



**IN-SITU CHEMICAL OXIDATION  
REMEDIAL ACTION REPORT  
ADDENDUM #1**

**CTS OF ASHEVILLE, INC. SUPERFUND SITE  
235 Mills Gap Road  
Asheville, Buncombe County, North Carolina  
EPA ID: NCD003149556  
Consent Decree – Civil Action No. 1:16-cv-380  
NCDEQ UIC Tracking No. WI0100571**

**Prepared for:**

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**Prepared by:**

**WSP USA Environment & Infrastructure Inc.  
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Asheville, North Carolina 28806**

**WSP Project 6252-16-2012**

**December 15, 2023**



December 15, 2023

Mr. Craig Zeller, P.E.  
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Remedial Project Manager  
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**Subject: In-situ Chemical Oxidation Remedial Action Report Addendum #1  
CTS of Asheville, Inc. Superfund Site  
235 Mills Gap Road, Asheville, Buncombe County, North Carolina  
EPA ID: NCD003149556  
Consent Decree – Civil Action No. 1:16-cv-380  
NCDEQ UIC Tracking Number WI0100571  
WSP Project 6252-16-2012**

Dear Mr. Zeller:

Please find attached the In-situ Chemical Oxidation Remedial Action Report Addendum #1 (ISCO RA Report Addendum #1) for the above-referenced Site. WSP USA Environment & Infrastructure Inc. (WSP) prepared this ISCO RA Report Addendum #1 on behalf of CTS Corporation to document the implementation of additional ISCO interim remedial activities at the CTS of Asheville, Inc. Superfund Site (Site) located at 235 Mills Gap Road in Asheville, Buncombe County, North Carolina. This ISCO RA Report Addendum #1 has been prepared to comply with the Consent Decree for Interim Remedial Design/Remedial Action at the CTS of Asheville, Inc. Superfund Site between the United States of America and CTS Corporation, Mills Gap Road Associates, and Northrop Grumman Systems Corporation (entered on March 7, 2017). This ISCO RA Report Addendum #1 is a supplement to the ISCO RA Report, dated May 19, 2020.

If you have questions regarding this ISCO RA Report Addendum #1, please contact us at (828) 252-8130.

Sincerely,

**WSP USA Environment & Infrastructure Inc.**

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Project Geologist

RMC/MEW:rmc

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#### LIST OF ACRONYMS

bgs	below ground surface
CD	Consent Decree
CFATS	Chemical Facility Anti-Terrorism Standards
CQA/QCP	Construction Quality Assurance/Quality Control Plan
DHS	Department of Homeland Security
EPW	emplacement well
ISCO	in-situ chemical oxidation
NCDEQ	North Carolina Department of Environmental Quality
PWR	partially weathered rock
QA/QC	quality assurance/quality control
RA	Remedial Action
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RD	Remedial Design
SOW	Statement of Work
TCE	trichloroethene (also, trichloroethylene)
UIC	Underground Injection Control
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound

## **1.0 BACKGROUND**

This document presents the In-situ Chemical Oxidation Remedial Action Report Addendum #1 (ISCO RA Report Addendum #1) for the implementation of additional ISCO interim remedial action activities (a 'polishing event') at the CTS of Asheville, Inc. Superfund Site (Site) located at 235 Mills Gap Road in Asheville, Buncombe County, North Carolina. The initial full-scale ISCO interim remedial action activities were documented in the ISCO Remedial Action Report dated July 20, 2020 (Wood, 2020). This ISCO RA Report Addendum #1 has been prepared to comply with Paragraph 4.5(d) of the Statement of Work (SOW) of the Consent Decree for Interim Remedial Design/Remedial Action (CD) at the Site between the United States of America and CTS Corporation, Mills Gap Road Associates, and Northrop Grumman Systems Corporation (Settling Defendants). The ISCO RA Report Addendum #1 activities were performed in general accordance with the ISCO Remedial Action Work Plan Addendum #1, dated June 2, 2023 (WSP, 2023a). A chronology of events related to the ISCO interim remedial actions is presented in Table 1.

### **1.1 PREVIOUS ISCO REMEDIAL ACTION ACTIVITIES**

Drilling activities for the installation of 76 additional emplacement wells for the initial full-scale ISCO interim remedial action were conducted between October 2019 and January 2020. The treatment interval was from the top of the 'highly' contaminated zone down to bedrock. The top of the contaminated zone was based on previously collected data in the treatment area and baseline groundwater sampling analytical results. From December 2019 to March 2020, a total of 380 emplacements, containing approximately 350,200 pounds of potassium permanganate in approximately 82,050 gallons of slurry, were constructed at the 76 emplacement well locations during the initial full-scale ISCO interim remedial action.

Since completion of the potassium permanganate emplacement in March 2020, eight ISCO performance groundwater monitoring events have been conducted. The ISCO performance groundwater monitoring program was initiated with 15 designated monitoring wells, and currently includes 12 monitoring wells. Three monitoring wells have been removed from the ISCO performance groundwater monitoring program since the TCE concentrations in groundwater samples collected from the monitoring wells were below five percent of the TCE concentration detected in the respective baseline samples, and below the average remedial action objective (RAO) concentration, for at least three consecutive performance monitoring events. USEPA approved the removal of these monitoring wells from the ISCO performance monitoring program. The average reduction of TCE in groundwater in the ISCO treatment area as of the July 2023 groundwater monitoring event is approximately 65 percent (WSP, 2023b).

As described in Section 3.7.3 of the ISCO Final Remedial Design, additional potassium permanganate emplacements (i.e., a 'polishing event') were contemplated to be required to achieve the RAO of a 95 percent TCE reduction. An ISCO polishing event, as described in the ISCO Remedial Action Work Plan Addendum #1, dated June 2, 2023, and approved by USEPA on June 16, 2023, was completed in August 2023. Information on this ISCO polishing event is discussed in the following sections.

## **1.2 EMPLACEMENT STRATEGY**

The treatment intervals for the polishing event emplacements were targeted based on groundwater conditions determined from previous ISCO-related groundwater sampling results. The emplacement depths were established based on the thickness of the contaminated zone targeted and previous emplacement locations. The amount of potassium permanganate used and the vertical spacing of each emplacement was dependent upon the historical TCE concentrations in the vicinity of the emplacements. Historical TCE concentrations in groundwater samples, and previously collected data, were evaluated to determine the amount of potassium permanganate to be emplaced at each location.

Based on the preliminary TCE concentrations reported for the groundwater sample collected from monitoring well MW-35 during the July 2023 ISCO performance monitoring event, the 46 emplacements proposed for completion in the originally planned 12 emplacement well locations were slightly reallocated to include two additional emplacement well locations (EPW-34 and EPW-43). This modification resulted in the polishing event consisting of 46 potassium permanganate emplacements in 14 existing emplacement wells. The saprolite zone only was targeted at seven locations, the partially weathered rock (PWR) zone only was targeted at four locations, and both the saprolite and PWR zones were targeted at three existing ISCO emplacement well locations.

A total of 40,000 pounds of potassium permanganate was proposed for emplacement at the 14 locations. The majority of emplacements were proposed using 1,000 pounds of potassium permanganate each, with a limited number of emplacements proposed using approximately 500 pounds of potassium permanganate each.

## 2.0 CONSTRUCTION ACTIVITIES

### 2.1 SITE PREPARATION ACTIVITIES

Prior to polishing event emplacement activities, the following Site preparation activities were conducted:

- Vegetation was cleared around the Site entrance to provide improved ingress/egress visibility from/to Mills Gap Road.
- Vegetation and other surface obstructions were cleared in the treatment area for equipment and personnel access.
- A water meter and backflow preventor assembly was obtained from the City of Asheville for use in accessing the municipal water supply.
- A frac tank was temporarily staged onsite so that the availability of water was consistent during emplacement activities.
- Three storage containers ('conex boxes') were staged onsite to securely store the potassium permanganate upon receipt from the manufacturer.
- Temporary toilet facilities were mobilized to the Site.

