FIFTH FIVE-YEAR REVIEW REPORT FOR CHEMTRONICS, INC. SUPERFUND SITE BUNCOMBE COUNTY, NORTH CAROLINA

August 2022

Prepared by

U.S. Environmental Protection Agency
Region 4
Atlanta, Georgia

CAROL MONELL

Digitally signed by CAROL MONELL
Date: 2022.08.04 12:58:41 -04'00'

Carol J. Monell, Director
Superfund & Emergency Management Division

Date

{This page was left intentionally blank}

Table of Contents

Tables

Figures

LIST OF ABBREVIATIONS AND ACRONYMS

AOC	Administrative Order on Consent
APA	Acid Pits Area
ARAR	Applicable or Relevant and Appropriate Requirement
BV	Back Valley
BZ	3-quinuclidinyl benzilate
cDCE	cis-1,2-dichloroethylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Chemicals of Concern
1,2-DCA	1,2-Dichloroethane
DA	Disposal Area
DCM	Dichloromethane
DPLUR	Declaration of Perpetual Land Use Restriction
EISB	Enhanced In-Situ Bioremediation
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FV	Front Valley
FYR	Five-Year Review
HCSM	Hydrogeologic Conceptual Site Model
HHRA	Human Health Risk Assessment
HQ	Hazard Quotient
IC	Institutional Control
IMAC	Interim Maximum Allowable Concentration
µg/kg	Micrograms per Kilogram
µg/L	Micrograms per Liter
MSD	Metropolitan Sewerage District
MNA	Monitored Natural Attention
MW	Monitoring Well
NCAC 2B	North Carolina 15A NCAC 02B .0100-.0300
NCAC 2L	North Carolina Groundwater Classifications and Standards
NCDENR	North Carolina Department of Environmental and Natural Resources
NCDEQ	North Carolina Department of Environmental Quality
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCE	Tetrachloroethene
PRP	Potentially Responsible Party
PTA	Pilot Test Area
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RDX	Research Department Explosive
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
TBA	Tert-Butyl Alcohol
TCE	Trichloroethylene
UU/UE	Unlimited Use and Unrestricted Exposure
VOC	Volatile Organic Compound

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and documents recommendations to address them.

The U.S. Environmental Protection Agency is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 Code of Federal Regulations (CFR) Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the fifth FYR for the Chemtronics, Inc. Superfund site (the Site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one operable unit (OU). OU-1 addresses contaminated soil and groundwater. This FYR Report addresses the OU.

EPA remedial project manager (RPM) Craig Zeller led the FYR. Participants included EPA community involvement coordinator Angela Miller, North Carolina Department of Environmental Quality (NCDEQ) project manager Beth Hartzell, and EPA contractor representatives Melissa Oakley and Lauren Johnson (Skeo). The potentially responsible parties (PRPs) – Chemtronics, Inc. (Chemtronics), Northrop Grumman Systems Corporation and CNA Holdings, LLC – were notified of the initiation of the FYR. The review began on 12/6/2021.

Site Background

The 541.9-acre Site is located in a rural area about 8 miles east of Asheville, in the town of Swannanoa in Buncombe County, North Carolina (Figure 1). The Site is located within a larger property, the Chemtronics property, which totals 1,068 acres and includes the 526.1-acre Chemtronics conservation easement. The Chemtronics property around the Site is not considered part of the Site (Figure 1). The Site is divided into two separate geographical areas known as the Front Valley (FV) and Back Valley (BV). The FV and BV are separated by a prominent ridge. Between 1952 and 1994, several companies made explosives, propellants, incapacitating agents and a variety of specialty chemicals at the Site. Manufacturing and related activities occurred on less than 200 acres of the Site. Operators disposed of various waste products and manufacturing byproducts on site. The primary waste products included chlorinated and non-chlorinated solvents, acidic solutions, byproducts of manufacturing processes and solid wastes.

The Site is not in use. The owner, Chemtronics, has no plans for reuse. Current site features include concrete former building pads, ponds, fences and capped disposal areas, remedial components, pollinator habitats, a security guard hut, groundwater treatment buildings (one decommissioned and one actively maintained) and a maintenance shed. Most of the Site is heavily wooded. Land uses surrounding the site property include sparsely populated woodlands, residential neighborhoods and an industrial facility. In 2018, Chemtronics established a conservation easement on 526.1 acres surrounding the Site (Figure 2). Groundwater is not used for any potable purpose at the Site. The city of Asheville's

public water supply system provides potable water for most of the area. Some residences near the Site rely on private wells for water. Recent sampling (2021) confirms that groundwater wells near the Site are unaffected by past site activities.

Surface water bodies on site include three ponds, Bee Tree Creek and two tributaries: Gregg Branch and Unnamed Branch (Figure 2). All surface water from the Site drains to these tributaries. The Unnamed Branch drains the FV. Gregg Branch drains the BV. Both tributaries discharge to Bee Tree Creek. Bee Tree Creek discharges to the Swannanoa River about 4,500 feet downstream of the Site (Figure 1). Groundwater at the Site is present in a three-part aquifer system consisting of the surficial aquifer (Zone AB), the transition zone aquifer (Zone CD) and the bedrock aquifer (Zone EF). In general, groundwater flows from the upland areas of the property toward the lowland areas or valleys. Groundwater also migrates vertically from the surficial aquifer unit in the upland areas down to the deeper transition zone and bedrock aquifer units, and horizontally to the southeast in all of the groundwater bearing units. In some of the lowland areas of the site, upward gradients are observed and groundwater that migrates from the upland areas of the property discharges to surface water in the lowland and creek-valley areas of the site, including to Bee Tree Creek, Gregg Branch and Unnamed Branch.

Appendix A includes more background information about the Site. Appendix B lists the resources referenced during the development of this FYR report. Appendix C provides current site status indicators. Appendix D provides a chronology of major site events.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Chemtronics, Inc.		
EPA ID: NCD095459392		
Region: 4	**State:** North Carolina	**City/County:** Swannanoa/Buncombe
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the Site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name: Craig Zeller		
Author affiliation: EPA with support provided by Skeo		
Review period: 12/6/2021 – 7/26/2022		
Date of site inspection: 1/11/2022		
Type of review: Statutory		

Review number: 5
Triggering action date: 9/28/2017
Due date *(five years after triggering action date)*: 9/28/2022

Figure 1: Site Vicinity Map

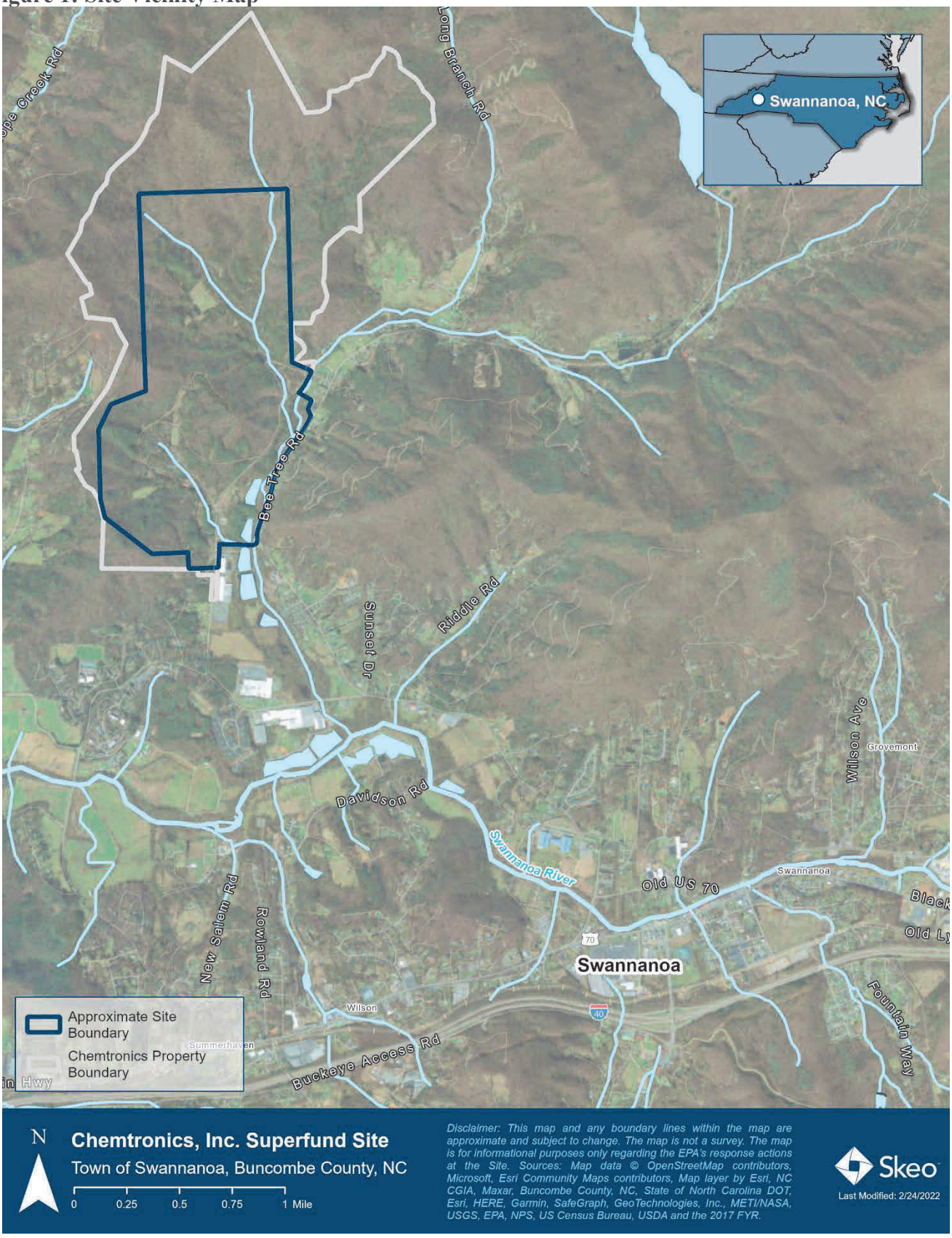
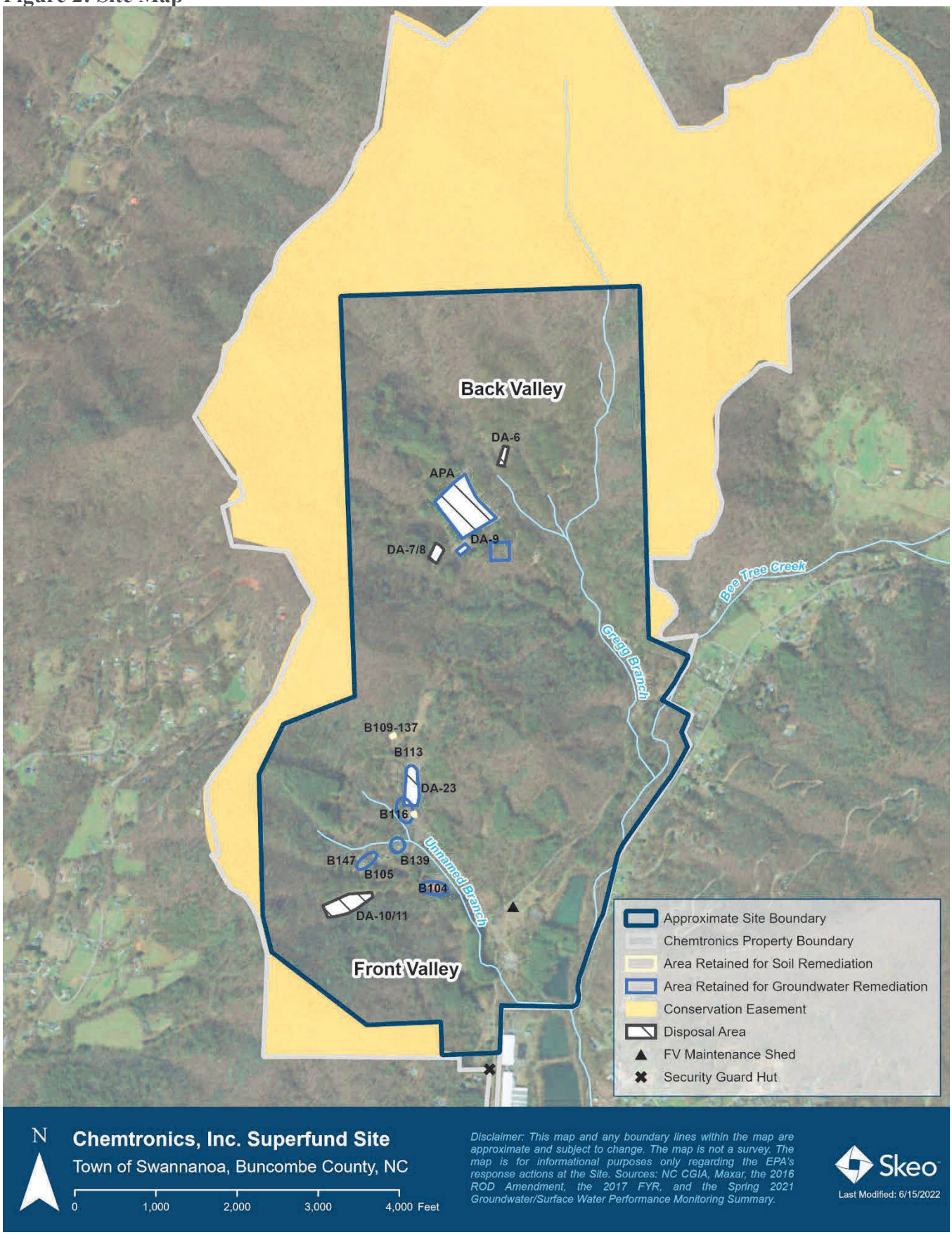


