Final Work Plan

Groundwater Interim Measures Work Plan for the Former Chemical Plant

Prepared for

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Birmingham, Alabama

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CH2MHILL

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Contents

Acronyms and Abbreviations

ADEM	Alabama Department of Environmental Management
bgs	below ground surface
CMS	Corrective Measures Study
CW	containment well
EPA	U.S. Environmental Protection Agency
FCP	former chemical plant
Frac Rite	Frac Rite Environmental, LTD
ft	feet
GWSAP	Groundwater Sampling and Analysis Plan
HSWA	Hazardous and Solid Waste Amendments
IM	interim measures
IMWP	Interim Measures Work Plan
MCL	maximum contaminant level
MW	monitoring well
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
RSL	regional screening level

1.0 Introduction

1.1 Project Background

Walter Coke, Inc. (Walter Coke), located in Jefferson County, Alabama, has been conducting a Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) since 1990 in accordance with the regulations set forth by the RCRA Hazardous and Solid Waste Amendments (HSWA) to evaluate past waste management practices at its Birmingham, Alabama, facility. During the RFI, a groundwater plume was identified in the former chemical plant (FCP) located at the northeastern edge of the actively operating portion of the facility (Figure 1). Chemicals identified in groundwater beneath the FCP at concentrations above their respective maximum contaminant levels (MCLs) include benzene, toluene, chlorobenzene, and several chlorinated ethenes.

An Interim Measures Work Plan (IMWP), prepared and submitted to the U.S. Environmental Protection Agency (EPA) in February 2002, included a detailed description of the conceptual geologic and hydrogeologic model for the site, which would affect groundwater flow from the FCP, along with an evaluation of several remedial options to reduce the chemical mass beneath the FCP and to prevent offsite migration of affected groundwater. An addendum to the 2002 IMWP was submitted to EPA in February 2011 to address EPA comments on the original submittal. On April 16, 2012, EPA approved the IMWP, specifically approving Sections 2 and 5 of the original 2002 submittal and the 2011 Addendum, pending modification per EPA comments (Appendix A).

This final Groundwater IMWP, revised per EPA's approval, focuses on the installation of a groundwater containment system to mitigate groundwater migration from the former plant toward the southeast past the facility boundary. The 2002 work plan is included in its entirety in Appendix B, and referenced as needed.

1.2 Objective of the Interim Measures

The groundwater plume at the FCP primarily is dissolved phase chlorinated solvents that have migrated to the downgradient property boundary along Shuttlesworth Drive. The objective of the interim measures (IM) is to provide hydraulic containment to reduce the potential for groundwater to migrate from the FCP beyond the property boundary. As a secondary benefit of hydraulic containment, the chemical mass in the groundwater under the FCP will be reduced via the extraction of groundwater to achieve containment.

In regard to EPA's comments requesting an evaluation of additional IMs to reduce chemical concentrations in the FCP soils, including soil vapor extraction, Walter Coke will evaluate the feasibility of source control and treatment remedies as part of the Corrective Measures Study (CMS) process.

Walter Coke understands that the site's final remedy goal for meeting groundwater protection standards will be to achieve MCLs, regional screening levels (RSLs), and/or risk-based standards developed as part of the CMS. However, this IMWP only addresses implementation of the groundwater containment system.

2.0 Groundwater Interim Measures Approach

This section outlines the groundwater IM to be implemented at the FCP, including: 1) performance objective; 2) containment well locations; 3) preconstruction monitoring; 4) well construction activities; 5) system performance monitoring; and 6) fracturing to improve yield.

2.1 Performance Objective

The performance objective for this IM is to establish pumping rates in the containment wells to maintain an inward gradient along the property line of monitoring wells MW-49S and MW-51. Per EPA's request, Walter Coke also will evaluate the hydraulic interaction and capture of the interior wells (CWs-3, 4, 5, and 6) for performance reporting purposes.

Although not a performance objective, the secondary benefit of chemical mass reduction will be quantified through groundwater sampling, as described in more detail under "System Performance Monitoring." Walter Coke will submit a separate groundwater monitoring plan to address the sampling and analyses of chemicals of potential concern for this IM.