Under CERCLA Section 121(e)(1), federal, state, or local permits are not required for the portion of any removal or remedial action conducted entirely onsite as defined in 40 CFR 300.5 (see also 40 CFR 300.400(e)(1) and (2)). In addition, CERCLA actions must only comply with the "substantive requirements," not the administrative requirements of regulations. Administrative requirements include permit applications, reporting, record keeping, and consultation with administrative bodies.

The following agency regulations requiring a permit/adherence were identified for implementation of the ISCO polishing event at the Site:

- North Carolina Department of Environmental Quality (NCDEQ) Division of Water Resources Underground Injection Control (UIC) Well Program rules for subsurface injection.
- Department of Homeland Security (DHS) Chemical Facility Anti-Terrorism Standards (CFATS).

The NCDEQ UIC Well Program was notified prior to initiation of the polishing event emplacement activities. NCDEQ indicated a modification of the existing UIC permit application was not necessary, but that permitting requirements were applicable and documentation of the polishing event could be submitted in the form of an Injection Event Record (NCDEQ Form UIC-IER).

Potassium permanganate in quantities exceeding the screening threshold quantity of 400 pounds is regulated by the DHS CFATS. Upon receipt of the potassium permanganate at the Site, the material was secured and maintained in accordance with DHS requirements.

Granular research-grade potassium permanganate, which is marketed as CAIROX<sup>®</sup> by Carus Corporation, was delivered in approximate 2,000-pound weather-proof 'super sacks' placed in plastic containers, which were subsequently stored in the onsite secured storage containers. The super sacks varied in actual weight but were on average slightly greater than 2,000 pounds each.

## **2.2 SUBSURFACE ACTIVITIES**

The following sections describe emplacement well preparation/cleanout and emplacement installations.

### **2.2.1 Emplacement Well Preparation/Cleanout**

FRx, Inc. (FRx), an environmental injection contractor, mobilized equipment and materials to the Site on August 14, 2023 and performed emplacement activities from August 15 through August 24, 2023. Prior to installation of emplacements, FRx measured the depth to bottom in each emplacement well. Eleven of the fourteen emplacement wells contained semi-solid material that needed to be removed prior to performing emplacements at the target depths. The semi-solid material consisted of soil, bentonite and potassium permanganate residuals from the 2020 full-scale emplacement activities. FRx flushed the emplacement wells utilizing municipally sourced water injected through stainless-steel tremie pipe to the bottom of the emplacement wells. The slurry was then recirculated through a pump and trough at the surface and back to the emplacement well. Solid material was allowed to accumulate in the trough. The contents of the trough were placed in adjacent emplacement wells as listed in Table 2. The subsurface equipment (e.g. tremie pipe) used in emplacement activities was not decontaminated between emplacement well locations, as the emplacement wells were subsequently treated by ISCO.

During emplacement well preparation activities, and emplacement completions, ambient air monitoring was performed periodically using a calibrated photoionization detector capable of measuring volatile organics in the parts per million range. The air monitoring indicated air quality was protective of onsite workers and the adjacent community during the emplacement activities.

### **2.2.2 Emplacement Installation**

The emplacement process occurred in three steps. First, a high velocity water jet was used to cut the PVC casing and grout at the target emplacement depth and create a kerf, or notch, in the surrounding formation. Inflatable packers were then used to isolate the emplacement interval. Second, the granular potassium permanganate was mixed with a water and bentonite slurry and the mixture was injected into the formation using a positive displacement pump. The third step involved 'chasing' the potassium permanganate/bentonite/water slurry through the injection equipment/conduit with a water/bentonite slurry to complete the emplacement of the material.

Potassium permanganate was hydraulically emplaced in the subsurface as a slurry of granular potassium permanganate and a carrier fluid (water/bentonite slurry) creating a sheet-like sub-horizontal disc in the subsurface. Approximately 40,000 pounds of potassium permanganate were emplaced at the 14 locations.

A hydraulic connection was observed between emplacement wells EPW-9 and EPW-17 during the emplacement at 71.5 feet below ground surface (bgs) in EPW-9. Once the hydraulic connection was established between the emplacement wells, the hydraulically connected well that was not receiving emplacement material was temporarily sealed with a mechanical packer. A hydraulic connection was established within EPW-20 at a shallower former emplacement depth during the chase of an emplacement at 53 feet bgs. This connection occurred during the chase which was then terminated, and the emplacement was otherwise not affected. A hydraulic connection to the ground surface was observed from the 40-foot bgs emplacement at EPW-16 (the shallowest emplacement). This emplacement was terminated prior to achieving the target emplacement amount of 1,000 pounds, and the remainder of the potassium permanganate, approximately 350 pounds, was included in the 43-foot bgs emplacement at EPW-16.

The saprolite emplacement locations are depicted in Figure 1 and the PWR emplacement locations are depicted in Figure 2. Thirty-two of the 46 emplacements (approximately 70 percent) contained 1,000 pounds of potassium permanganate or greater. The remainder of the emplacements contained at least 500 pounds of potassium permanganate. Table 3 contains a summary of the emplacement mass and volumes. An NCDEQ Injection Event Record is included as Appendix A.

WSP provided oversight of the emplacement activities and managed the delivery and storage of potassium permanganate. Copies of the logbook used to document construction activities are included in Appendix B.

### **2.3 WASTE MANAGEMENT ACTIVITIES**

The super sacks in which the potassium permanganate was delivered and stored were neutralized onsite by rinsing in a container filled with a solution of dissolved sodium thiosulfate and municipally sourced water. The super sacks were then placed in a bulk solid waste container along with other non-regulated solid waste produced during the project (e.g. empty bentonite powder bags, gloves, general refuse) for subsequent transport and disposal at the permitted Buncombe County municipal solid waste landfill. Following neutralization, the super sack rinse water was discharged to the ground surface in a manner that precluded erosion.

### **2.4 DESIGN MODIFICATIONS**

As described above, the emplacement strategy was modified based on the preliminary results of the July 2023 ISCO performance monitoring event. The 46 emplacements proposed for completion in the originally planned 12 emplacement well locations were slightly reallocated to include two additional emplacement well locations (EPW-34 and EPW-43). This modification resulted in the polishing event consisting of 46 potassium permanganate emplacements in 14 existing emplacement wells.

Daylighting is the occurrence of potassium permanganate mixture at the ground surface during injection activities. The 40-foot bgs emplacement at EPW-16 could not be completed with the target amount of 1,000 pounds of potassium permanganate due to daylighting. The emplacement was terminated with approximately 650 pounds of potassium permanganate emplaced. The remainder of the emplacement amount, approximately 350 pounds of potassium permanganate, was added and emplaced with the 1,000-pound emplacement at 43 feet bgs in EPW-16.

During emplacement activities, solids were encountered in the bottoms of four EPWs (after emplacement well preparation and flushing was performed) at depths that prevented construction of the emplacements at the proposed deepest intervals. The emplacement depths at these locations were redistributed upward between one to five feet in the treatment interval.

These design modifications, which were based on conditions encountered in the field during performance of the interim remedial actions, are not anticipated to have a substantial impact on the overall design goal of the polishing event (the emplacement of 40,000 pounds of potassium permanganate at target treatment zones).