Figure 2: Site Map



II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The rupture of a wastewater lagoon liner in 1979 released wastewater at a disposal area (DA) (later referred to as DA-23). In 1980, the state of North Carolina (the State) ordered Chemtronics to discontinue all discharges to on-site disposal areas. The EPA added the Site to the Superfund program's National Priorities List (NPL) on September 8, 1983.

Under a 1985 Administrative Order on Consent (AOC), two PRPs (Chemtronics and Northrop Grumman Systems Corporation) performed the Site's first remedial investigation and feasibility study (RI/FS) from 1985 to 1987. The 1987 RI identified 23 individual DAs, which were grouped into six (6) discrete waste DAs (Table 1). Together, these DAs occupy less than 10 acres of the Site. The human health risk assessment (HHRA) performed during the first RI identified unacceptable risks associated with exposure to volatile organics in surface soil, with the greatest risk of exposure at DA-9. Groundwater contaminants identified by the first RI included volatile organics, non-volatile organics and metals. The RI determined that concentrations of those groundwater constituents exceeded drinking water and/or groundwater quality criteria in the surficial aquifer and the bedrock aquifer.

From 1980 to 1984, the Chemtronics facility also operated on site as a permitted hazardous waste treatment, storage and disposal facility in accordance with Resource Conservation and Recovery Act (RCRA) regulations. The original remedy focused on CERCLA-related wastes (the DAs) and did not address RCRA-regulated areas on the Site. Following a North Carolina Department of Environmental and Natural Resources (NCDENR – now NCDEQ) request in 2007 for the EPA to consolidate oversight of all site-related remediation efforts under its CERCLA authority (the Response Actions section of this FYR Report provides more information), the EPA entered into an AOC in 2008 with the Site's three PRPs. The PRPs – Chemtronics, Northrop Grumman Systems Corporation and CNA Holdings, LLC – performed the second sitewide RI/FS from 2009 to 2016. The second RI/FS and resulting selected remedy addresses remaining contamination not addressed by the original remedy.

The HHRA completed during the 2015 RI did not identify any unacceptable risks to human health associated with hazardous substances at the Site under current site conditions. Under potential future conditions, the HHRA identified unacceptable risks for on-site workers and on-site residents. The future risk scenarios resulting in unacceptable risk included a future industrial worker exposure to chemicals of concern (COCs) via direct contact with surface soil and vapors from subsurface soil, vapor intrusion, and potable/non-potable groundwater use; a future maintenance worker/construction worker exposure to COCs via direct contact with groundwater; and a future on-site resident exposure to COCs via direct contact with surface soil and vapors from subsurface soil, vapor intrusion and potable use of groundwater. The HHRA identified unacceptable future risk associated with two soil areas and site groundwater in all three parts of the site aquifer system (Zones AB, CD and EF). The 2016 FS Report identified two soil areas and five groundwater areas in the FV and two groundwater areas in the BV to be retained for remediation (Table 1). No further additional areas of concern were retained for further evaluation, as they did not result in unacceptable risk to human health or the environment. Table 2 lists soil areas of concern and soil COCs associated with each area. Table 3 lists the groundwater areas of concern and the groundwater COCs associated with each area. Except for potential future off-site potable/non-potable groundwater use, the 2015 RI did not identify any potential future unacceptable risks to off-site receptors from hazardous substances at the Site.

The 2015 ecological risk assessment, performed as part of the 2015 RI, concluded that conditions at the Site do not pose unacceptable risks to aquatic and terrestrial populations. However, potential risks to ecological receptors at some isolated locations at the Site could not be ruled out definitively. The ecological risk assessment states that specific monitoring requirements will be included in the sitewide remedy to make sure site conditions do not pose unacceptable risks to ecological receptors.

Table 1: Waste Disposal Areas and Remediation Areas

Area	1987 RI Waste DAs	2015 RI Areas Retained for Remediation	
		Soil	Groundwater
FV	DA-10/11, DA-23	Building 116 (B116), Building 109-137 (B109-137)	Building 104 (B104), Building 105 (B105) and 147 (B147), Building 139 (B139), DA-23/Building 116
BV	DA-6, DA-7/8, DA-9, Acid Pits Area (APA)	--	APA, DA-9
Notes: -- = NA; no soil areas were retained for remediation in the BV			

Table 2: Soil Areas of Concern and COCs Identified in the 2016 Record of Decision (ROD) Amendment

COC	Media
1,2-DCA, vinyl chloride, benzene, 1,1,2-trichloroethane, cyclohexane, methylene chloride	B116 Soil
Naphthalene, 1,2,4-trimethyl-benzene, 1,3,5-trimethyl-benzene, Xylenes (total)	B109-137 Soil
Notes: *Source:* Site's 2016 ROD Amendment, PDF pg. 137 and 152 1,2-DCA = 1,2-dichlorethane	

Table 3: Groundwater Areas of Concern and COCs Identified in the 2016 ROD Amendment

Area Name	Groundwater COC	Aquifer
FV		
B104	Chloroform, carbon tetrachloride, 1,2-DCA, cDCE, dichloromethane, perchlorate, PCE, RDX, TCE, vinyl chloride	Bedrock
B105 and B147	1,2-DCA, cDCE, dichlromethane, perchlorate, RDX, TCE, vinyl chloride	Surficial and Transition Zone
B139	1,2-DCA, perchlorate, RDX, TCE, vinyl chloride	Bedrock
DA-23/B116	1,2-DCA, PCE, perchlorate, RDX, TCE, vinyl chloride	Surficial, Transition Zone and Bedrock
BV		
APA	Benzene, chloroform, dichloromethane, 1,2-DCA, PCE, perchlorate, RDX, TBA, TCE	Surficial, Transition Zone and Bedrock
DA-9	1,2-DCA, perchlorate, RDX, TCE	Surficial, Transition Zone and Bedrock
Notes: *Source:* Site's 2016 ROD Amendment, PDF pg. 27 cDCE = cis-1,2-dichloroethylene PCE = tetrachloroethene RDX = research department explosive TBA = tert-butyl alcohol TCE = trichloroethylene 1,2-DCA = 1,2-dichloroethane		

Response Actions

In September 1984, the U.S. Army Toxic and Hazardous Materials Agency collected samples from two (2) drums exposed at the surface in DA-10/11. It was suspected that the drums might contain wastes

from production of the chemical warfare agent 3-quinuclidinyl benzilate (BZ). While analysis showed no evidence of BZ in the drums, the EPA removed them and disposed of them off site in January 1985 in response to community concerns.

The EPA selected a remedy to address soil and groundwater contamination associated with the six DAs in the Site's 1988 ROD and modified the remedy in a 1989 ROD Amendment. The remedial action objectives (RAOs) identified in the 1988 ROD consisted of:

- Protect public health and the environment from exposure to contaminated on-site soil through inhalation, direct contact, and erosion of soil in surface waters and wetlands.
- Prevent off-site migration of groundwater contamination.
- Restore contaminated groundwater to levels protective of human health and the environment.

The remedy selected in the 1988 ROD and modified by the 1989 ROD Amendment included the following components:

- Installation of multi-layer caps over DA-6, DA-7/8, DA-9, DA-10/11 and the Acid Pits Area (APA).
- Establishment of vegetation over the caps and installation of a gas collection ventilation system, if necessary.
- Placement of a multi-layer cap, which includes a synthetic liner, over DA-23, with installation of a gas collection ventilation system if necessary.
- Installation of fencing and signs around capped areas.
- Groundwater extraction and treatment.
- Reviewing existing groundwater monitoring systems and installing more wells, if necessary.
- Setting action levels for contaminants present in the DAs so that after remediation levels for groundwater have been obtained and verified through monitoring, if this level is reached in any subsequent sampling episode, a remedial action to eliminate that source of contamination permanently will be initiated.
- Sampling of pond water and sediment, and, if necessary, treatment using the groundwater treatment system or the selected soil containment process.
- Groundwater, surface water and sediment monitoring for the Unnamed Branch, Gregg Branch and Bee Tree Creek to ensure no adverse impacts during remedy implementation and to establish a database to measure success of the remedy implementation.

The 1988 ROD and 1989 ROD Amendment focused on CERCLA-related wastes (the DAs) and did not address RCRA-regulated areas (areas historically used for manufacturing operations) on the Site. In 1997, Chemtronics entered into an AOC and Hazardous Solid Waste Amendments Corrective Action with the State. Site investigations identified multiple groundwater plumes associated with RCRA waste management units. Some of the plumes were co-mingled with the groundwater monitored as part of the CERCLA remedy. Following the sitewide RI/FS in 2016, the EPA selected a remedy to address remaining sitewide contamination in the Site's 2016 ROD Amendment.