2.2 Containment and Monitoring Well Locations

Walter Coke proposes to adjust the location of five of the six originally proposed containment well locations (CWs-1, 3, 4, 5, and 6), as shown in Figure 2 (this Figure 2 replaces Figure 5-1 of the 2002 IMWP [Appendix B], noting that all wells are now designated as 'CW' for containment wells). The proposed containment wells were relocated to be closer to the center of the FCP area, further away from existing monitoring wells, and in the case of CW-5, closer to the fence line where chemicals in groundwater are near the property boundary. The location of CW-2, originally proposed along the fence line, has not been moved.

The adjustment away from monitoring wells was done to minimize the potential that pumping would affect the ability to collect groundwater samples from monitoring wells. Also, the CW well locations were adjusted so that the impacts of pumping could be monitored by a broader set of wells. The adjustments also resulted in several of the wells being moved closer to the downgradient boundary.

Because of the adjustment of CW-1 closer to the boundary and subsequently downgradient of MW-51, Walter Coke proposes to install a new monitoring well downgradient of CW-1, MW-90 (Figure 2). The new well will be installed within the shallow bedrock and screened in the interval where shallow affected groundwater was noted in nearby wells MWs-49S, 50, and 51. The shallow groundwater is expected to be encountered between 15 and 40 feet (ft) below ground surface (bgs).

2.3 Preconstruction Monitoring

Monthly water levels will be collected from the wells summarized in Table 1, and shown in Figure 2, for 3 months before installation of the containment wells to establish a baseline for hydraulic gradient. All of the selected wells are screened within the shallow bedrock at depths ranging from 10 to 50 ft bgs.

2.4 Well Construction Activities

Sections 5.1.1 through 5.1.3 of the 2002 IMWP describe the procedures for installing the containment wells and managing wastes from installation activities. The procedures include surface casing installation, borehole development and pumping tests, and containment well installation. These procedures are not reiterated in this Final IMWP, but rather are included in Appendix B.

2.4.1 Construction Pump Testing

Following borehole development as described in Section 5.1.2 of the 2002 IMWP (Appendix B), pump tests will be conducted to evaluate well yield for selection of pump size. During the yield test procedure, water levels will be monitored in nearby wells to evaluate the potential for short-term hydraulic impacts on those wells. This testing and the post-construction testing described in the following text address EPA's request for evaluation of the hydraulic interconnection between the containment wells and the monitoring wells.

2.4.2 Waste Management

Section 5.1.5 of the 2002 IMWP describes the procedures for soil and purge water waste management. These procedures are not reiterated in this Final IMWP, but rather are included in Appendix B.

2.5 System Performance Monitoring

To evaluate and demonstrate the effectiveness of the IM, Walter Coke proposes the performance measures described in the following subsections

2.5.1 Performance Objective–Inward Hydraulic Gradient

A transducer study will be conducted along the property boundary at MWs-49S, 50, and 51. The transducers will be installed in the wells 1 week before system startup and continue for 1 month past system startup. These data will be used to demonstrate hydraulic connectivity at the monitoring well locations and the creation of an inward gradient.

Once the entire IM system is operationally ready, monthly water levels will be collected manually for 6 months in the wells listed in Table 1, followed by quarterly monitoring for the remainder of the year. After each round of water levels are collected, a potentiometric surface map of the FCP will be prepared. The change in gradient will be evaluated over time. In addition, hydrographs showing the water level trend in each well over time will be prepared and evaluated. Transducer study data will be included in the hydrographs for MWs-49S, 50, 51, and new well, MW-90.

2.5.2 Secondary Benefit–Contaminant Mass Reduction

For an initial period of 1 year, quarterly sampling will be conducted to estimate the chemical mass removed by the containment system. A sample of the groundwater recovered from the system will be collected from a sampling port that includes the combined flow from all of the containment wells. The sample will be analyzed for volatile organic compounds and semivolatile organic compounds via EPA SW-846 Methods 8260B and 8270D, respectively. The concentrations of the chemicals detected in the sample will be multiplied by the volume of water extracted from the system during the monitoring period to calculate the total mass extracted in pounds. In addition to the mass (pounds) removed, the total volume of groundwater recovered will be reported in gallons. These data will be reported routinely to EPA and the Alabama Department of Environmental Management (ADEM) as described under the Reporting Requirements.