### **3.0 CONSTRUCTION QUALITY CONTROL**

The following sections describe the construction quality control implemented during the ISCO polishing event activities. For performance standards, please refer to the In-Situ Chemical Oxidation Remedial Action Report dated May 19, 2020.

#### **3.1 CONSTRUCTION QA/QC**

Construction quality assurance/quality control (QA/QC) procedures were implemented as described in the Construction Quality Assurance/Quality Control Plan (CQA/QCP), (Wood 2019b), Appendix B of the Final Remedial Design. The CQA/QCP described planned and systematic activities that provide confidence that the remedial action construction will satisfy plans, specifications, and related requirements.

The following QA/QC activities were conducted:

- During construction, phases of the construction were reviewed as related to the design. In general, reviews were conducted during and after emplacement activities.
- Minor construction deficiencies were identified when a performed work, material, or installation did not meet project plans or specifications. An example of a minor deficiency was altering proposed emplacement depths and intervals due to excess solids in the bottoms of select emplacement wells.

The ISCO polishing event was constructed/performed as designed with the exception of minor changes as described in Section 2.4.

## **4.0 FINAL INSPECTION AND CERTIFICATIONS**

Mr. Matthew Wallace, Mr. Gregory Hutchins and Mr. Rodney Clark with WSP (representatives of the SDs) and Mr. Craig Zeller with USEPA performed a final inspection of the constructed remedy on October 17, 2023.

### **4.1 SAFETY**

Safety procedures contained in the Site Health and Safety Plan were followed during the RA construction activities. There were no Occupational Safety and Health Administration recordable incidents, or releases of material/chemicals to the environment/community which required a response.

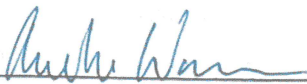
### **4.2 CERTIFICATIONS**

As required by Section 4.5(d) of the CD SOW, below are the required Certifications by the Settling Defendants' responsible official and the Supervising Contractor.

CTS of Asheville, Inc. Superfund Site  
In-Situ Chemical Oxidation Remedial Action Report Addendum #1  
WSP Project 6252-16-2012  
December 15, 2023

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I have no personal knowledge that the information submitted is other than true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violation.

For the Settling Defendants:



\_\_\_\_\_  
Andrew Warren, CTS Corporation  
Responsible Official

For the Supervising Contractor



\_\_\_\_\_  
Matthew Wallace, P.E.  
WSP USA Environment & Infrastructure Inc.

## 5.0 CONTACT INFORMATION

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### **ISCO Emplacement Contractor**

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## **6.0 REFERENCES**

Wood, 2020. In-Situ Chemical Oxidation Remedial Action Report, CTS of Asheville, Inc. Superfund Site, July 20, 2020.

WSP, 2023a. In-Situ Chemical Oxidation Remedial Action Work Plan Addendum #1, CTS of Asheville, Inc. Superfund Site, June 2, 2023.

WSP, 2023b. July 2023 In-Situ Chemical Oxidation Performance Monitoring Report, CTS of Asheville, Inc. Superfund Site, September 14, 2023

*CTS of Asheville, Inc. Superfund Site  
In-Situ Chemical Oxidation Remedial Action Report Addendum #1  
WSP Project 6252-16-2012  
December 15, 2023*

## **TABLES**

**TABLE 1**  
**Chronology of Events Related to ISCO Interim Remedial Action**  
**CTS of Asheville, Inc. Superfund Site**  
**Asheville, North Carolina**  
**WSP Project 6252-16-2012**

Date	Event
2/11/2016	Interim Action Record of Decision signed
3/7/2017	Consent Decree entered
4/19/2017	Remedial Design Work Plan submitted to USEPA
4/19/2017	ISCO Pre-Design Investigation Work Plan submitted to USEPA
5/1/2017	Remedial Design Work Plan approved by USEPA
9/11/2017	ISCO Pre-Design Evaluation Report submitted to USEPA
11/7/2019	ISCO Treatability Study Work Plan submitted to USEPA
11/30/2017 - 5/3/2019	Implement ISCO Treatability Study
5/3/2019	ISCO Treatability Study Evaluation Report submitted to USEPA
6/6/2019	ISCO Preliminary Remedial Design submitted to USEPA
7/12/2019	ISCO Final Remedial Design submitted to USEPA
7/22/2019	ISCO Final Remedial Design approved by USEPA
8/19/2019	ISCO Remedial Action Work Plan submitted to USEPA
8/26/2019	ISCO Remedial Action Work Plan approved by USEPA
9/24/2019	Conduct the Preconstruction Conference at the Site
10/1/2019 - 1/10/2020	Installation of emplacement well casings
10/1/2019 - 10/10/2019	Installation of monitoring wells
10/16/2019 - 10/18/2019	Collection of baseline groundwater samples
11/25/2019	Injection Permit Application submitted to NCDEQ
12/20/2019	Injection Permit Application approved by NCDEQ
12/4/2019 - 3/4/2020	Installation of potassium permanganate emplacements
12/19/2019	Interim Remedial Action Objective Values Technical Memorandum submitted to USEPA
1/9/2020	Interim Remedial Action Objective Values Technical Memorandum approved by USEPA
3/20/2020	Inspection of Constructed ISCO Remedy with USEPA at the Site
5/19/2020	ISCO Remedial Action Report submitted to USEPA
7/20/2020	ISCO Remedial Action Report approved by USEPA
10/9/2020	July 2020 ISCO Performance Monitoring Report submitted to USEPA
2/26/2021	January 2021 ISCO Performance Monitoring Report submitted to USEPA
9/10/2021	July 2021 ISCO Performance Monitoring Report submitted to USEPA
3/31/2022	January 2022 ISCO Performance Monitoring Report submitted to USEPA
10/3/2022	July 2022 ISCO Performance Monitoring Report submitted to USEPA
3/3/2023	January 2023 ISCO Performance Monitoring Report submitted to USEPA
6/2/2023	ISCO Remedial Action Work Plan Addendum #1 submitted to USEPA
6/16/2023	ISCO Remedial Action Work Plan Addendum #1 approved by USEPA
7/19/2023	Conduct the Polishing Event Preconstruction Conference at the Site
8/14/2023 - 8/23/2023	Polishing Event - Installation of additional potassium permanganate emplacements
9/14/2023	July 2023 ISCO Performance Monitoring Report submitted to USEPA
10/17/2023	Inspection of Constructed ISCO Polishing Event Remedy with USEPA at the Site
12/15/2023	ISCO Remedial Action Report Addendum #1 submitted to USEPA

Notes:

ISCO - In-Situ Chemical Oxidation

USEPA - United States Environmental Protection Agency

NCDEQ - North Carolina Department of Environmental Quality

Prepared By: RMC 11/20/23

Checked By: GLH 11/22/23

**TABLE 2**  
**Emplacement Well Cleanout/Recirculation Material Redistribution Summary**  
**CTS of Asheville, Inc. Superfund Site**  
**Asheville, North Carolina**  
**WSP Project 6252-16-2012**

<b>EPW</b>	<b>Date</b>	<b>Source EPW(s)</b>	<b>Approximate Volume of Recirculation Material Redistributed (gallons)</b>	<b>Comments</b>
8	8/16/2023	9, 16	20	some liquid / some solids
10	8/17/2023	16, 17	20	mostly liquid
18	8/16/2023	9, 16	20	mostly liquid
24	8/16/2023	16	10	mostly liquid
25	8/16/2023	9, 16	20	mostly liquid
26	8/17/2023	17	10	mostly liquid
33	8/17/2023	34	10	mostly liquid
38	8/22/2023	75	10	mostly liquid
72	8/21/2023	75, 78	10	some liquid / some solids
76	8/23/2023	75, 78	20	some liquid / some solids