The RAOs identified in the 2016 ROD Amendment consisted of:

- Prevent dermal contact and inhalation by human receptors of carcinogenic and non-carcinogenic contaminants from subsurface soil at concentrations that pose an unacceptable risk.
- Prevent COC migration from impacted soil to groundwater that may result in concentrations above levels protective for drinking water use.
- Restore affected groundwater to levels acceptable for future beneficial use as a drinking water resource.

- Prevent exposure to groundwater with COC concentrations above levels that are protective for drinking water use.
- Prevent migration of contaminated groundwater to on-site surface water and sediment at concentrations that pose an unacceptable human health or ecological risk.
- Prevent migration of contaminated groundwater to off-site surface water and sediment at concentrations that pose an unacceptable human health or ecological risk.

The remedy selected in 2016 ROD Amendment included:

- Excavation and off-site disposal of contaminated soil from FV areas B109-137 and B116 at an EPA-approved landfill.
- Enhanced in-situ bioremediation (EISB) with long-term groundwater monitoring and monitored natural attenuation (MNA) for contaminated groundwater for the following areas in the FV: B104, B105 and B147, B139, and DA 23/B116.
- EISB with long-term groundwater monitoring and MNA for contaminated groundwater in the following areas in the BV: downgradient of DA-9 and the APA.
- Placement of institutional controls on the Superfund site portion of the Chemtronics property using the state of North Carolina Declaration of Perpetual Land Use Restrictions (DPLURs). These institutional controls will limit land uses at the Site to commercial/industrial uses, restrict groundwater use and prevent use of on-site groundwater for potable purposes. The DPLUR process requires the generation of a plat map that defines the Site's boundaries. NCDEQ or its successor will enforce the DPLURs.
- Maintenance of the caps and engineering controls for the six DAs required by the 1988 ROD and its associated documents.
- Performance monitoring and evaluation as outlined in the 2011 Proposed Assessment Monitoring Plan and the 2016 FS Report, which is to be finalized as part of a Performance Monitoring Plan in the Site's Remedial Design Report.
- Elimination of the requirement for pumping and treating groundwater in both valleys as specified in the 1988 ROD, abandonment of unnecessary structures associated with these pump-and-treat systems, and elimination of the trigger described in Section 6.5 – "Future Actions" – in the 1988 ROD.
- Continued evaluation of the remedy consistent with the FYR process.

The 2016 ROD Amendment based soil cleanup levels on the protection of future construction/industrial workers from direct contact and vapor inhalation. The EPA established risk-based soil cleanup levels under the assumption that the Site will remain in commercial/industrial use. The 2016 ROD Amendment based groundwater cleanup levels on North Carolina Groundwater Classifications and Standards (15A NCAC 2L). For those constituents where 15A NCAC 2L standards were not available, cleanup levels were based on health-based limits calculated during the Site's HHRA. COCs and cleanup levels listed in the 2016 ROD Amendment supersede COCs and cleanup levels established by the 1988 ROD. Tables E-1 and E-2 in Appendix E include soil and groundwater COCs and cleanup levels, as established by the 2016 ROD Amendment.

Status of Implementation

Site PRPs implemented the remedy selected in the 1988 ROD and 1989 ROD Amendment from 1991 to 1993. Remedial activities included capping and fencing of all DAs and installation and operation of two (2) groundwater extraction and treatment systems – one in the FV and one in the BV. Remedy construction also included long-term monitoring of groundwater and the installation of a passive gas venting system in the APA's cap. The vents have been sampled twice to determine if the disposal area

beneath the cap emits gases. Gases have never been detected and the vents are no longer monitored. During remedy implementation, the PRPs sampled water and sediment in the pond on the Unnamed Branch in the FV. No contamination was detected in the pond. As a precautionary measure, the PRPs removed the structure impounding the water and drained the pond. The PRPs established a monitoring program for surface water to ensure no adverse impact on the streams during implementation of the remedial action and to establish a database to measure success of the remedial action once implemented. Initial sampling took place in 1991 and a second sampling followed in 1993, after completion of remedial construction. The results of chronic toxicity on survival in the second sampling event were inconclusive. Current surface water sampling findings indicate that surface water at the Site does not currently pose an unacceptable risk to ecological receptors (the Data Review section of this FYR Report provides more information).

Between 2004 and 2006, outside of the scope of CERCLA, the PRPs demolished all buildings and structures on site down to the building slabs, except for those buildings and structures associated with environmental assessment and remediation efforts. The demolition included the collection and off-site disposal of building debris, scrap metal, asbestos-containing wastes, and various hazardous and non-hazardous wastes.

In 2014, the EPA approved the shutdown of the Site's two extraction and treatment systems to allow collection of groundwater and surface water data under non-pumping conditions to evaluate remedial alternatives. At the time of the shutdown, the FV pump-and-treat system had treated about 21.6 million gallons of groundwater and the BV pump-and-treat system had treated about 100.8 million gallons of groundwater. Data collected during the 2015 RI confirmed the presence of groundwater plumes in the FV, including downgradient of the influence of the FV groundwater extraction system. The 2016 ROD Amendment identified that the FV and BV pump-and-treat systems had approached the end of their functional lifespan. The systems remain off and the PRPs decommissioned or modified the extraction wells in October 2018. The FV treatment system has been maintained for intermittent treatment of groundwater purged from wells during sampling, generated from the construction and development of new site wells, or extracted from wells during pilot tests. The BV treatment system building remains on site and is deactivated. The building is locked and routinely inspected as part of regular operation and maintenance (O&M) activities.

In 2014, the PRPs voluntarily paid to upgrade the public water supply line serving Old Bee Tree Road (south of the Site) so that it could accommodate more residential connections. The PRPs also paid to connect four downgradient residences to the new water line (one connection along Old Bee Tree Road in 2014 and three connections along Lauren Ridge Way in 2016). The PRPs paid to decommission three wells that had been used for potable water supplies. These voluntary actions by the PRPs aim to further eliminate the potential for future off-site exposure to groundwater contamination. In addition, the Site's hydrogeological conceptual site model (HCSM) shows that groundwater in the BV flows southeast toward Bee Tree Creek, and then turns to the south due to hydraulic gradients from the Bee Tree Creek hydrologic zone. East of the Site, groundwater flows toward Bee Tree Creek from the east. The convergence of groundwater flow near Bee Tree Creek prevents off-site plume migration.

EISB pilot tests are currently underway across the Site. Results so far have demonstrated that aerobic and/or anaerobic EISB can be an effective remedial tool for in-situ degradation of site COCs in all hydrogeologic zones in the FV and BV (the Data Review section of this FYR Report provides more information). The PRPs plan to continue these pilot tests to provide more supporting data for design and implementation of the full-scale remedy. The full-scale remedy will be designed and implemented under the Consent Decree, which became effective April 14, 2022. The PRPs have performed voluntary

groundwater and surface water monitoring at the Site as an interim measure between the 2016 ROD Amendment and the 2022 Consent Decree finalization. In addition to the groundwater monitoring requirements, Section 7.2 of the 2016 ROD Amendment establishes more monitoring requirements to ensure that site conditions do not pose unacceptable risks to ecological receptors (the Systems Operations/Operation and Maintenance section of this FYR Report provides more information). Most of these monitoring requirements are already being voluntarily implemented.

With the 2022 Consent Decree now finalized, monitoring requirements will be implemented and incorporated into the formal Site-Wide Performance Monitoring Plan, which will be developed as part of the Remedial Design. The 2022 Consent Decree specifies performance of the remedial design, remedial construction, O&M, institutional controls and monitoring of the remedy selected in the 2016 ROD Amendment. Now that the 2022 Consent Decree has been finalized, the PRPs will begin implementing the Remedial Design/Remedial Action Statement of Work that includes the remedy selected in the 2016 ROD Amendment.

Institutional Control (IC) Review

The 2016 ROD Amendment requires implementation of institutional controls on the Superfund site portion of the Chemtronics property using the state of North Carolina DPLURs. The 2016 ROD Amendment requires that these institutional controls will, at a minimum, limit land uses at the Site to commercial/industrial uses, restrict groundwater use and prevent use of on-site groundwater for potable purposes. The DPLUR process also requires the generation of a plat map that defines the Site's boundaries.

Per the EPA's 2012 guidance *Institutional Controls: A Guide to Planning, Implementing, Maintaining and Enforcing Institutional Controls at Contaminated Sites,* a Consent Decree can be employed as an institutional control instrument. The Consent Decree for the site was finalized in April 2022 and satisfies most of the institutional control requirements set forth by the 2016 ROD Amendment. The 2022 Consent Decree prohibits various activities at the site without prior approval from EPA. These activities include anything that could interfere with the remedy including the construction of any new structures. The 2022 Consent Decree also prohibits the use of contaminated groundwater and activities that could result in exposure to contaminants that are in subsurface soil and groundwater. While the Consent Decree does not specifically limit land uses at the Site to commercial/industrial uses, it prohibits activities that could result in exposure to contaminants, which could include residential land use.

In addition, planned institutional controls, in the form of a North Carolina DPLUR, will be implemented under the 2022 Consent Decree. The EPA and NCDEQ have negotiated draft DPLUR language. The draft DPLUR language prohibits residential land use, prohibits the use of groundwater and installation of groundwater wells for any non-remedial purpose, prohibits activities that could disturb the remedy, and prohibits digging, material disturbance, excavation or removal of any surface or subsurface soil. The draft DPLUR language was included in Appendix E of the 2022 Consent Decree. The PRPs will file and record the final institutional controls with Buncombe County according to the schedule outlined in the 2022 Consent Decree.

The 2015 HHRA identified unacceptable future risk to industrial workers and on-site residents via direct contact with vapors from subsurface soil and vapor intrusion. The remedy from the 2016 ROD Amendment does not specifically require institutional controls to address the vapor intrusion pathway. However, there are currently no buildings within 100 feet of a subsurface vapor source and therefore, under current site conditions, there is no complete vapor intrusion exposure pathway. The 2022 Consent

Decree does provide considerations that any new structures on site shall be constructed in a manner that will minimize potential risk of inhalation of contaminants.

While not required by the Site's 2016 remedy, the PRPs paid to prepare and record restrictive covenants for 11 off-site addresses (14 property parcels) located south of the Site from 2014 to 2016 (Table 5). The restrictive covenants prevent the use or extraction of groundwater from the subject properties and required the closure of any existing wells. Current monitoring data indicate that site related groundwater contamination is contained on site (the Data Review section of this FYR Report provides more information). These voluntary actions by the PRPs aimed to further eliminate the potential for future off-site exposure to groundwater contamination.

Table 4 below summarizes implemented and planned institutional controls for the Site. Table 5 summarizes implemented institutional controls for off-site properties. Figure 3 shows the area subject to the institutional controls established by the 2022 Consent Decree. Appendix F includes an excerpt from the 2022 Consent Decree, an excerpt from the draft DPLUR language and an example of a restrictive covenant filed for one of the off-site downgradient properties.