At the end of the initial (1- year) period, an evaluation will be performed to investigate whether there is additional value to be provided by continued quarterly sampling. Walter Coke will provide the results of this evaluation to EPA.

TABLE 1
List of Wells Proposed to Evaluate the Interim Measures
Groundwater Interim Measures Work Plan for the Former Chemical Plant Walter Coke, Birmingham, AL

Well ID	Monitored Unit	Screened Interval (ft bgs)	Depth to Bedrock (ft bgs)
MW-49S	SB	16-26	13.5
MW-50	SB	25-35	19
MW-51	SB	14-24	9
MW-52	SB	11.5-21.5	10.5
MW-53	SB	12-22	10
MW-54	SB	22-32	18
MW-55	SB	12-22	8
MW-56	SB	10-20	4
MW-70	SB	18.8-28.8	13.3
MW-71	SB	30.8-40.8	12
MW-72	SB	42.8-52.8	16
MW-77	SB	25-35	6.5
MW-78	SB	36-46	7.1
MW-80	SB	33-43	20
MW-81	SB	11-21	6.5
MW-90	SB	NYI	NYI

Notes:
ft bgs = feet below ground surface
SB = shallow bedrock monitoring well
NYI = not yet installed (proposed as part of the performance monitoring system)

2.6 Fracturing to Improve Yield

To address EPA's comment about fracturing, CH2M HILL contacted Frac Rite Environmental, LTD (Frac Rite) regarding retro-fracturing at existing containment wells. Frac Rite confirmed that retro-fracturing near existing wells has been successful in the past to increase production and the radius of influence, but cautioned that site geology can be a limiting factor in the technology's success. Walter Coke has submitted site-specific geologic information to Frac Rite for feasibility and cost evaluation.

Walter Coke shares EPA's interest in maximizing well yield and demonstrating performance. Walter Coke will review the system performance monitoring described herein and, if the system does not achieve the standard after 1 year of monitoring, Walter Coke will evaluate various methods of improving yield and containment, including the use of hydrofracturing.

3.0 Reporting Requirements and Schedule

The following reports will be submitted to EPA and ADEM as the IM is implemented:

- **Construction Progress Reports** will be submitted bi-monthly until the IM system is operationally ready. Once the system is operationally ready, quarterly reporting will begin as described in the following bullet.
- **Quarterly Monitoring Reports** will be prepared for 1 year to generally include a report narrative, groundwater elevation data, a system evaluation, quarterly monitoring results, mass removal calculations (as warranted), and recommendations for system improvement. The system evaluation will include groundwater flow direction and magnitude, containment, potentiometric surface and chemical concentration maps, and data trend plots. The quarterly monitoring results will include chemical concentration data from the system sampling port and monitoring wells, and groundwater elevation tables.

  After four quarterly sampling events, EPA may approve annual monitoring of the IM; if so, annual reports will be submitted from that point forward until a final remedy is approved for the site.
- The fourth Quarterly Monitoring Report (or Annual Report, as appropriate) also will include an annual system effectiveness report calculating the mass removed and, if necessary, corrective measures with a schedule for implementation for EPA's concurrence. The report submittal dates are summarized in Table 2.

3.1 Schedule

The following schedule in Table 2, as discussed and documented, from the April 13, 2012, letter (refer to Appendix A).

TABLE 2
Interim Measures Work Plan Schedule
Groundwater Interim Measures Work Plan for the Former Chemical Plant Walter Coke, Birmingham, AL

Item	Due
A. Final IMWP incorporating EPA comments	May 16, 2012
B. Planning, design and subcontractor acquisition to support the final IMWP	July 16, 2012
C. IM Groundwater Sampling and Analysis Plan (GWSAP) and Indoor Air Vapor Intrusion Work Plan	June 29, 2012
D. Preconstruction Monitoring	Within 30 days of EPA approval of the IM GWSAP
E. Construction complete and begin system startup	Within 30 days of completion of Item D (Preconstruction Monitoring)
F. Construction progress reports	Bimonthly until the system is operational
G. Quarterly Monitoring Reports	60 days after the end of the quarter for a duration of 2 years (maximum) or 1 year if approved by EPA (Item I).
H. Annual System Effectiveness Reports	Included in fourth quarter report (Item G)
I. Annual Sampling	After 1 year of operation with EPA approval

Figures