Notes:

EPW - Emplacement well

Prepared By: RMC 11/20/23

Checked By: GLH 11/27/23

**TABLE 3**  
**Potassium Permanganate Emplacement Summary**  
**CTS of Asheville, Inc. Superfund Site**  
**Asheville, North Carolina**  
**WSP Project 6252-16-2012**

<b>EPW</b>	<b>Emplacement Completion Date</b>	<b>Treatment Interval (feet bgs)</b>	<b>Number of Emplacements</b>	<b>Potassium Permanganate (pounds)</b>	<b>Potassium Permanganate Slurry (gallons)</b>
9	8/15/2023	38 - 75	6	5,000	910
12	8/23/2023	43 - 76	1	1,000	201
16	8/16/2023	38 - 81	4	3,500	619
17	8/17/2023	31 - 64	7	5,500	876
20	8/23/2023	37 - 77	4	3,000	713
34	8/17/2023	40 - 64	3	2,000	342
35	8/18/2023	40 - 68	1	1,000	201
36	8/18/2023	58 - 74	3	3,000	608
37	8/22/2023	41 - 78	4	4,000	774
43	8/17/2023	39 - 61	3	2,500	378
46	8/22/2023	43 - 81	4	4,000	784
47	8/23/2023	49 - 84	2	2,000	392
75	8/21/2023	53 - 68	3	2,500	603
78	8/21/2023	55 - 60	1	1,000	206

Notes:

EPW - Emplacement well

bgs - below ground surface

Potassium permanganate slurry is a mixture of potassium permanganate, water and bentonite

Prepared By: RMC 11/20/23

Checked By: GLH 11/22/23

*CTS of Asheville, Inc. Superfund Site  
In-Situ Chemical Oxidation Remedial Action Report Addendum #1  
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December 15, 2023*

## **FIGURES**



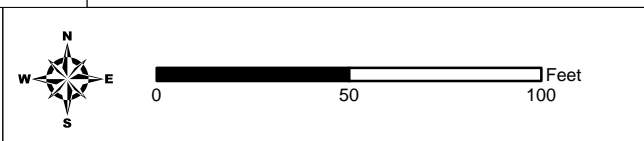
Sapolite Emplacements  
 10 EPW Locations  
 31 Total emplacements

TITLE:  
**SAPROLITE  
 EMPLACEMENT LOCATIONS  
 CTS OF ASHEVILLE, INC.  
 SUPERFUND SITE  
 ASHEVILLE, NORTH CAROLINA**

**NOTE: THIS MAP IS FOR  
 REFERENCE ONLY!**  
 Although every effort has been made to ensure the accuracy of information, errors and conditions originating from the physical sources used to develop the database may be reflected in the data supplied.  
 The requestor must be aware of data conditions and ultimately bear responsibility for the appropriate use of the information with respect to possible errors, original map scale, collection methodology, currency of data, and other conditions specific to certain data.

**Legend**

- ISCO Performance Monitoring Well Location
- Existing Emplacement Well (EPW) Location
- Polishing Event Emplacement
- Property Line
- ISCO Treatment Area (Northern Area)
- Additional ISCO Treatment Area



PREPARED BY: G. HUTCHINS 11/21/2023	PROJECT NUMBER: 6252-16-2012	Figure No. <b>1</b>
CHECKED: M. WALLACE 11/21/2023	MAP PROJECTION: NC State Plane (NAD83)	
File: C:\Users\USGH716342\Desktop\CTS GIS\Shallow.mxd		



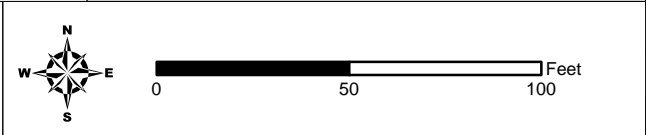
PWR Emplacements  
 7 EPW Locations  
 15 Total Emplacements

TITLE:  
**PARTIALLY WEATHERED ROCK EMPLACEMENT LOCATIONS**  
**CTS OF ASHEVILLE, INC.**  
**SUPERFUND SITE**  
**ASHEVILLE, NORTH CAROLINA**

**NOTE: THIS MAP IS FOR REFERENCE ONLY!**  
 Although every effort has been made to ensure the accuracy of information, errors and conditions originating from the physical sources used to develop the database may be reflected in the data supplied.  
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**Legend**

- ISCO Performance Monitoring Well Location
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PREPARED BY: G. HUTCHINS 11/22/2023	PROJECT NUMBER: 6252-16-2012	Figure No. <b>2</b>
CHECKED: M. WALLACE 11/22/2023	MAP PROJECTION: NC State Plane (NAD83)	
File: C:\Users\USGH716342\Desktop\CTS GIS\PWR.mxd		

*CTS of Asheville, Inc. Superfund Site  
In-Situ Chemical Oxidation Remedial Action Report Addendum #1  
WSP Project 6252-16-2012  
December 15, 2023*

## **APPENDIX A**

### **NCDEQ INJECTION EVENT RECORD**

North Carolina Department of Environmental Quality – Division of Water Resources  
**INJECTION EVENT RECORD (IER)**

Permit Number WI0100571

1. **Permit Information**

CTS Corporation  
Permittee

CTS of Asheville, Inc Superfund Site  
Facility Name

235 Mills Gap Road, Asheville, NC (Buncombe)  
Facility Address (include County)

2. **Injection Contractor Information**

FRx, Inc.  
Injection Contractor / Company Name

Street Address 11258 Cornell Park Drive, Suite 610

Blue Ash                      Ohio                      45242  
City                              State                              Zip Code

( 864 ) 356 - 8424  
Area code – Phone number

3. **Well Information**

Number of wells used for injection 14

Well IDs: EPWs: 9, 12, 16, 17, 20, 34, 35, 36, 37, 43, 46, 47, 75 and 78

Were any new wells installed during this injection event?  
 Yes                       No

If yes, please provide the following information:

Number of Monitoring Wells NA

Number of Injection Wells NA

Type of Well Installed (Check applicable type):  
 Bored                       Drilled                       Direct-Push  
 Hand-Augured                       Other (specify) \_\_\_\_\_

***Please include a copy of the GW-1 form for each well installed.***

Were any wells abandoned during this injection event?

Yes                       No

If yes, please provide the following information:

Number of Monitoring Wells NA

Number of Injection Wells NA

***Please include a copy of the GW-30 for each well abandoned.***

4. **Injectant Information**

Potassium Permanganate (CAIROX® S by Carus Corp.)  
Injectant(s) Type (can use separate additional sheets if necessary)

Concentration 100% solid potassium permanganate mixed into a bentonite and water slurry

If the injectant is diluted please indicate the source dilution fluid. City of Asheville municipal potable water

Total Volume Injected (gal) 7,605 gallons

Volume Injected per well (gal) See Table 3 (201-910 gal)

5. **Injection History**

Injection date(s) Aug. 15, 2023 to Aug. 21, 2023

Injection number (e.g. 3 of 5) 3 of 3 (estimated)\*  
\*includes pilot study, full scale event, and this polishing event

Is this the last injection at this site?

Yes\*\*                       No

\*\*pending monitoring results will determine potential future Additional polishing injection event(s).

I DO HEREBY CERTIFY THAT ALL THE INFORMATION ON THIS FORM IS CORRECT TO THE BEST OF MY KNOWLEDGE AND THAT THE INJECTION WAS PERFORMED WITHIN THE STANDARDS LAID OUT IN THE PERMIT.