Table 4: Summary of Implemented and Planned Institutional Controls (ICs)

Media, Engineered Controls and Areas That Do Not Support UU/UE Based on Current Conditions	ICs Needed	ICs Called for in the Decision Documents	Affected Area	IC Objective	Title and Date of IC Instrument
Soil	Yes	Yes	Superfund site (parcel 977092504700000)[a]	At a minimum, restrict land use to commercial/industrial uses.	Draft DPLUR language. The PRPs will file and record final institutional controls with Buncombe County according to the schedule outlined in the 2022 Consent Decree.
Soil	Yes	Yes	DAs located within the Superfund site	Prohibit digging at the DAs established by the 1988 ROD to prevent disturbance of the caps and unacceptable exposure to contaminated subsurface soil.	Consent Decree, April 14, 2022
					Draft DPLUR language. The PRPs will file and record final institutional controls with Buncombe County according to the schedule outlined in the 2022 Consent Decree.
Groundwater	Yes	Yes	Superfund site (parcel 977092504700000)[a]	At a minimum, restrict groundwater use and prevent the use of groundwater for potable purposes.	Draft DPLUR language. The PRPs will file and record final institutional controls with Buncombe County according to the schedule outlined in the 2022 Consent Decree.
					Consent Decree, April 14, 2022

Notes:

a. The 2016 ROD Amendment requires institutional controls for only the portion of the Chemtronics property parcel that is a Superfund site.

Table 5: Declaration of Restrictive Covenants for Off-Site Properties

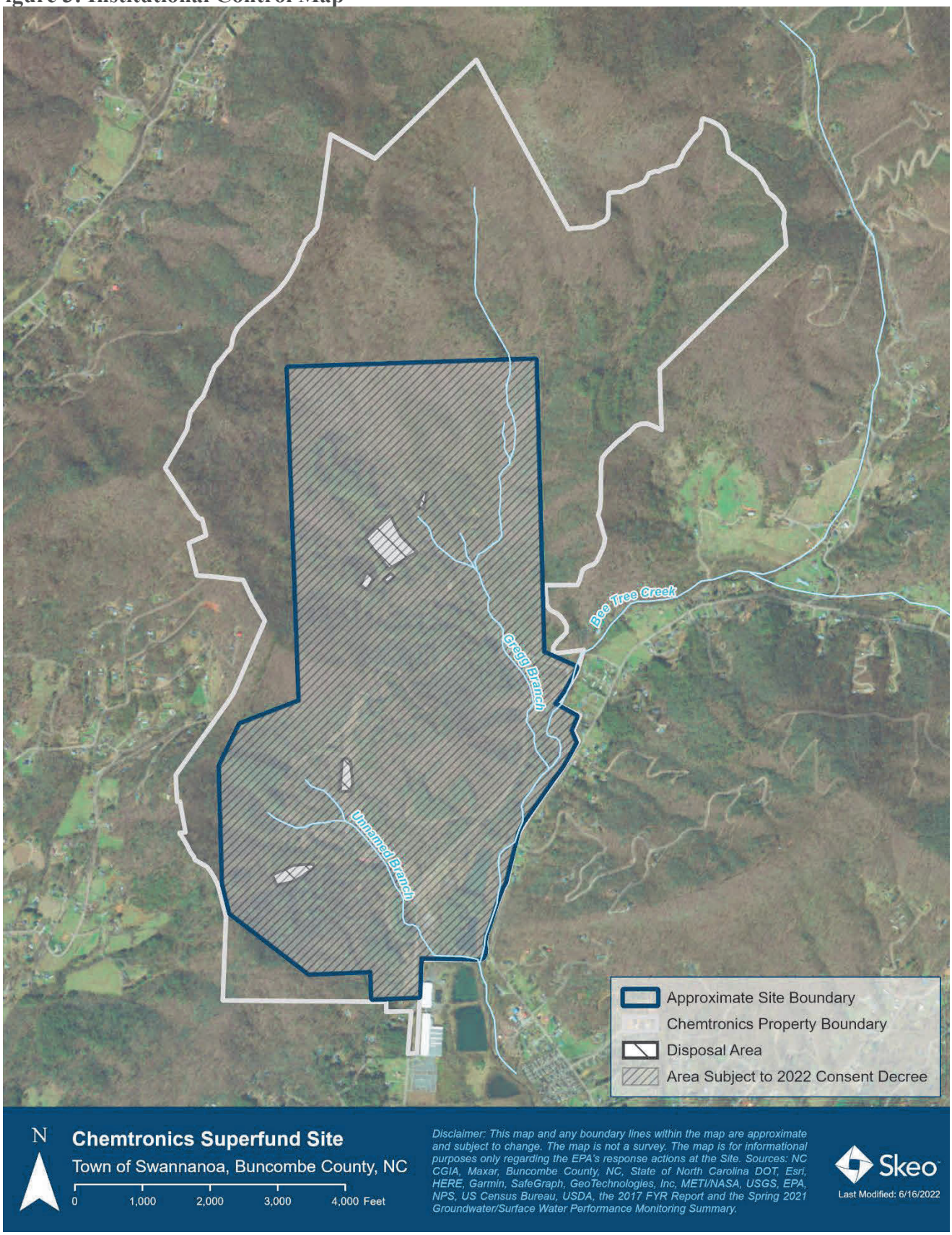
Affected Media and Location	ICs Needed	ICs Called for in the Decision Documents	IC Objective	Affected Parcel(s)[a]	Filing Date and Deed Book and Page Numbers
Off-Site Groundwater	No	No	Prevent the use or extraction of groundwater and require the closure of any existing wells.	9679961573	Filed 12/01/2014, 5265/974
				9679962708	Filed 12/1/2014, 5265/935
				9679961696	Filed 12/1/2014, 5265/947
				9679962661	Filed 12/1/2014, 5265/953
				9679972491	Filed 12/1/2014, 5265/941
				9679963934	Filed 12/1/2014, 5265/982
				9679972036	Filed 3/4/2014, 5189/1823
				9679972241	Filed 12/23/2014, 5272/222
				9679879763	Filed 12/1/2014, 5265/967
				9679973940	Filed 8/27/2015, 5347/1619
				9679873956	Filed 12/1/2014, 5265/959
				9679879368	Filed 11/8/2016, 5488/1832
				9679970429	Filed 11/7/2016, 5488/693
				9679970539	Filed 11/7/2016, 5488/702

Notes:

a. Parcel numbers above provided by Anchor QEA in March 2017.

b. All restrictive covenants listed above can be viewed online at the Buncombe County Register of Deeds website: http://registerofdeeds.buncombecounty.org/External/LandRecords/protected/v4/SrchBookPage.aspx.

Figure 3: Institutional Control Map



Systems Operations/Operation and Maintenance (O&M)

The PRPs performed voluntary groundwater and surface water monitoring at the Site as an interim measure between the 2016 ROD Amendment and the 2022 Consent Decree. Now that the 2022 Consent Decree is finalized, a formal Site-Wide Performance Monitoring Plan will be developed as part of the remedial design. Groundwater and surface water is currently monitored semi-annually in the spring and fall. Monitoring also includes active sampling of EISB pilot-test study areas. In addition, in 2021, the PRPs voluntarily monitored select domestic wells east of the BV to collect analytical data and refine the Site's HCSM. In 2018, the EPA approved the removal of total cyanide, lead, chromium, nickel, copper and zinc from the list of required analytes. Until 2020, Anchor QEA also performed CERCLA compliance monitoring, as defined in the 1997 O&M Manual. In 2020, the EPA approved a request from the PRPs to remove the CERCLA compliance groundwater sampling requirement because the requirement is no longer applicable with the issuance of the 2016 ROD Amendment.

In addition to the groundwater monitoring requirements, Section 7.2 of the 2016 ROD Amendment establishes the following additional monitoring requirements to make sure site conditions do not pose unacceptable risks to ecological receptors:

- Soil sampling for ortho-chlorobenzylidene malononitrile at one location in the on-site bear pit during the next FYR process.
- Surface water and sediment sampling for pesticides during the FYR process.
- Sampling of one surface water location downstream from the confluence of Bee Tree Creek for pesticides in the annual monitoring program.
- Continued surface water sampling for volatile organic compounds (VOCs), particularly trichloroethylene (TCE), as part of the annual monitoring programs.

Most of the above monitoring requirements are already being voluntarily implemented. Now that the 2022 Consent Decree is finalized, all monitoring requirements will be implemented and incorporated into the formal Site-Wide Performance Monitoring Plan, which will be developed as part of the Remedial Design.

Per the EPA's approval, PRP contractor Anchor QEA shut down the FV and BV groundwater extraction and treatment systems in September 2014. The 2016 ROD Amendment eliminated the requirement for pumping and treating groundwater in both valleys. The PRPs decommissioned or modified the extraction wells in October 2018. The FV treatment system has been maintained for intermittent treatment of purge water generated during sampling activities, extracted groundwater generated during pilot-test studies and water generated during construction of new site wells. The PRPs submit semiannual compliance reports for treatment system discharge pipes 01 and 03 and monthly reports to the Metropolitan Sewerage District (MSD) of Buncombe County. The reports verify that water discharged to the MSD meets site permit limits.

The PRPs submit quarterly O&M reports to the EPA. No significant O&M issues have been noted since the previous FYR. On occasion, wildlife has dug shallow holes under the DA fences and on the caps. These holes are filled and seeded, as needed, as part of the regular inspection of the capped areas. In 2019, the EPA approved the addition of a stormwater control structure on the downgradient edge of the APA cap area to intercept stormwater runoff and divert it to the western tributary of Gregg Branch, rather than allowing runoff to flow directly off the cap and infiltrate into the BV. The structure was completed in August 2020. Since the conceptual plans were approved, solar-powered electrical fencing was added to surround the structure and prevent wildlife from disturbing it. The PRPs contract a licensed surveyor to perform cap settlement surveys every five years. The last survey took place in 2022. No evidence of excessive settlement was observed. The next settlement survey is scheduled to take place

in 2027. More site O&M activities include mowing, inspection and general maintenance of capped areas, and maintenance of wells, fencing, signs, culverts and roads. The PRPs are exploring ways for pollinator habitats to potentially minimize site-related O&M (mowing) in certain areas.

III. PROGRESS SINCE THE PREVIOUS REVIEW

This section includes the protectiveness determination and statement from the 2017 FYR Report as well as the recommendations from the 2017 FYR Report and the status of those recommendations.

Table 6: Protectiveness Determinations/Statements from the 2017 FYR Report

OU #	Protectiveness Determination	Protectiveness Statement
Sitewide	Will be Protective	The sitewide remedy is expected to be protective of human health and the environment upon completion of the implementation of the 2016 ROD Amendment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. The capping and fencing of the DAs addressed soil that posed unacceptable risks to human health, and site groundwater is not used for any purpose. A review of monitoring data and current site conditions confirm that there are no complete exposure pathways associated with surface water, groundwater or soil at the Site. However, in addition to the implementation of the new sitewide remedy selected by the 2016 ROD Amendment, the following actions are needed for the remedy to be protective over the long term: • Finalize institutional controls and record final institutional control documents with the Buncombe County Register of Deeds Office. The final institutional controls should prohibit material disturbance, excavation, or removal of material, and any other activities at the DAs that could potentially impact the integrity of the caps or result in inacceptable exposure to contaminated subsurface soil without the prior written permission of EPA and/or NCDEQ. • Continue to closely monitor TBA concentrations at MWl72-T32D and surrounding monitoring wells. Implement the work plan submitted by the PRPs to EPA/NCDEQ in May 2017 to conduct an EISB pilot scale treatability study in the vicinity of monitoring well BW-14, which is located upgradient of well MW172-T32D. This treatability study will be similar in size and scope to the other treatability studies initiated by the PRPs during the RI/FS process. Implement work plan upon EPA approval.

