

Appendix B
2019 Status Report: 13-Acre Tract
Groundwater Containment and
Treatment System

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1. Introduction

1.1 Site Description

This appendix summarizes activities conducted between January 1 and December 31, 2019 related to the groundwater containment and treatment system (system) located at the Rohm and Haas Inc. (Rohm and Haas) 13-Acre Tract at the Charlie Burch Pits site in Spring, Texas (site; Figure B-1).

1.2 Report Objectives

This appendix has been prepared to satisfy an objective of the revised site *Response Action Plan* (Parsons 2011) for documenting groundwater remediation system operations in an annual report. The report includes summary information regarding the total gallons of groundwater recovered as well as analytical results for treated groundwater.

2. Description of 13-Acre Tract Groundwater Containment and Treatment System

2.1 System Description

The primary objective of the 13-Acre Tract system is to capture 1,2-dichloroethane (1,2-DCA) and maintain hydraulic control of the plume to prevent further migration of 1,2-DCA. Concentrations near the recovery wells have been reduced to below its protective concentration level (PCL) of 0.005 milligram per liter (mg/L), and the system has continued to operate to retain the hydraulic conditions (flow). The location of the system is depicted on Figure B-1 and described below.

Throughout the reporting period, the system included the major components listed below:

- Four Zone A recovery wells (ranging from 45 to 55 feet below ground surface) housed in concrete vaults with a steel protective cover and equipped with Grundfos Redi-Flo3 submersible electric pumps. Wells TRW-CB-1 and TRW-CB-2 remain in place, but the pumps have been removed, and the system is offline. The other two wells (TRW-CB-3 and TRW-CB-4) were operational until November 25, 2019. The pumps were later shut down for maintenance and have not been restarted as of December 2019. Based on Texas Commission on Environmental Quality (TCEQ) approval, the pumps will remain off during the remainder of 2020.
- Two protective concrete-vaulted valve boxes house pressure gauges, totalizing flow meters, and sampling ports. Two CU300 status control units for the Redi-Flo3 pumps are adjacent to each valve box; however, the CU300s next to wells TRW-CB-1 and TRW-CB-2 previously were removed.
- Subsurface Schedule 80 polyvinyl chloride and high-density polyethylene piping conveys groundwater from the recovery wells to the treatment compound.
- The treatment compound contains a cartridge sediment filter system, two 2,000-pound liquid phase granular activated carbon (GAC) vessels operating in series, and a system control shed.
- Three GAC vessels are located within the treatment compound. During normal operation, two GAC vessels operate as lead and lag vessels, while the third GAC vessel is used as a standby that is placed online when the lead vessel exhibits breakthrough.
- The system control shed houses piping that conveys treated water from the GAC vessels, two Signet totalizing flow meters, the control panel, and the breaker panel.
- Alarms provide notification of low water flow, high cartridge filter differential pressure, and high water levels in infiltration trench CB-IT-2 or in a recovery well. Low flow is the only alarm that will shut down the system. Alarms from high pressure in the filter provides notification that the filter, low-flow effluent lines, and high water level in infiltration trench CB-IT-2 are not dialing out when triggered. During more than 10 years of operation, no alarm conditions were encountered from high water level in the

infiltration trench or the high-pressure sensors. High water levels in recovery wells is indicative of pump failure or stoppage. This will trigger an alarm through the system's dial-out feature.

- Piping conveys treated water to the infiltration trench currently in operation (CB-IT-2). Two infiltration trenches (CB-IT-1 and CB-IT-2) were constructed; however, only CB-IT-2 is in service.

2.2 Water Discharge Criteria

Injection of treated groundwater at the site is covered under an underground injection control (UIC) Class V authorization approved by a TCEQ amendment letter dated November 23, 2013, and subsequent UIC authorization dated March 20, 2014. In accordance with the UIC authorization, treated groundwater is subsequently reinjected into the uppermost aquifer (Zone A). The current principal reinjection requirements are summarized below:

- Reinjection of treated groundwater will not exceed 80 gallons per minute (gpm).
- Injection volumes, pressures, and concentrations of constituents of concern (including pH and total dissolved solids [TDS]) in treated groundwater shall be sampled quarterly at the point of reinjection and reported semiannually.
- Concentration levels shall not exceed the water quality levels of the extracted groundwater and should remain below PCLs for 1,2-DCA.