\_\_\_\_\_  
SIGNATURE OF INJECTION CONTRACTOR                      12/06/2023  
DATE

Doug Knight  
PRINT NAME OF PERSON PERFORMING THE INJECTION

*CTS of Asheville, Inc. Superfund Site  
In-Situ Chemical Oxidation Remedial Action Report Addendum #1  
WSP Project 6252-16-2012  
December 15, 2023*

## **APPENDIX B**

### **COPIES OF LOGBOOK**

Location Asheville, NC Date 8/14/23Project / Client CTS of Asheville6252-16-2012 Page 1/2

- 0730 - R. Clark onsite to meet portapalm delivery
- 0800 - Dinner offsite
- 0830 - Greg Hutchins & R. Clark, M. Wallace w/ WSP onsite.
- 0915 - FRX onsite / discuss scope of work & HASP. w/ Spencer, Jessica L. & Isaac w/ FRX
- 1000 - Potassium permanganate delivered / FRX begins moving totes to storage containers. Twenty 2,000lb totes to three temporary storage containers
- Begin filling 20,000 gallon frac tank w/ water 1030-1230 w/ LOS onsite in gate.
- 1350 - Complete loading potassium permanganate in trailers & lock / give copy of keys to FRX.
- Complete filling 20,000 gallon frac tank.

Location Asheville, NC Date 8/19/23Project / Client CTS of Asheville6252-16-2012 Page 1 of 1

1400-1445 - At lunch

Measured length of tooling as 4.7' from bottom to frac/injection <sup>interval</sup> tool is 11.1' in length

- FRX resumes setup  
1515-1530 - T. Storm / wait in truck

1545 - Resumes setup / begin pumping water from frac tanks to mix trailer

1630 - FRX leaves site for day

~~8/14/23~~

Location Asheville, NC Date 8/15/23Project / Client CTS of Asheville6252-16-2012 Page 2/2

0800 - R. Clark & FRx (3 personnel)  
arrive / conduct H&S Meeting

0825 - FRx begins lowering  
tremie into EPW-9

- Flush EPW-9 w/ water  
via tremie from 0835 to

0850 - Tag PTW in  
MW-33 = 16.67

MW-33A 16.78

opened to place packers  
in wells

- measured from top of  
tooling, to frac depth  
= 6.5' w/ tail of 4.5'

setup tape from GS.  
1040 - Unable to get to  
prescribed depth w/  
tooling 500lb frac

⊙ 71.5' bgs

- Contact Matt W. / PM to  
discuss / discuss mud  
ratio / mix.

- Load 2,000 lb bags  
of  $KMnO_4$  to hopper

Location Asheville, NC Date 8/15/23 129Project / Client CTS of Asheville6252-16-2012 Page 1/2

- Mix ~ 400 gallons of mud  
(three bags of Quick Gel  
High Yield Bentonite)  
50 16 bags ~ 5 gallon each

- Pump out recirc tote to  
EPW-8 EPW-25, &  
EPW-18

10:25 - Blaster / injection line  
dogged / remove tooling  
trip out / unclog line  
& trip in

EPW-9 @ 71.5' bgs  
Start: 11:15 Perm: 500 lbs  
Stop: 11:26 Mud: 100 gallons  
Chase: 70 gallons

Hydraulic connect w/  
EPW-17 during chase

- cleanup  $KMnO_4$  on ground  
surface & place packer in EPW-17

12:55 - FRx knuckles / frac  
@ 67' bgs in EPW-9

130

Location Asheville, NC Date 8/15/23

Project / Client CTS of Asheville

6252-16-2012

Page 2/2

EPW-9 @ 67 Perm: 500  
 Start: 12:58 Mud: 50  
 Stop: 13:06 Chase: 60

EPW-9 @ 61  
 Start: 13:27 Perm: 1,000  
 Stop: 13:38 Mud: 100  
 Chase: 40

13:45 load 2,000 lbs  
 bag #2 into hopper

EPW-9 @ 49'  
 Start: 13:57 Perm: 1,000  
 Stop: 14:10 Mud: 50<sup>50</sup> gal  
 Chase: 30<sup>RM</sup> gal

EPW-9 @ 43'  
 Start: 14:35 Perm: 1,000  
 Stop: 14:44 Mud: 55 gal  
 Chase: 20<sup>RM</sup> gal

14:50 load sack #3  
 2000 lbs into hopper

Location Asheville, NC Date 8/15/23<sup>131</sup>

Project / Client CTS of Asheville

6252-16-2012

Page 3/2

EPW-9 @ 40'  
 Start: 14:59 Perm: 1,000  
 Stop: 15:08 Mud: 55  
 Chase: 25<sup>RM</sup>

- Begin tripping out EPW-9  
 - Place some of solids  
 from tub into EPW-8  
 ~ 7 gallons worth

1637 - Begin tripping into  
 EPW-16 after setup  
 place some RM 845/123

1700 - Washout EPW-16 w/  
 trawler to ~ 75' 6gs w/  
 fresh water. Pump flush  
 water into EPW-8 and  
 EPW-19 & EPW-24 (~ 25  
 gallons) w/ 50 gallons  
 remaining in tub

1730 - Leave site for day

*[Signature]*  
 8/15/23

Return to the Rain

Location Asi vito, NC Date 8/16/20  
 Project / Client TS of Asi vito  
Case 16-2017 Page 11

0800 F.R. vitta (4 persons)  
 - changed 200 in EPW-16  
 to 250 psi  
 to maintain site again

0830 - M. Wallace & G. Hutches  
 W/NSD onsite.

EPW-16 @ 67' bcc

0917 Start 1 Perm 500 lbs  
 0920 Stop Mud 100  
 Case 30

Load bag 4 (2000 lb)  
 into hopper 2500 lb

0930-1130 - Injector changed

EPW-16 @ 61

Start 10:32 Perm 1000  
 Stop 10:42 Mud 55

Pressure 100 psi Case 30

Well in MW-33A rises

to 11.5' dia

1030 - knotted EPW-16 @ 61

for 1 1/2 minutes.

Location Asi vito, NC Date 2/16/20  
 Project / Client TS of Asi vito  
Case 16-2017 Page 11

EPW-16 @ 43'

Start 10:56 Perm 1000  
 Stop 11:05 Mud 50  
 Case 30

Load bag 5 into hopper

EPW-16 @ 40' bcc

Start 11:23 Perm 650  
 Stop 11:29 Mud 35  
 Case 0

Verlight B to south  
 possible geoprobe location  
 - will attempt to install  
 inject 250 gallons into  
 previous hole @ 43'

EPW-15 @ 43 (pad II)

Start 11:37 Perm 250  
 Stop 11:43 Mud 40  
 Case 30

1200-1315 - R. Clark on fire  
 watch white flx @ land

1315 - Return to site @ EPW-17

1500 lb currently in hopper Return to site

Location Asheville, NC Date 8/16/73  
 Project / Client 552-16-2012 Paged  
CTS of Asheville wells

85 bags (2000 lbs) used  
 - Place mud tub contents in EPW 9, 10, 18, 24 & 25

Tapped P/B @ 51' 10" in

EPW-17 (previous tag  
 @ 48.3') / removed

sediment during 2nd  
 connection w/ EPW-9  
 @ 71.5' / flush via  
 frame to bottom

& remove tooling

- EPW-17 / encountered  
 bend while lowering / remove  
 tooling & reattempt  
 forced tooling to depth  
 @ 63' bgs / casing cracked  
 possibly

EPW-17 @ 63' bgs  
 Start 15:12 Perm 1000  
 Stop 15:22 Mud 45  
 Chase 50

Load bag # 6 potassium  
 permanganate

Location Asheville, NC Date 8/16/73  
 Project / Client CTS of Asheville  
552-16-2012 Page 7/7