Table 7: Status of Recommendations from the 2017 FYR Report

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
OU1 (Sitewide)	The 2016 ROD Amendment required implementation of institutional controls to, at a minimum, limit land uses to	Finalize institutional controls and record final institutional control documents with the Buncombe County Register of	Ongoing	The Consent Decree for the site was finalized in April 2022 and satisfies most of the institutional control requirements set forth by the 2016 ROD Amendment. Implementation of planned	NA

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
	commercial/industrial uses, restrict groundwater use and prevent the use of on-site groundwater for potable purposes. The institutional controls have not yet been finalized.	Deeds Office. The final institutional controls should prohibit material disturbance, excavation, or removal of material, and any other activities at the DAs that could potentially impact the integrity of the caps or result in unacceptable exposure to contaminated subsurface soil without the prior written permission of EPA and/or NC DEQ.		institutional controls, in the form of a North Carolina DPLUR, will occur under the 2022 Consent Decree and will fulfill the remaining institutional control requirements established by the 2016 ROD Amendment.	
	BV well MW172-T32D, which is located along the Site's southeastern boundary, recently showed exceedances of the TBA cleanup level of 10 µg/L. Due to the close proximity of well MW172-T32D to a residential area on the other side of Bee Tree Creek, there is a potential for TBA to migrate beyond Bee Tree Creek at concentrations above the cleanup level. However, it should be noted that the PRPs sampled eight private wells in this residential area in 2017 and TBA was not detected at any of those private wells.	Continue to closely monitor TBA concentrations at MW172-T32D and surrounding monitoring wells. Implement the work plan submitted by the PRPs to EPA/NCDEQ in May 2017 to conduct an EISB pilot scale treatability study in the vicinity of monitoring well BW-14, which is located upgradient of well MW172-T32D. This treatability study will be similar in size and scope to the other treatability studies initiated by the PRPs during the RI/FS process. Implement work plan upon EPA approval.	Completed	MW172-T32D was monitored quarterly through 2021. In 2017, the PRPs initiated an aerobic bioremediation BW-14 Area pilot test. The PRPs documented the study in the 2018 EISB Pilot Test Status for Groundwater Pilot Test Areas and the 2019 EISB Pilot Test Status for Groundwater Pilot Test Areas. The Data Review section of this FYR Report discusses the results of that pilot study. In 2021, the PRPs voluntarily evaluated the use of groundwater east of the Site's Back Valley and performed groundwater monitoring at select domestic wells which confirmed that private wells near the Site are unaffected by past site activities. The PRPs are also installing more wells downgradient of MW172-T32D (aka the 'Narrows' area) to delineate plume migration further. The above actions address this previous FYR Report issue and recommendation.	4/16/2019

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Community Involvement and Site Interviews

A public notice was made available by newspaper posting in the *Asheville Citizen Times*, on 1/5/2022 (Appendix G). It stated that the FYR was underway and invited the public to submit any comments to the EPA. The results of the review and the report will be made available at the Site's information repository, Warren Wilson College Library, located at 701 Warren Wilson Road in Swannanoa.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. The interviews are summarized below. Appendix H provides the completed interview summary forms. Due to the ongoing COVID-19 pandemic, community members were not approached for interviews.

Beth Hartzell with NCDEQ stated that she is not aware of any changes to state laws that might affect the protectives of the Site's remedy and that institutional controls will be implemented at the Site upon the approval of the Consent Decree.[1]

Jim McGinty with Chemtronics is not aware of any negative site effects on the community. He believes that the creation of the 500+ acre conservation easement has been a great benefit to the community.

Eric Wiebe, a PRP contractor representative, said that the capped and fenced waste disposal areas are meeting expectations, and the EISB pilot studies have fully demonstrated applicability for the Site.

Robert Cork with PRP contractor Anchor QEA believes that the comprehensive, voluntary groundwater and surface monitoring programs continue to confirm protectiveness of public health and the environment.

Data Review

The PRPs performed voluntary groundwater and surface water monitoring as an interim measure between the 2016 ROD Amendment and the 2022 Consent Decree. This FYR evaluated surface water and groundwater data collected during semiannual monitoring events from April 2018 to May 2021, groundwater data collected from EISB pilot-test study areas in 2018 and 2019, and monitoring data collected from select domestic wells east of the Site in 2021.

Due to the voluntary nature of the sampling events conducted during this FYR period, the number of samples collected, the locations of groundwater and surface water samples, and the analytical suites of site-specified compounds varied per sampling event. With the 2022 Consent Decree now finalized, a formal Site-Wide Performance Monitoring Plan will be developed as part of the Remedial Design.

Groundwater

Site-related groundwater contamination is present in the FV and the BV within all three parts of the aquifer system beneath the Site – Zone AB, Zone CD and Zone EF. Groundwater COCs consist primarily of VOCs, nitroaromatic compounds and perchlorate. The 2016 ROD Amendment used TCE isopleth maps to depict the extent of groundwater contamination in both valleys. Figures M-5 through

[1] This interview response was provided prior to the finalization of the 2022 Consent Decree.

M-8 show TCE plume locations for Zone AB and Zone CD in the FV and BV, as of April 2021.[2] In general, groundwater data indicate that the most heavily contaminated site groundwater is in Zone CD in the BV, located primarily at and downgradient from the BV DAs (Figures M-10 and M-12). The extent of groundwater contamination in Zone EF covers a much smaller area than in the shallower, overlaying zones. COC concentrations in Zone EF exceed cleanup levels, but in general are much lower than in the shallower zones. Site groundwater is not used for any purpose. Current sampling data do not indicate off-site migration of site-related COCs. Figures M-1 and M-2 show groundwater monitoring well locations.

Front Valley and Mid-Valley

In general, COC concentrations in the FV tend to be lower than in the BV. Historical data indicate that VOCs, nitroaromatic compounds (including research department explosive [RDX]) and perchlorate concentrations at the FV property boundary wells are generally not detected above laboratory detection limits. When they are detected, they are found at concentrations less than their cleanup levels. Monitoring data from this FYR period is consistent with prior results and confirms that the FV COC plume has likely not advanced toward the property boundary. During the fall 2020 sampling event, FV boundary wells had estimated (J-flagged) concentrations below or equal to cleanup levels (Table M-1). Over time, COC concentrations in the FV mid-valley monitoring wells have generally been stable or declining.

During the fall 2020 sampling event, eight mid-valley FV wells were sampled. All sampled wells, except for one well (MW146-M43C), had results consistent with historical trends. In the fall 2020 sampling event, MW146-M43C had higher COC concentrations than its previous sampling event in 2017; the PCE concentration slightly increased to greater than 10 times the cleanup level, and TCE and RDX increased to concentrations greater than the cleanup level (Figure M-9). During the spring 2021 event, COC concentrations at MW146-M43C were similar to the COC concentrations observed in the fall of 2020 (Figure M-11).

Back Valley

During the fall 2020 sampling event, seven of the nine sampled BV property boundary wells were non-detect or below cleanup levels for VOCs, consistent with prior results (Figure M-10).[3] BV property boundary wells sampled for nitroaromatics and perchlorate were non-detect, generally consistent with results from prior sampling events. MW172-T32D and MW285-T31F have consistently exceeded cleanup levels for several COCs (Table 8) (Figure M-10). Analytical results for MW285-T31F during spring 2021 sampling were generally consistent with fall 2020 results (Table 8). MW172-T32D is not located in an area where groundwater is moving off-site, as groundwater makes a right-hand turn and moves parallel to the property boundary toward the FV (Figure M-2).

[2] Isoconcentration contours for Zone EF are not presented because these wells are constructed in fractured bedrock. An interpretation using isoconcentration contours for Zone EF would not portray the compound concentration distribution within the bedrock fracture network accurately due to the tortuous nature of groundwater flow within the fractured bedrock aquifer system.

[3] Sampled property boundary wells in the BV during the fall 2020 sampling event were MW285-T31F, MW286-T31CD, MW162-T31A, MW163-T32C, MW225-T32F, MW172-T32E, MW172-T32D, MW289-T34EF and MW290-T34D.

Table 8: Back Valley Property Boundary Monitoring Well Exceedances, 2018 to 2021

Analyte	Cleanup Level (µg/L)	2018 Exceedances			2019 Exceedances		2020 Exceedances				Spring 2021 Exceedances[h]	
		Spring[b]	Fall[c]		Spring[d]	Fall[e]	Spring[f]		Fall[g]			
		Monitoring Well										
		MW172-T32D	MW172-T32D	MW163-T32C	MW172-T32D		MW285-T31F	MW172-T32D	MW285-T31F	MW172-T32D	MW172-T32D	MW285-T31F
VOCs (µg/L)												
1,2-DCA	0.4	--	--	--	0.50 J	--	--	--	--	--	--	--
1,2-Dichloropropane	0.6	--	1.2	--	1.50 J	1.4	--	1.2	--	0.95	0.89	--
Benzene	1	30	67	--	12	10	--	3.4	1.5	3.2	2.3	1.4
Methyl-tert-butyl ether	20	--	34	--	38	35	--	25	--	23	--	--
Tert-Butyl alcohol	10	1,600	3,400	22	3,400	3,400	18	1,700	40	2,200	1,600	44
Vinyl chloride	0.03	0.2 J	0.5 J	--	--	--	--	--	--	--	--	--

Notes:

a. If more than one sample was taken, the higher of the two results was reported.
b. Source is Table 3 of the Spring 2018 Groundwater and Surface Water Assessment Monitoring Summary (PDF pg. 12).
c. Source is Table 3 of the 2018 Annual Assessment Monitoring Report (PDF pg. 39).
d. Source is Table 2 of the Spring 2019 Groundwater Assessment Monitoring Summary (PDF pg. 8).
e. Source is Table 3 of the 2019 Annual Assessment Monitoring Report (PDF pg. 34).
f. Source is Table 2 of the Spring 2020 Groundwater Assessment Monitoring Summary (PDF pg. 12).
g. Source is Table 3 of the 2020 Annual Assessment Monitoring Report (PDF pg. 36).
h. Source is Table 3 of the Spring 2021 Groundwater/Surface Water Performance Monitoring Summary (PDF pg. 17).

J = estimated value. The result is greater than or equal to the method detection limit and less than the limit of quantitation
-- = analyte did not exceed cleanup level during this monitoring event
µg/L = micrograms per liter

The Site's HCSM shows that groundwater in the BV flows southeast toward Bee Tree Creek, and then turns south due to hydraulic gradients from the Bee Tree Creek hydrologic zone. East of the Site, groundwater flows toward Bee Tree Creek from the east and the convergence of groundwater flow near Bee Tree Creek prevents off-site plume migration. This is consistent with COCs being non-detect or below cleanup levels east of Bee Tree Creek at wells MW289-T34EF and MW290-T34EF. Four (4) additional monitoring wells to assess plume migration downgradient of MW172-T32D (aka the 'Narrows' area) were installed in January 2022. Current sampling data do not indicate off-site migration of site-related COCs. Voluntary quarterly groundwater monitoring at MW172-T32D continued through fall 2021 and will be reduced to semiannual starting in 2022.