None of the UIC authorization requirements were exceeded during the reporting period.

3. System Operations, Maintenance, and Sampling

This section discusses system operations, maintenance, and sampling during the reporting period of January 1 through December 31, 2019. Quarterly samples were collected on:

- January 31, 2019
- April 15, 2019
- July 16, 2019
- October 15, 2019

3.1 System Operations and Maintenance

The operations and maintenance (O&M) program included the following elements during each visit:

- *System Inspection:* During inspection, the following parameters were recorded:
 - Pump pressures
 - Total volumetric flow and flow rate from each well
 - Total volumetric flow and flow rate to CB-IT-2

The following actions were taken as part of routine site O&M activities conducted during the reporting period:

- *Filter Change-out:* Filters have not needed to be replaced since they were last changed out in March 2018.
- *GAC Change-out:* A carbon changeout was conducted in January 2018. Data collected since January 2019 indicate concentrations of 1,2-DCA in the treated effluent (post-GAC samples) were in compliance with the approved UIC authorization amendment dated March 20, 2014. The amendment requires that constituent concentrations in reinjected water be lower than in the water being extracted at the site or below the PCL. The GAC vessels have been drained, but remain onsite, given TCEQ approval to shut down the system for evaluation during 2020.

The following non-routine events associated with the 13-Acre Tract system that occurred during the reporting period:

- *Temporary System Shutdowns*: System shutdowns exceeding 24 hours occurred for the following reason:
 - The system was shut down, locked out, and tagged out from October 17, 2018 through January 29, 2019 to replace one pump and two transducers that were not functioning properly because of inclement weather that submerged the junction boxes.
 - The system was shutdown, locked out, and tagged out on August 1, 2019 to replace an uninterruptible power supply that was not functioning properly.
 - The system was shut down, locked out, and tagged out on November 25, 2019 because of a break in the hose leading to the GAC tank.
- *Miscellaneous O&M Activities*: Miscellaneous O&M activities during the 2019 reporting period included:
 - September 2019: The area around the treatment system, well vaults, and infiltration trench in the 13-Acre Tract was mowed in advance of groundwater sampling.
 - October 2019: Infiltration trench CB-IT-2 was inspected for the potential of reduced infiltration capacity and associated aboveground ponding from root growth. No reduced infiltration capacity or aboveground ponding was observed during the reporting period, and a semiannual root inhibitor application of copper sulfate was performed as a maintenance measure for the infiltration trench.

Although all four recovery wells remain at the site, they are not operating given the conditional approval for shut down provided by TCEQ in a letter dated March 2, 2020 (Appendix E).

3.2 Groundwater Recovery Volume

Based on data from the total flow meter readings (Table B-1), approximately 8.9 million gallons of groundwater were recovered between January 1 and December 31, 2019, with a total recovered volume since startup of approximately 190.4 million gallons.

3.3 Quarterly Sampling Results

Quarterly samples are collected before recovered groundwater enters the lead vessel (influent/pre-GAC sample), at the intermediate stage between the two GAC vessels, and after exiting the lag vessel (effluent/post-GAC sample). Samples were analyzed for 1,2-DCA; TDS; and pH. The samples from each quarterly event were submitted to SGS Accutest Laboratories in Houston, Texas. Table B-2 lists the laboratory analytical results for the quarterly samples. As shown, concentrations of 1,2-DCA in the influent, intermediate, and effluent were below 0.001 mg/L over the four sampling events.

3.4 Summary

The following summarize results from system O&M in 2019.