EPW-17 @ 57  
 Start 15:50 Perm 1000  
 Stop 15:59 Mud 50  
 Chase 25

EPW-17 @ 51  
 Start 16:13 Perm 500  
 Stop 16:18 Mud 95  
 PSI 150 Chase 20

EPW-17 @ 45  
 Start 16:36 Perm 1000  
 Stop 16:46 Mud 55  
 PSI 150 Chase 50

1645-1720 - Cleanup up  
 for day trip up to  
 next interval

- Place contents of tub in EPW-9, 10, 16 & 26  
 1730 - leave site

*[Signature]*  
 8/16/73

Location Asheville, NC Date 8/17/13Project / Client 6252-16-2012  
CTS of Asheville Page 1/2

0800 - FRV (3 personnel) & R. Clark  
WSP onsite conduct HOS testing  
- FRV mixed mud & prepared  
- Load bag # 7 R.M.M. #

EPW-17 @ 39'  
Start 09:13 Perm 1000  
Stop 09:26 Mud ~~45~~ 45  
Chase 30

Blower disconnects during  
injection. Hose & 1 gallon  
slurry to ground surface  
dilute & ventilate.

EPW-17 @ 36'  
Start: 9:49 Perm 500  
Stop: 9:55 Mud 35  
Chase 30

EPW-17 @ 33'  
Start 10:08 Perm 500  
Stop: 10:14 Mud 35  
Chase 30

Location Asheville, NC Date 8/17/13Project / Client 6252-16-2012  
CTS of Asheville Page 1/2

- 10:30-11:15 - New # strip  
on EPW-43 & load  
bag # 8 (2000 lbs) to bagger  
Tag WL in MW-35A

DTW = 17.40  
Tag WL in MW-35

DTW = 17.48

- Tagged depth to  
goop in EPW-43 @ 53'  
1200-1230 - Wash  
1230 - Wash out bottom  
of EPW-43

P.I.D. = 00 during cut @ 53'  
EPW-43 @ 53'  
Start: 12:51 Perm 1000  
Stop: 13:02 Mud 50  
Chase 40

EPW-43 @ 47'  
Start: 13:13 Perm 1000  
Stop: 13:22 Mud 50  
Chase 35

MW-35 = 15.60  
MW-35A = 16.19  
directly after 47' injection

Location Asheville, NC Date 8/17/23Project / Client CTS of AshevilleGSW-16-2012 Page 2/2

Load bag # 9 into hoppers

DTW @ MW-19 = 20.92

DTW @ MW-19A = 20.98

~~Exe setup on EPW-34~~

RNL 8/17/23

EPW-43 @ 41' bgs

Start: 15:44 Perm: 500

Stop: 13:50 Mud: 40

Chase: 35

Exe setup on EPW-34

tagged DTB = 53' / goop  
stop in treme to wash  
out casing / place some wax  
into EPW-33

EPW-34 @ 52' Perm: 500

Start: 15:06 Mud: 40

Stop: 15:13 Chase: 40

RNL 8/17/23

EPW-~~43~~ 34 @ 46

Start: 15:22 Perm: 1000

Stop: 15:31 Mud: 35

Chase: 35

Location Asheville, NC Date 8/17/23Project / Client CTS of AshevilleGSW-16-2012 Page 2/2Injector clogged @  
40' interval removed  
tooling & unclog  
injector

EPW-34 @ 40'

Start: 16:27 Perm: 500

Stop: 16:34 Mud: 40

Chase: 30

~~MW-19A DTW = 21.42~~~~MW-19 DTW = 21.20~~

RMC 8/18/23

8/18/23

RNL

Location Asheville, NC Date 8/18/23Project / Client CTS of Asheville6252-16-2017 page 1/2

0800 - Matt / Eric (3 personnel)  
 - Contact H. S. Mast  
 - Move to EPW-35 & setup  
 prepare frame to wash out  
 bottom of casing  
 Tag DTB @ EPW-35  
 @ 49.5' bar

- Wash out bottom casing  
 Measure WL in MW-19/19A  
 MW-19A = 21.42

MW-19 = 21.70 <sup>8/18/23</sup> PM

- Place wash into EPW-~~35~~ 34

0930 - Unable to get  
 tooling beyond 63'  
 deep. Contact Matt  
 W/ indicators to  
 install frac @ 63' bar

EPW-35 @ 63'  
 Starts 9:44 Perm: 1,000  
 Stop @ 9:58 Mud: 110  
 Chase 40

0946 - hose breaks during injection

Location Asheville Date 8/18/23Project / Client CTS of Asheville6252-16-2017 page 1/2

- lose 1/2 gallon to surface  
 FR, neutralize & replace  
 hose

1000 - Begin tripping out of  
 EPW-35

1046 - Move to and setup on  
 - EPW-36

Tagged DTB (loop @ 56  
 - Setup frame pipe to  
 wash out / clean out  
 wash tub sediment / place  
 in EPW

1119 - Stop for lunch  
 1215 - FR return from lunch

\* Flush out EPW-36 w/  
 fresh water  
 Unable to get tooling beyond 68'  
 EPW-36 @ 68' Perm: 1,000  
 Start 13:17 Mud: 100  
 Stop @ 13:29 Chase 50 ft  
 Return to Rain

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Location Asheville, NC Date 8/18/23

Project / Client CTS of Asheville  
G52-16-2012 Page 2/2

13:39 - Injector nozzle  
clogged  
14:05 - Trip back into EPW-36  
17' was L into EPW-35

EPW-36 @ 64'  
Start 14:14 Perm: 1000  
Stop 14:25 Mud: 120  
Chase: 35

MW-19 DTW = 19.43  
MW19A DTW = 18.75  
FAx loads 2000 lb  
bag into hopper

Backcount 8 super sacks  
remain in cone  
1 loaded into hopper  
use 1/2 of it in  
EPW-36 @ 60'

EPW-36 @ 60'  
Start 14:39 Perm: 1000  
Stop 14:52 Mud: 110  
Chase: 40

Location Asheville Date 8/18/23<sup>143</sup>Project / Client CTS of Asheville  
G52-16-2012 Page 2/2

DTW = 17.67 in MW-19A  
DTW = 19.15 in MW-19  
after injection @ 60'

Move setup to EPW-78  
near MW-37/37A  
well pair  
- Clean up site  
Trip out of EPW-36

16:30 - leave site

*[Signature]* 8/18/23

Location Asheville, NC Date 8/21/23

Project / Client CTS of Asheville

G252-16-2012 Page 1/1

0800 - Onsite / conduct  
H & S Meeting

- FRx begins move & Setup w/ EPW-78
- Tagged DTB in EPW-78 @ ~ 48' bgs

Tag DTW = 23.78 in MW-37

Tag DTW = 23.85 in MW-37A

0930 - Begin washing out EPW-78 / Unable to get to depth once tooling is 40' reinstalled. At 54.5' bgs. Remove tooling & reinstall w/ no packer on bottom. Install to depth of 58.0' bgs

0940 - Robert Brown & Greg Hutchins w/ WSP are onsite.