During the 2021 spring sampling event, VOC, nitroaromatics and perchlorate concentrations in the BV upper- and mid-valley wells were generally consistent with recent trends (Figure M-12). TBA and benzene concentrations at lower BV well MW287-S32EF have generally increased since the well was installed in 2017, with TBA concentrations exceeding 10 times the cleanup level and benzene concentrations exceeding the cleanup level. Similarly, at adjacent well MW288-S32CD, TBA concentrations have generally increased since 2017, with the spring 2021 TBA concentration increasing from 6.5 J µg/L in the fall 2020 sampling event to 120 µg/L.

Surface Water

Although there are no cleanup levels for surface water, the RAOs identified in the 2016 ROD Amendment aim to prevent migration of contaminated groundwater to on-site and off-site surface water. TCE and perchlorate are among the most frequently detected site analytes in surface water. The most recent surface water results that include both FV and BV surface water features (fall 2020) are shown in Figure M-9 and Figure M-10. During this FYR period, perchlorate concentrations and, at a lesser frequency, TCE concentrations exceeded their respective North Carolina 15A NCAC 02B .0100-.0300 (NCAC 2B) surface water standards at on-site sampling locations along Gregg Branch and the Unnamed Branch. During the FYR period, no site-related analytes were detected above the NCAC 2B standards at any of the surface water sampling locations along Bee Tree Creek (Table M-3). Surface water monitoring location BTW 1-P45 is just south of the site boundary along Bee Tree Creek (Figure M-3). During the previous FYR, it was observed that perchlorate and RDX concentrations had slightly increased at BTW 1-P45 during the August 2015 sampling event. During this FYR period, at BTW 1-P45, perchlorate concentrations remained below NCAC 2B standards and RDX was not detected (Table M-2). The Gregg Branch and Unnamed Branch tributaries discharge to Bee Tree Creek. The lack of COC concentrations above the NCAC 2B standards at BTW 1-P45, the farthest downgradient, off-site surface water sampling location in Bee Tree Creek, supports the conclusion that transport of contaminants observed in Gregg Branch and Unnamed Branch to off-site receptors via surface water is not a significant route of migration. Surface water monitoring locations are shown in Figure M-3 and Figure M-4.

The NCAC 2B surface water standards are protective of human health; they are not applicable to ecological receptors. To evaluate potential risk to ecological receptors in Bee Tree Creek, the Unnamed Branch, and Gregg Branch, the FYR compared concentrations of constituents detected in surface water during the FYR period to EPA Region 4 chronic freshwater screening values.[4] Screening values are not available for all detected surface water constituents.[5] During this FYR period, no concentrations in

[4] EPA Region 4 Surface Water Screening Values for Hazardous Waste Sites, included in EPA Region 4's Ecological Risk Assessment Supplemental Guidance (updated March 2018), available online at https://www.epa.gov/sites/default/files/2018-03/documents/era_regional_supplemental_guidance_report-march-2018_update.pdf (accessed 1/20/2022).

[5] Region 4 chronic freshwater screening values are not available for the following detected constituents: Tetrachloroethene (PCE), o-xylene, sulfate, perchlorate, chloromethane, tert-Butyl alcohol, and hexachlorocyclohexane, beta-.

Bee Tree Creek, the Unnamed Branch or Gregg branch exceeded Region 4 chronic freshwater screening values. These findings indicate that surface water at the Site does not currently pose an unacceptable risk to ecological receptors.

EISB Pilot Tests

The remedy selected in the 2016 ROD Amendment has not yet been implemented. EISB pilot tests are underway across the Site under the FV and BV to evaluate aerobic and anaerobic EISB treatment of COCs under a variety of geochemical and geologic conditions at the Site. Pilot-test areas (PTAs) include FV PTAs at Building 104-145 (B104-145), B105-139, B147, B149 and DA 23/B116 (Figure M-1), and BV PTAs in the BW-14 and P-5 areas (Figure M-2). Collectively, results from the groundwater pilot tests demonstrate that aerobic and/or anaerobic EISB can be an effective remedial tool for in-situ degradation of site COCs in all hydrogeologic zones in the FV and BV. The most recent results confirm that, in some PTAs, select COC concentrations have declined below cleanup levels and/or below the 1,000-times cleanup threshold used to identify areas for source mass flux reduction in the 2016 ROD Amendment.

Domestic Well Investigation

In 2021 (July to November), the PRPs voluntarily evaluated groundwater use east of the Site's BV and performed groundwater monitoring at select domestic wells to support refinement of the Site's HCSM. This event investigated private wells in two clusters: the Hunter Kilby Road cluster and the Smokey Mountain Drive cluster (Table 9) (Figure M-13). Six private wells were sampled for chemical analyses and potentiometric level data in the Hunter Kilby Road cluster; one well was investigated for potentiometric level information only. The Hunter Kilby Road cluster well samples were analyzed for VOCs, nitroaromatics and perchlorate. Only potentiometric data were collected from the Smokey Mountain Drive well cluster.

No compounds were detected in Hunter Kilby Road samples. Potentiometric levels at both well clusters align with the Site's HCSM; static potentiometric levels east of Bee Tree Creek are higher than those at the creek or next to the creek. These potentiometric level data indicate that groundwater east of the creek flows west toward the creek, rather than toward the domestic wells. Therefore, based on existing lines of evidence, groundwater extracted by the domestic wells is supplied by groundwater recharge on the eastern slope and from higher elevation areas east of the domestic wells, not from areas under Bee Tree Creek or the Site. Results of this investigation support that off-site migration of groundwater east/southeast of the BV is unlikely, and that previously sampled wells east of the Site are not affected by the Site.

Table 9: Domestic Well Investigation Clusters

Cluster	Sample ID
Hunter Kilby Road	847 BT
	849 BT
	899 BT
	11 HK
	16 HK
	32 HK
	33 HK
Smokey Mountain Drive	32 SM
	36 CM
Notes: *Source:* Site's 2022 Summary of Voluntary Off-Site Domestic Well Investigation and Monitoring.	

Site Inspection

The site inspection took place on 1/11/2022. Participants included Craig Zeller (EPA Region 4 RPM), Jim McGinty and Harry Morris (Halliburton), Mike Shannon and Eric Wiebe (Northrop Grumman), Todd Hagemeyer (PRP contractor – Geosyntec), Robert Cork (PRP contractor - Anchor QEA), and Melissa Oakley and Lauren Johnson (Skeo). The purpose of the inspection was to assess the protectiveness of the remedy. Appendix I provides the site inspection checklist. Appendix J provides site inspection photographs.

The site inspection began at the FV maintenance shed with a safety and site information briefing. It included a tour of the following FV areas: DA-10/11, the B104 area, the B105 pilot area, the B109-137 future soil remediation area, DA-23, and signage. The site inspection included a tour of the following BV areas: DA-7/8, the APA, DA-9, DA-6, the P5 PTA and the MW172-T32D area.

Chain-linked fences clearly marked with warning signage and secured with locked gates surround each of the six disposal areas. All fences were in good condition. The caps on the six disposal areas appeared to be in good condition and all vegetation appeared to be well established, healthy, and well maintained. Site inspection participants observed several minor areas on DA-10/11 where wildlife has dug under the fence to access the capped area. As part of regular O&M maintenance activities, holes on/near the edge of the capped areas are filled and seeded, as needed. All monitoring wells, extraction wells and injection wells were secured with locks. They were clearly labeled and appeared to be in good condition.

Site inspection participants also observed the inactive BV groundwater treatment system building, the FV groundwater treatment system building and a pollinator habitat pilot project plot. The system components of the FV groundwater treatment system were clearly labeled and appeared to be in good condition. The groundwater treatment system building remains locked when not in use.

Site access is restricted by fencing and secured front and back gates. The front gate and on-site access are monitored by a security guard stationed in a guard hut at the site entrance. The front gate is clearly posted with warning signage. The back gate is locked, and access is blocked by concrete barriers. No trespassing issues have been observed in the last five years. No issues were observed during the site inspection that could potentially affect the protectiveness of the remedy.

Following the site inspection, Skeo staff visited the Site's local information repository, Warren Wilson College Library, located at 701 Warren Wilson Road in Swannanoa. A records review verified that the complete Administrative Record of printed site-related documents is available for public viewing. This record has also been scanned and digitized. All site-related documents dated 2006 and later, including the 2016 ROD Amendment and 2017 FYR Report, are available in disk form for public viewing.

V. TECHNICAL ASSESSMENT

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

Question A Summary:

The review of relevant documents and the site inspection indicate that, once implemented, the new sitewide remedy selected in the 2016 ROD Amendment is expected to function as designed and address remaining site-related contamination. The soil component of the 1988 ROD is functioning as designed. The 2022 Consent Decree specifies the performance of the remedial design, remedial construction, O&M, institutional controls and monitoring of the remedy selected in the 2016 ROD Amendment.

With the 2022 Consent Decree now finalized, the PRPs will begin implementing the Remedial Design/Remedial Action Statement of Work that includes the remedy selected in the 2016 ROD Amendment. The PRPs performed voluntary groundwater and surface water monitoring at the Site as an interim measure between the 2016 ROD Amendment and the performance of the work required by the 2022 Consent Decree.

The capping and fencing of the DAs addresses soil that posed unacceptable risks to human health. Security personnel, locked gates, fences, and signage prevent unauthorized site entry. There have been no issues with trespassing on the Site during the last five years. While performed outside the scope of CERCLA, the demolition and off-site disposal of site structures and associated wastes further eliminated the potential for unacceptable risks to human health posed by the Site. While in operation, the FV and BV groundwater extraction and treatment systems prevented off-site migration of groundwater contamination and, to a certain extent, reduced COC concentrations in site groundwater.

Site groundwater is not used for any potable purpose. Current sampling data do not indicate off-site migration of site-related COCs. Once implemented, it is expected that the remedy selected in the 2016 ROD Amendment will address remaining site-related contamination. COC concentrations at BV well MW172-T32D remain above cleanup levels. While MW172-T32D is near the site boundary, it does not indicate movement of groundwater contamination toward the site boundary. The Site's HCSM shows that groundwater in the BV flows southeast toward Bee Tree Creek, then turns south due to hydraulic gradients from the Bee Tree Creek hydrologic zone. East of the Site, groundwater flows toward Bee Tree Creek from the east and the convergence of groundwater flow near Bee Tree Creek prevents off-site plume migration. The PRPs initiated voluntary groundwater monitoring at select domestic wells in 2021. This monitoring confirmed the HCSM, that on-site groundwater does not flow toward domestic wells east of the Site and that previously sampled wells east of the Site are not affected by the Site. In addition, four monitoring wells to assess plume migration along the Bee Tree Creek hydrological zone were installed in January 2022. Collectively, results from groundwater pilot tests at the Site (including injection events in 2018, 2019 and 2020) demonstrate that aerobic and/or anaerobic EISB can be an effective remedial tool for in situ degradation of site COCs in all hydrogeologic zones in the FV and BV.

