Although the calculated indoor air concentrations exceed EPA's acceptable limits, no unacceptable exposures are anticipated because the Site currently has no inhabited buildings near these wells. Therefore, vapor intrusion does not currently pose a threat to human health. If site conditions are expected to change, the vapor intrusion pathway should be reassessed to ensure no unacceptable exposures.

Table G-1: Vapor Intrusion Screening-Level Assessment

COC	Maximum Ground Water Concentrations in 2013	Well Location	VISL[a]	Calculated Indoor Air Concentration[a]	Vapor Intrusion Carcinogenic Risk	Vapor Intrusion Hazard
Residential						
1,2,4-Trichlorobenzene	190 (µg/L)	RW-4/4R	36	11 (µg/m^3)	NA	**5.3**
1,2-Dichlorobenzene	680 (µg/L)	RW-4/4R	2,700	53.4 (µg/m^3)	NA	0.26
Commercial						
1,2,4-Trichlorobenzene	190 (µg/L)	RW-4/4R	150	11 (µg/m^3)	NA	**1.3**
1,2-Dichlorobenzene	680 (µg/L)	RW-4/4R	11,000	53.4 (µg/m^3)	NA	0.061

Notes:

a. EPA Vapor Intrusion Screening Level Calculator, February 2014 (http://www.epa.gov/oswer/vaporintrusion/documents/VISL-Calculator.xlsm).

Appendix H: Springs Industries, Inc. Response to 2009 Five Year Review Recommendations – January 22, 2014

Springs firmly believes that USEPA's recommendation for sampling the groundwater recovery and treatment system's discharge to McCalleys Creek for 1,2-dichlorobenzene is unnecessary and unjustified based on the historical monitoring data for the site. When SCDHEC issued the Wamchem NPL Site's initial NPDES Permit No. SC0046701 in December 1994, the permit included weekly effluent monitoring requirements and limits for benzene, toluene, total phenols, 1, 4-dichlorobenzene, 2, 4-dinitrotoluene, naphthalene, 1, 2, 4-trichlorobezene, total xylenes, nickel, silver, zinc, and BOD5, along with monthly whole effluent chronic toxicity testing. Startup and operation of the groundwater recovery and treatment system was initiated on September 18, 1996. Part III Item 12 of the site's initial NPDES permit required that Springs submit an additional completed 2-C NPDES Application Form for the analysis of the treatment system discharge within 90 days of the initial discharge of treated groundwater. The completed 2-C Form was submitted to SCDHEC prior to the December 17, 1996 deadline. The full 2-C analysis of the treated groundwater discharge indicated that 1, 2-dichlorobenzene was not detected above the laboratory method detection limit of 10 µg/L. When SCDHEC renewed the Wamchem NPL Site's NPDES permit in September 2000, the agency's reasonable potential analysis indicated that effluent monitoring requirements and permit limits for all parameters listed in the site's previous NPDES permit were not necessary since no reasonable potential existed for these parameters to exceed water quality standards. Based on the results of the reasonable potential analysis, the new NPDES permit required effluent sampling twice per month for 1,2,4-trichlorobenzene as check for the groundwater treatment system's efficiency. SCDHEC also modified the effluent toxicity monitoring requirement to a 48-hour static acute test that was to be conducted once during the three-year life of the permit. SCDHEC renewed the Wamchem NPL Site's NPDES permit in April 2003 and again in May 2009. For both NPDES permits, effluent sampling requirements and limits remained for 1,2,4-trichlorobenzene but sampling requirements were reduced to monthly. The effluent toxicity monitoring requirement remained a 48-hour static acute test conducted once during the 5-year life of each permit.

Springs also has surface water monitoring data collected in 2000 and 2001 on McCalley's Creek adjacent to the Wamchem NPL Site. Springs collected the surface water samples and had them analyzed for all nine of the constituents of concern (COC) for the site in conjunction with the Groundwater Mixing Zone Application it was preparing for SCDHEC during this period. A site map and the analytical results for both the 2000 and 2001 surface water sampling events are included in this attachment. These data were submitted to USEPA on April 16, 2009. For both sampling events, surface water samples were collected from McCalley's Creek at each of the three sampling points approximately one hour before low tide so the samples would have maximum groundwater input to the tidal creek and minimum influence by tidal activity. A review of the analytical results indicates that none of the COCs were detected above their respective laboratory method detection limit at any of the sampling points during either sampling event. The laboratory method detection limit utilized for 1, 2-

dichlorobenzene was 5 µg/L.

Groundwater monitoring data for the Wamchem NPL Site indicate that 1, 2-dichlorobenzene concentrations detected in the recovery wells have been declining. Since the groundwater recovery and treatment system was placed in operation in September 1996, 1, 2-dichlorobenzene has been detected above the site cleanup goal of 1,970 µg/L only at RW-2R, RW-4R, and RI-5. 1,2-Dichlorobenzene concentrations have not been detected above the cleanup goal at RI-5 since February 1998 and have shown a steady decline from a maximum concentration of 3,490 µg/L in August 1997 to 18 µg/L in April 2012 and 2013. 1, 2-Dichlorobenzene concentrations have not been detected above the cleanup goal at RW-2R since April 2010 and have shown a general decline since March 2006 from a concentration of 3,600 µg/L to 510 µg/L in April 2013. 1, 2-Dichlorobenzene was below the cleanup goal at RW-4R in April 2013 at a concentration of 680 µg/L and has shown a general decline after reaching a maximum concentration in the new recovery wells (replaced in June 1997) of 10,000 µg/L in March 2006 to 680 µg/L in April 2013.