- Started 1500 lbs in hopper
- Placed wash into EPW

723-76

Location Asheville, NC Date 8/21/23

Project / Client CTS of Asheville

G252-16-2012 Page 1/1

EPW-78 @ 58'  
Start: 10:50 Perm: 100C  
Stop: 11:02 Mud: 100  
Chase: 55

- Remove tooling from EPW-78
- 1200 - Stop for lunch
- 1245 - Return from lunch
- DTB = ~ 40' bgs
- Begin washing out EPW-78; encountered obstruction @ ~ 49' bgs
- FRx consults notes / look in logbook / no references to obstructions. Wash out resumes / get to bottom with tremie wash for 5 minutes & remove tremie
- 1330 - R. Brown leaves site
- Unable to get tooling beyond 64' bgs. Contact Matt W. about adjusting fracture / injection intervals
- Decide new intervals

Location Asheville, NC Date 8/21/23Project / Client CTS of Asheville6252162012Page 2/2

will be 63' (500 lbs), 60' (1000 lbs)

to 55' (1000 lbs)

EPW-75 @ 63'

Start: 13:54 Perm: 500 rmc

Stop: 14:04 Mud: 100 9S

Measure DTW after injection Chase: 55

DTW = 21.9 in MW-37A

DTW = 23.52 in MW-37

- Load 200016 super sack into logger

14:20 - Remove tooling & prepare  
to wash via tremie / wash via  
tremie, Reinstall packer  
(4.5' tail) to frac injection

tooling &amp; tip in

1523 - Trip in tooling / cable

to get tooling to 60'  
injection interval.

EPW-75 @ 60'

Start: 15:38 Perm: 1,000

Stop: 15:51 Mud: 100

Chase: EC

EPW-75 @ 55'

Start: 16:13 Perm: 1000

Stop: 16:24 Mud: 100

- Clean tub solids into EPW-76 55' Chase

The manufacturers of *Rite in the Rain* all-weather writing products are grateful to the numerous environmental experts who have contributed to the development of this book. Should you have any additions, improvements or corrections for future publications of this field book or have suggestions for other environmental field book formats, we welcome your input.

Although much effort has been taken to assure the accuracy of the following reference pages of the *Darting* LLC cannot guarantee the accuracy of the data.

The information contained in this manual is for informational purposes only and does not constitute an offer of insurance or any other financial product. Please contact your insurance agent for more information.

### Common Field Data Error Codes

These codes are used to identify common mistakes and errors that occur above or close to the wellbore. Commonly used error codes include:

- RE Recording Error
- CE Calculation Error
- TE Transcription Error
- SE Spelling Error
- CC Changed for Clarity
- DC Original Sample Description
- CA Changed After Further Evaluation
- WO Write Over
- NI Not Initiated and Dated at Time of Entry
- NR Not Recorded at the Time of Initial Observation

Note: Error code should be circled, dated, and initialed when recorded.

Placed  
washed  
72, 75, 76 & 78

### Hazard Classifications

- Class 1 Explosives
- Class 2 Gas
- Class 3 Flammable Liquid
- Class 4 Flammable Solids (Potential spontaneous combustion, or emission of flammable gases when in contact with water)
- Class 5 Oxidizing Substances and Organic Peroxides
- Class 6 Toxic (poisonous) and infectious substances
- Class 7 Radioactive material
- Class 8 Corrosives
- Class 9 Miscellaneous dangerous goods

### Container type abbreviations (for sampling guidelines)

- BR - Boston Round • ABR - Amber Boston Round • AJ - Amber Jug •
- AWM - Amber Wide Mouth • Poly - Polyethylene Bottles • BOD - Bottle •
- CWM - Clear Wide Mouth

1730  
1750 - leave  
8/21/23



4 Location Asheville, NC Date 8/22/23  
Project / Client CTS of Asheville  
62262012 Page 2/1

EPW-46 @ 54'  
Start: 11:19 Perm: 1,000 lbs  
Stop: 11:28 Mud: 100  
Clase: 40

EPW-46 @ 48'  
Start: 11:43 Perm: 1,000 lbs  
Stop: 11:52 Mud: 100  
Clase: 40

DTW to MW-36 = 26.60  
DTW in MW-36A = 22.50  
RUC

EPW-46 @ 45'  
Start: 12:02 Perm: 1,000 lbs  
Stop: 12:10 Mud: 100 gal  
Clase: 35 gal

12:10-13:10 Stop for lunch

13:10 - Move from EPW-46  
to EPW-37. Tag DTB  
= 63' bgs; trap in w/  
trench pipe & wash  
out; place cuttings in  
EPW-46; load 2000 lb bag in bagged

5 Location Asheville, NC Date 8/22/23  
Project / Client CTS of Asheville  
622-16-2012 Page 2/1

EPW-37 @ 61'  
Start: 14:51 Perm: 1,000<sup>RUC</sup>  
Stop: 15:01 Mud: 100<sup>RUC</sup> 105  
Clase: 40

EPW-37 @ 55'  
Start: 15:11 Perm: 1,000 gal  
Stop: 15:20 Mud: 95  
Clase: 40

EPW-37 @ 49'  
Start: 15:32 Perm: 1,000 gal  
Stop: 15:47 Mud: 100 gal  
Clase: 50 gal

EPW-37 @ 43'  
Start: 15:51 Perm: 1,000  
Stop: 16:01 Mud: 100  
Clase: 40

16:05 - FRK stop for break  
16:20 Clean up for the day  
& set up on EPW-17

17:30 - Leave site

Location Asheville, NC Date 8/23/23

Project / Client CTS of Asheville

6252-16-2012

Page 1/2

0800 - Arrive onsite / conduct ABS Meeting

- Resume setup of EPW-47

0849 - Begin notching @ EPW-47 @ - 4' log

EPW-47 @ S4

Start: 08:50 Perm: 1,000 lb

Stop: 09:00 Mud: 110

Chase: 25

EPW-47 @ S1

Start: 09:09 Perm: 1,000

Stop: 09:18 Mud: 120

Chase: 35

- Load supersack 2000 lb

Measure DTW 20 min. after last

inj. in MW-36 = 23.45

\* in MW-36A = 24.80

FRx moves from EPW-47

to EPW-20 & sets

up.

Location Asheville, NC Date 8/23/23

Project / Client CTS of Asheville

6252-16-2012

Page 1/2

R. Clark gauges WLB in MW-34/34A

DTW in MW-34 = 27.33

DTW in MW-34A = 26.28

prior to injection @ EPW-20

EPW-20 @ S3

Start: 10:31 Perm: 500 lb

Stop: 10:37 Mud: 75 gal

MW-34 rmc MW-34A Chase: 25 gal

MW-34 = 26.98 MW-34A = 23.15

EPW-20 @ 48 Rmc 8/23/23

EPW-20 @ S3 daylight

@ EPW-20 during chase

injection bypassed / packer

via formation from a previous frac (likely @ S1 @ 45)

EPW-20 @ 48'

Start: 10:44 Perm: 1,000

Stop: 10:54 Mud: 100

Chase: 35

MW-34 = 26.65

MW-34A = 23.45

EPW-20 @ 42'

Start: 11:05 Perm: 1,000

Stop: 11:15 Mud: 140

MW-34A = 24.25

MW-34 = 26.00

Chase: 40 *lets in the rain*

Location Asheville, NC Date 8/23/23Project / Client CTS of Asheville6252-16-2012Page 2/2

EPW-20 @ 39

Start: 11:23 Perm: 500

Stop 11:29 Mud: 100

Chase 45

MW-34A = 24.40 (after)

MW-34 = 25.95 (39' inj.)

Move from EPW-20 to  
EPW-12 & Setup

EPW-12 @ 45

Start 13:28 Perm 1000

Stop 13:47 Mud. 100

Chase 50

DTW = 24.20 in MW-34A (after)

DTW = 23.85 in MW-34 (45' inj.)

FRx trips out of EPW-12  
& begin clearing equipmentLocation Asheville, NC Date 8/23/23Project / Client CTS of Asheville6252-16-2012Page 2/2- FRx cleans equipment.  
B begins packing  
equipment for demobilization

1700 - FRx leaves site

R

8/23/23

Location Asheville, NC Date 8/24/23Project / Client CTS of Asheville6252-16-2012Page 111

0800 - FRx (3 personnel) onsite

- Conduct the 5 Meeting

- Begin draining frac tank.