Surface water data collected during this FYR period do not indicate off-site migration of site-related COCs at concentrations that exceed applicable groundwater criteria. Based on data collected to date, neither surface water nor sediment is a source of contamination. Contaminants detected in streams are from discharge of groundwater into the stream or surface runoff during storm events. As stated in the ROD, contaminant levels in surface water bodies are expected to decline with implementation of groundwater and soil remediation. Concentrations in streams indicate that contaminants are not migrating via the surface water/sediment pathway and do not result in unacceptable human health risk. Monitoring at these locations should continue to ensure that COC concentrations remain below the NCAC 2B standards.

The 2016 ROD Amendment requires institutional controls to, at a minimum, limit land uses to commercial/industrial uses, restrict groundwater use and prevent the use of on-site groundwater for potable purposes. The 2022 Consent Decree meets most of the institutional control requirements established by the 2016 ROD Amendment by prohibiting the following: use of contaminated groundwater, activities that could result in exposure to contaminants that are in subsurface soil and groundwater, and activities that could interfere with the remedy, including the construction of any new structures without prior approval from the EPA. The 2015 HHRA identified unacceptable future risk to industrial workers and on-site residents via direct contact with vapors from subsurface soil and vapor

intrusion. However, under current conditions, there are no complete vapor intrusion exposure pathways, and the 2022 Consent Decree provides consideration that any new structures on site shall be constructed in a manner that will minimize potential risk of inhalation of contaminants. Additional planned institutional controls, in the form of a North Carolina DPLUR, will be implemented under the 2022 Consent Decree. The draft DPLUR language prohibits residential land use, prohibits the use of groundwater and installation of groundwater wells for any non-remedial purpose, prohibits activities that could disturb the remedy, and prohibits digging, material disturbance, excavation, or removal of any surface or subsurface soil. The draft DPLUR language was also included in Appendix E of the 2022 Consent Decree. The PRPs will file and record the final DPLUR with Buncombe County according to the schedule outlined in the 2022 Consent Decree.

While not required by the remedy selected in the Site's 2016 ROD Amendment, between 2014 and 2016, the PRPs paid to extend the public water supply line to areas south of the Site and established restrictive covenants with several off-site property owners downgradient of the Site. The restrictive covenants prevent the use or extraction of groundwater from subject properties and require closure of any existing wells. These actions further reduce the potential for future off-site water wells to affect migration of groundwater contamination on site.

O&M activities are adequate and ensure the continued protectiveness of the remedy. The PRPs performed voluntary groundwater and surface water monitoring as an interim measure between the 2016 ROD Amendment and the 2022 Consent Decree. Cap settlement surveys indicate no evidence of cap subsidence at any DAs, and routine cap inspections and maintenance ensure the continued integrity of the DA caps. Additional site O&M activities include mowing, inspection and general maintenance of capped areas, and maintenance of wells, fencing, signs, culverts, and roads. With the 2022 Consent Decree now finalized, a formal Site-Wide Performance Monitoring Plan will be developed as part of the Remedial Design.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels and RAOs used at the time of the remedy selection still valid?

Question B Summary:

The exposure assumptions and RAOs used at the time of remedy selection remain valid. There are no current complete exposure pathways to contaminated media at the Site. The Site remains vacant and site groundwater is not used for any potable purpose. Capping and fencing of the DAs and restricted site access prevents unacceptable exposure to site-related contamination. The Consent Decree acts as an institutional control that prevents exposure to site-related contamination and once finalized, the DPLUR for the Site will restrict site land uses to commercial/industrial uses and prohibit groundwater use for any purpose other than investigation, remediation and monitoring of groundwater quality. All RAOs are expected to be met following full-scale implementation of the remedy selected in the 2016 ROD Amendment.

The 2016 ROD Amendment based groundwater cleanup levels on North Carolina Groundwater Classifications and Standards (NCAC 2L). Groundwater cleanup levels based on NCAC 2L standards remain valid, as those standards have not changed since the 2016 ROD Amendment (Appendix K). In cases where NCAC 2L standards are not available, cleanup levels were based on health-based limits calculated during the Site's HHRA. To evaluate if the non-ARAR-based groundwater cleanup levels remain valid, a screening-level risk evaluation was completed for the groundwater COCs for which federal MCLs or NCAC 2L standards were not established (Appendix L). The screening-level risk review for groundwater was conducted by comparing ROD cleanup levels to the EPA's 2021 tapwater

regional screening level (RSL) using the EPA's current toxicity values. The risk review demonstrates that most of the non-ARAR-based groundwater cleanup levels remain valid, as they are equivalent to risks below the EPA's upper bound of the cancer risk management range (1×10^{-4}) and result in hazard quotients (HQs) below the EPA's threshold of 1.0. The screening-level risk evaluation indicated that health-based groundwater cleanup levels for tetrahydrofuran and 3-nitrotoluene are associated with risk above the EPA's noncancer threshold of 1.0 (Table L-2). However, the cleanup levels for tetrahydrofuran and 3-nitrotoluene are based on more rigorous Site- and COC-specific health-based standards calculated during the human health risk assessment and were approved by the EPA. In addition, tetrahydrofuran and 3-nitrotoluene are not primary risk or remedial-drivers, there is no complete exposure pathway, and the Consent Decree prohibits use of contaminated groundwater and any activities that could result in exposure to contaminants in groundwater.

The 2016 ROD Amendment based soil cleanup levels on the protection of a future construction/industrial worker scenario from direct contact and vapor inhalation. The EPA established risk-based soil cleanup levels under the assumption that the Site will remain in commercial/industrial use. This FYR evaluated the soil cleanup levels with a screening-level risk evaluation, using the EPA's current toxicity values (Appendix L). The risk evaluation demonstrates that the ROD cleanup levels for soil remain valid under a commercial/industrial land use scenario because they are equivalent to risks below the EPA's upper bound of the cancer risk management range (1×10^{-4}) and result in HQs below the EPA's threshold of 1.0 (Table L-1). In addition, once finalized, institutional controls will restrict land use to commercial and industrial purposes only.

Shallow groundwater beneath parts of the Site is contaminated with VOC concentrations above cleanup levels. However, there are no routinely occupied enclosed structures on site, so there is no complete vapor intrusion exposure pathway under current conditions. The FV maintenance shed is immediately northwest of building 152 and the security guard hut is located along the Site's southern boundary (Figure 3). Based on the current extent of groundwater contamination in the surficial aquifer, VOC-contaminated groundwater is not present beneath, or within 100 lateral feet of, the FV maintenance shed, security personnel who use the security guard hut, or downgradient residents. Therefore, vapor intrusion does not currently pose a risk to workers in the shed, security personnel who use the guard hut, or off-site receptors.

The ecological risk assessment, performed as part of the 2015 RI, concluded that community-level risks for ecological receptors are not expected on a broad scale. However, potential risks to ecological receptors at some isolated site locations could not be definitively ruled out. Section 7.2 of the 2016 ROD Amendment establishes specific monitoring requirements to ensure that site conditions do not pose unacceptable risks to ecological receptors. The 2016 ROD Amendment indicates that performance monitoring requirements will be finalized as part of the Performance Monitoring Plan during the remedial design. To evaluate potential risk to ecological receptors in Bee Tree Creek, the Unnamed Branch, and Gregg Branch, this FYR compared concentrations of constituents detected in surface water during this FYR period to EPA Region 4 chronic freshwater screening values. Between 2018 and 2021, no constituent concentrations observed in Bee Tree Creek, the Unnamed Branch, or Gregg Branch exceeded Region 4 chronic freshwater screening values. These findings indicate that surface water at the Site does not currently pose an unacceptable risk to ecological receptors.

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.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the FYR:
OU-1 (Sitewide)

OTHER FINDINGS

Two recommendations were identified during the FYR. These recommendations do not affect current or future protectiveness.

- Include the monitoring requirements established in Section 7.2 of the 2016 ROD Amendment in the Site's forthcoming Performance Monitoring Plan to ensure that site conditions do not pose unacceptable risks to ecological receptors.
- The 2016 ROD Amendment required implementation of institutional controls using the State of North Carolina DPLURs. The DPLUR has not yet been finalized. Finalize the DPLUR to meet the requirements established by the 2016 ROD Amendment.

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement
Protectiveness Determination: Will be Protective
Protectiveness Statement: The sitewide remedy is expected to be protective of human health and the environment upon complete implementation of the remedy selected in the 2016 ROD Amendment. In the interim, exposure pathways that could result in unacceptable risks are being controlled. The capping and fencing of DAs addressed soil that posed unacceptable risks to human health, and site groundwater is not used for any potable purpose. A review of monitoring data and current site conditions confirm that there are no complete exposure pathways associated with surface water, groundwater, or soil at the Site. In addition, the 2022 Consent Decree acts as an institutional control that prevents exposure to site-related contamination.

VIII. NEXT REVIEW

The next FYR Report for the Chemtronics, Inc. Superfund site is required five years from the completion date of this review.

APPENDIX A – SITE BACKGROUND

This appendix supplements the site background found in Section I of this FYR Report.

Site operations at the Chemtronics facility reportedly included incineration of solid waste material and possibly solvents in the APA and disposal of chemical waste and spent acid in the APA trenches. Chemical wastes from the manufacturing of ortho-chlorobenzylidene malononitrile and 3-quinuclidinyl benzilate were placed in metal 55-gallon drums and reportedly neutralized with a kill solution. Site operators buried these drums in DA-6, DA-7/8, DA-9, and DA-10/11 along with other process wastes and solid wastes. DA-23 is a former wastewater treatment bio-lagoon built on top of an abandoned leach field associated with Building 113. Building 113 was the building where most of the production/ manufacturing occurred (Figure 2). Manufacturing activities occurred primarily in the FV. Material testing and waste disposal occurred primarily in the BV.

APPENDIX B – REFERENCE LIST

2018 Annual Assessment Monitoring Report, Chemtronics Site, Swannanoa, Buncombe County, North Carolina. Prepared by Anchor QEA for Chemtronics, Inc., Northrop Grumman Systems Corporation April 22, 2019.

2018 EISB Pilot Test Status for Groundwater Pilot Test Areas, Chemtronics Superfund Site, Swannanoa, Buncombe County, North Carolina. Prepared by Geosyntec Consultants for Chemtronics, Inc. and Northrop Grumman Systems Corporation. April 16, 2019.

2019 Annual Assessment Monitoring Report, Chemtronics Site, Swannanoa, Buncombe County, North Carolina. Prepared by Anchor QEA for Chemtronics, Inc., Northrop Grumman Systems Corporation April 30, 2020.

2019 EISB Pilot Test Status for Groundwater Pilot Test Areas, Chemtronics Superfund Site, Swannanoa, Buncombe County, North Carolina. Prepared by Geosyntec Consultants for Chemtronics Inc. and Northrop Grumman Systems Corporation. June 19, 2020.

2020 Annual Assessment Monitoring Report, Chemtronics Site, Swannanoa, Buncombe County, North Carolina. Prepared by Anchor QEA for Chemtronics, Inc., Northrop Grumman Systems Corporation April 16, 2021.

2022 Settlement Marker Elevation Data, Chemtronics Site, Swannanoa, Buncombe County, North Carolina. Prepared by Ed Holmes & Associates. February 22, 2022.

Consent Decree. United States District Court for the Western District of North Carolina Asheville Division. April 14, 2022.