- The 13-Acre Tract groundwater extraction and treatment system was operational from late January 2019 until it was taken offline on November 25, 2019 for maintenance and was not restarted as of December 2019.
- The system remained offline until conditional approval for shut down was received from TCEQ in a letter dated March 2, 2020 (Appendix E).

4. References

Parsons. 2011. *Response Action Plan for Rohm and Haas Charlie Burch Site, Spring, Texas, VCP No. 421, Rev 01*. May.

Texas Commission on Environmental Quality (TCEQ). 2020. Letter RE: Conditional Approval for System Shutdown. March 2.

Tables

Table B-1. 13-Acre Tract - Estimated Groundwater Recovery Volume

2019 Annual Groundwater Monitoring Report

Rohm and Haas, Charlie Burch Pits Site, Spring, Texas

Inspection Date	Total Flow within Inspection Period (gallons)
1/18/2019	105,978 ^a
2/15/2019	741,485
3/28/2019	820,930
4/24/2019	794,448
5/17/2019	820,930
6/6/2019	794,448
First Half 2019 Total Gallons	4,078,219
Average Estimate Flow Rate 1st Half 2019 (gpm)	18.39
7/16/2019	1,331,740
8/14/2019	799,477
9/11/2019	775,493
10/15/2019	610,540
11/26/2019	1,259,940 ^b
12/12/2019	SD ^b
Second Half 2019 Total Gallons	4,777,190
Average Estimate Flow Rate 2nd Half 2019 (gpm)	22.26
2019 Total Gallons	8,855,409

Notes:

SD = system down

a. System offline from January 1 to January 27, 2019

b. System taken offline for assessment and repairs on November 25, 2019 and has remained offline based on conditional approval by Texas Commission on Environmental Quality dated March 2, 2020.

gpm= gallons per minute

Effluent daily discharge shall be limited to less than 80 gallons per minute

Table B-2. 13-Acre Tract 2019 Analytical Results
 2019 Annual Groundwater Monitoring Report
 Rohm and Haas, Charlie Burch Pits Site, Spring, Texas

Location	Date Collected	1,2-DCA (mg/L)	TDS (mg/L)	pH
Influent	1/31/2019	0.00096 J	614	6.43
	4/15/2019	0.00077 J	621	5.84
	7/16/2019	0.00046 J	651	6.07
	10/15/2019	0.00046 J	633	6.42
Intermediate	1/31/2019	0.00063 J	593	6.37
	4/15/2019	0.00093 J	621	5.77
	7/16/2019	<0.00040	643	6.06
	10/15/2019	0.00053 J	655	6.48
Effluent	1/31/2019	<0.00040	600	6.55
	4/15/2019	0.00067 J	632	5.75
	7/16/2019	0.00075 J	664	6.04
	10/15/2019	0.00081 J	636	6.63

Notes:

mg/L = milligrams per liter

TDS = total dissolved solids

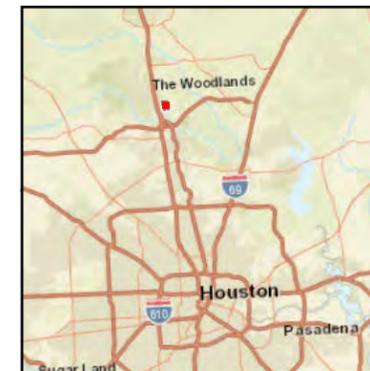
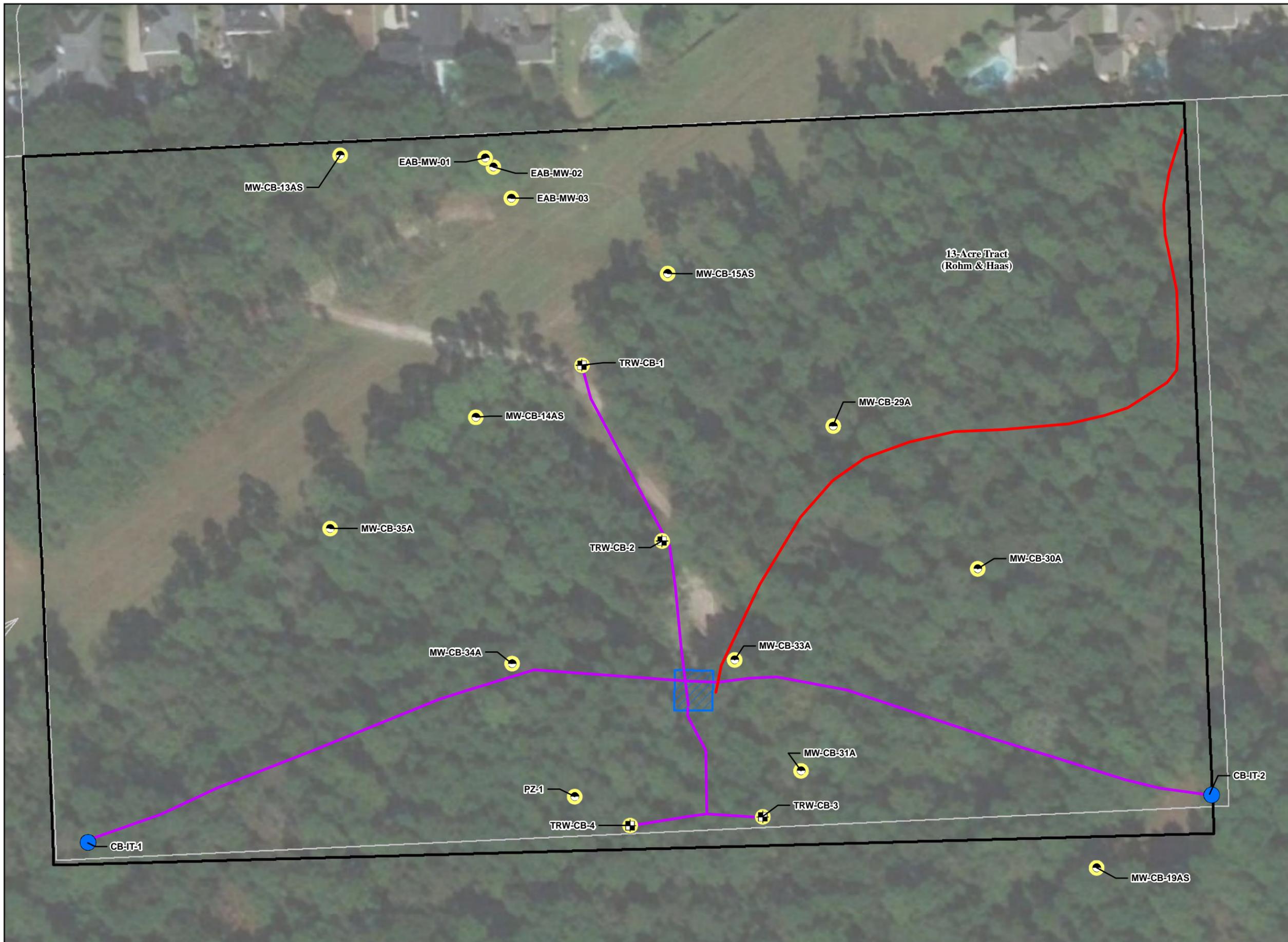
1,2-DCA = 1,2-dichloroethane

Bold type indicates a detection greater than the sample quantitation limit.

J = Estimated result

< = Not detected at the quantitation limit indicated

Figure



Legend

- Recovery Well (Zone A)
- Monitoring Well Location (Zone A)
- Injection Trench
- GAC System Enclosure
- Site Boundary
- Recovery System Piping
- Electrical Line

0 40 80 Feet

Figure B.1
 Site Location and Site Plan
 Charlie Burch Site
 Spring, Texas

Union Carbide Corporation
 A Subsidiary of The Dow Chemical Company
 Rohm and Haas Texas Inc., VCP No. 421

Drawing Date: April 2020
 Drawn By: GT **JACOBS**