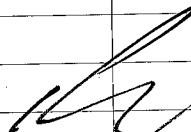
- FRx resumes packing for demobilization.

1000 - FRx leaves site.

- 1045. Matt Wallace / USF onsite.

- R. Clark performs cleanup / spreads wheat straw over areas disturbed by equipment &amp; performs other site work

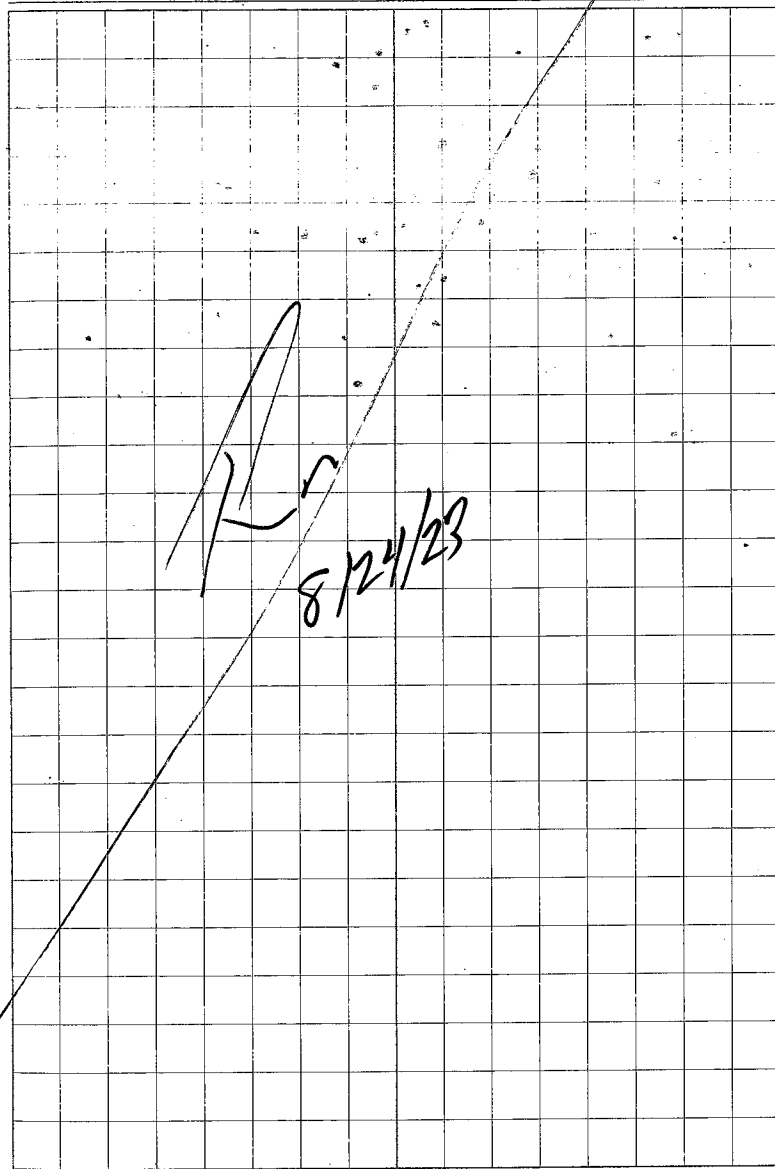
1200 - R. Clark leaves site


  
 R. Clark 8/24/23

Location \_\_\_\_\_

Date \_\_\_\_\_

Project / Client \_\_\_\_\_



Location Asheville, NC Date 8/25/13

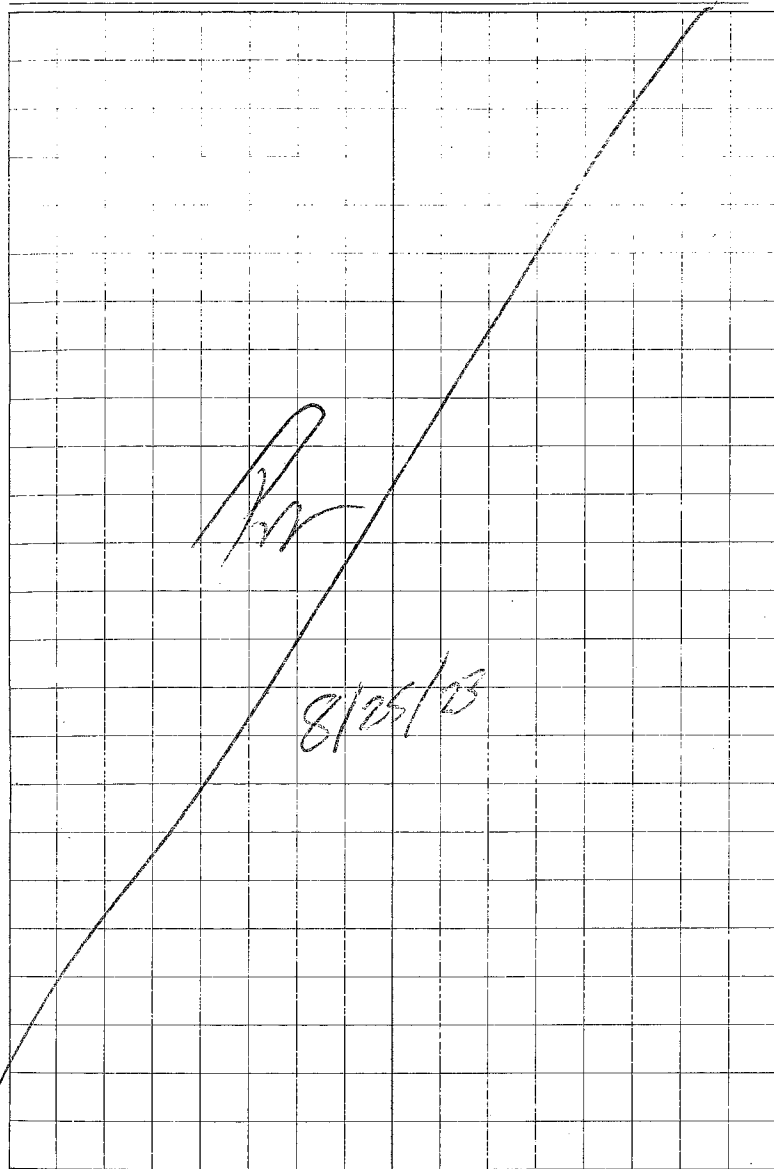
Project / Client CTS of Asheville  
6252-16-2012 Page 1/1

0800 - R. Clark onsite  
to meet Able, containers  
driver. Begin draining fract tank  
0900 - Driver arrives  
Remove 1st Conex  
1025 - Driver returns  
Remove 2nd Conex  
1145 - Driver Returns  
Remove 3rd conex.  
1230 - Leave site

*[Signature]*  
8/25/13

Location \_\_\_\_\_ Date \_\_\_\_\_

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8/25/13

Location Asheville, NC Date 8/29/23

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1015 - A. Clark onsite to  
 meet frac tank  
 truck driver for  
 removal of frac tank  
 1030-1055 - Remove  
 frac tank  
 1055-1230 - mark EPW's  
 w/ T-posts in high  
 traffic areas  
 1700 - off site

*[Signature]*  
 8/29/23

Location \_\_\_\_\_ Date \_\_\_\_\_

Project / Client \_\_\_\_\_

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*[Signature]*  
 8/29/23