Fall 2021 – Voluntary Groundwater and Surface Water Performance Monitoring, Chemtronics CERCLA Site. Anchor QEA. October 11, 2021.

Fourth Five-Year Review Report, Chemtronics, Inc. Superfund Site, Buncombe County, North Carolina. U.S. Environmental Protection Agency. September 2017.

Front Valley and Back Valley Extraction Well and Treatment System Temporary Shutdown Report. Prepared by Altamont Environmental, Inc. for Chemtronics, Inc., Northrop Grumman Systems Corporation and CNA Holdings LLC. January 15, 2016.

Monitoring Report for Temporary Shutdown of the Front and Back Valley Extraction Wells and Treatment Systems. Prepared by Altamont Environmental, Inc. for Chemtronics, Inc., Northrop Grumman Systems Corporation and CNA Holdings LLC. June 15, 2015.

Monthly MSD Sewer Discharge Compliance Report – February 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. March 19, 2018.

Monthly MSD Sewer Discharge Compliance Report – March 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. April 10, 2018.

Monthly MSD Sewer Discharge Compliance Report – April 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. May 10, 2018.

Monthly MSD Sewer Discharge Compliance Report – May 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. June 7, 2018.

Monthly MSD Sewer Discharge Compliance Report – June 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. July 10, 2018.

Monthly MSD Sewer Discharge Compliance Report – September 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. October 10, 2018.

Monthly MSD Sewer Discharge Compliance Report – October 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. November 10, 2018.

Monthly MSD Sewer Discharge Compliance Report – November 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. December 7, 2018.

Monthly MSD Sewer Discharge Compliance Report – December 2018, Chemtronics CERCLA Site, Swannanoa, North Carolina. January 8, 2019.

Monthly MSD Sewer Discharge Compliance Report – January 2019, Chemtronics CERCLA Site, Swannanoa, North Carolina. February 8, 2019.

Monthly MSD Sewer Discharge Compliance Report – February 2019, Chemtronics CERCLA Site, Swannanoa, North Carolina. March 8, 2019.

Monthly MSD Sewer Discharge Compliance Report – May 2019, Chemtronics CERCLA Site, Swannanoa, North Carolina. June 7, 2019.

Monthly MSD Sewer Discharge Compliance Report – July 2019, Chemtronics CERCLA Site, Swannanoa, North Carolina. August 9, 2019.

Monthly MSD Sewer Discharge Compliance Report – August 2019, Chemtronics CERCLA Site, Swannanoa, North Carolina. September 9, 2019.

Monthly MSD Sewer Discharge Compliance Report – October 2019, Chemtronics CERCLA Site, Swannanoa, North Carolina. November 10, 2019.

Monthly MSD Sewer Discharge Compliance Report – December 2019, Chemtronics CERCLA Site, Swannanoa, North Carolina. January 2, 2019.

Monthly MSD Sewer Discharge Compliance Report – February 2020, Chemtronics CERCLA Site, Swannanoa, North Carolina. March 6, 2020.

Monthly MSD Sewer Discharge Compliance Report – March 2020, Chemtronics CERCLA Site, Swannanoa, North Carolina. April 10, 2020.

Monthly MSD Sewer Discharge Compliance Report – June 2020, Chemtronics CERCLA Site, Swannanoa, North Carolina. July 10, 2020.

Monthly MSD Sewer Discharge Compliance Report – July 2020, Chemtronics CERCLA Site, Swannanoa, North Carolina. August 19, 2020.

Monthly MSD Sewer Discharge Compliance Report – October 2020, Chemtronics CERCLA Site, Swannanoa, North Carolina. November 5, 2020.

Monthly MSD Sewer Discharge Compliance Report – December 2020, Chemtronics CERCLA Site, Swannanoa, North Carolina. January 6, 2020.

Monthly MSD Sewer Discharge Compliance Report – March 2021, Chemtronics CERCLA Site, Swannanoa, North Carolina. April 8, 2021.

Monthly MSD Sewer Discharge Compliance Report – May 2021, Chemtronics CERCLA Site, Swannanoa, North Carolina. June 9, 2021.

Monthly MSD Sewer Discharge Compliance Report – August 2021, Chemtronics CERCLA Site, Swannanoa, North Carolina. September 9, 2021.

Monthly MSD Sewer Discharge Compliance Report – September 2021, Chemtronics CERCLA Site, Swannanoa, North Carolina. October 10, 2021.

Monthly MSD Sewer Discharge Compliance Report – October 2021, Chemtronics CERCLA Site, Swannanoa, North Carolina. November 5, 2021.

Quarterly Status Report for January through March 2018, Chemtronics CERCLA Site. Anchor QEA. April 10, 2018.

Quarterly Status Report for April through June 2018, Chemtronics CERCLA Site. Anchor QEA. July 10, 2018.

Quarterly Status Report for July through September 2018, Chemtronics CERCLA Site. Anchor QEA. October 10, 2018.

Quarterly Status Report for October through December 2018, Chemtronics CERCLA Site. Anchor QEA. January 8, 2019.

Quarterly Status Report for January through March 2019, Chemtronics CERCLA Site. Anchor QEA. April 10, 2019.

Quarterly Status Report for April through June 2019, Chemtronics CERCLA Site. Anchor QEA. July 10, 2019.

Quarterly Status Report for July through September 2019, Chemtronics CERCLA Site. Anchor QEA. October 10, 2019.

Quarterly Status Report for October through December 2019, Chemtronics CERCLA Site. Anchor QEA. January 10, 2020.

Quarterly Status Report for January through March 2020, Chemtronics CERCLA Site. Anchor QEA. April 10, 2020.

Quarterly Status Report for April through June 2020, Chemtronics CERCLA site. Anchor QEA. July 10, 2020.

Quarterly Status Report for July through September 2020, Chemtronics CERCLA Site. Anchor QEA. October 10, 2020.

Quarterly Status Report for October through December 2020, Chemtronics CERCLA Site. Anchor QEA. January 10, 2021.

Quarterly Status Report for January through March 2021, Chemtronics CERCLA Site. Anchor QEA. April 9, 2021.

Quarterly Status Report for April through June 2021, Chemtronics CERCLA Site. Anchor QEA. July 6, 2021.

Quarterly Status Report for July through September 2021, Chemtronics CERCLA Site. Anchor QEA. April 9, 2021.

Record of Decision Amendment, Chemtronics Superfund Site, Swannanoa, Buncombe County, North Carolina. U.S. Environmental Protection Agency. September 29, 2016.

Spring 2018 – Groundwater and Surface Water Assessment Monitoring Summary, Chemtronics CERCLA Site. Anchor QEA. July 12, 2018.

Spring 2019 Groundwater Assessment Monitoring Summary. Chemtronics CERCLA Site. Anchor QEA. September 18, 2019.

Spring 2020 – Groundwater Performance Monitoring, Chemtronics CERCLA Site. Anchor QEA. April 30, 2020.

Spring 2020 – Groundwater Assessment Monitoring Summary, Chemtronics CERCLA Site. Anchor QEA. September 14, 2020.

Spring 2021 Groundwater/Surface Water Performance Monitoring Summary, Chemtronics CERCLA Site. Anchor QEA. April 16, 2021.

Summary of Voluntary Off-Site Domestic Well Investigation and Monitoring, Chemtronics CERCLA Site. Anchor QEA. January 10, 2022.

Superfund Record of Decision: Chemtronics, NC. United States Environmental Protection Agency. April 5, 1988.

Supererfund Record of Decision Amendment: Chemtronics, NC. United States Environmental Protection Agency. April 26, 1989.

Third Five-Year Review Report, Chemtronics Superfund Site, Swannanoa, Buncombe County, North Carolina. U.S. Environmental Protection Agency. September 26, 2012.

APPENDIX C – CURRENT SITE STATUS

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

Are Necessary Institutional Controls in Place?
☐ All ☒ Some ☐ None

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

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

APPENDIX D – SITE CHRONOLOGY

Table D-1: Site Chronology

Event	Date
Industrial operations began at the Site	1952
State ordered Chemtronics to stop discharges to all disposal trenches	1980
The EPA finalized the Site's listing on the NPL	September 8, 1983
U.S. Army's Toxic and Hazardous Materials Agency collected samples from two drums exposed at surface of DA 10/11	1984
PRPs began the Site's RI/FS	January 2, 1985
PRPs Chemtronics and Northrop Grumman Systems Corporation entered AOC to perform Site's RI/FS	October 21, 1985
PRPs completed Site's RI/FS The EPA signed Site's ROD	April 5, 1988
The EPA issued a Unilateral Administrative Order to the PRPs, Chemtronics, Northrop Grumman Systems Corporation and CNA Holdings, Inc., to perform the remedial action	March 22, 1989
PRPs began the Site's remedial design	March 23, 1989
The EPA signed the ROD Amendment	April 26, 1989
PRPs completed the Site's remedial design and began the remedial action	June 10, 1991
PRPs completed the Site's remedial action The EPA issued the Site's Preliminary Close-Out Report	March 25, 1993
PRP contractor RUST Environmental finalized the Site's O&M Manual	December 1997
The EPA completed the Site's first FYR Report	September 27, 2002
PRPs completed the Holistic Site Management Plan to provide direction regarding future investigation and remediation efforts	January 2003
North Carolina Division of Natural Resources Hazardous Waste Section requested that the EPA consolidate oversight of all environmental remediation activities under CERCLA authority	March 9, 2007
The EPA completed the Site's second FYR Report	September 27, 2007
PRPs Chemtronics, Northrop Grumman Systems Corporation and CNA Holdings, Inc. entered AOC to perform the sitewide RI/FS and started the sitewide RI/FS	October 25, 2008
PRPs completed Building Demolition and Waste Removal Report documenting non-CERCLA building demolition and waste removal performed between 2004 and 2006	2009
The EPA completed the Site's third FYR Report	September 26, 2012
PRPs voluntarily upgraded public water supply line serving Old Bee Tree Road and connected one residence	2014
PRPs shut down FV and BV groundwater extraction and treatment systems to allow for collection of data under non-pumping conditions	September 25, 2014
PRPs completed the sitewide RI	December 21, 2015
PRPs voluntarily connected three residences along Lauren Ridge Way to the public water supply line	2016
PRPs completed sitewide FS, including implementation of pilot tests at B104, B105, B139, B147, B149 and DA-23/B116, and downgradient of DA-9 and the APA	July 11, 2016
The EPA approved the Site's FS Report	July 25, 2016
The EPA signed the Site's ROD Amendment	September 29, 2016
The EPA signed the Site's fourth FYR Report	September 28, 2017
PRPs established a conservation easement on 526 acres surrounding the Site	2018
The Department of Justice filed the Consent Decree to the district court for the Western District of North Carolina.	September 2020
The EPA approved a request from Anchor QEA to remove the CERCLA compliance groundwater sampling requirement	October 23, 2020
PRPs completed voluntary off-site domestic well investigation and monitoring	January 10, 2022
The Consent Decree was entered and became effective.	April 14, 2022

APPENDIX E – SITEWIDE COCs

Table E-1: Cleanup Levels for COCs in Soil

TABLE 14 CLEANUP LEVELS FOR CHEMICALS OF CONCERN IN SOIL					
Chemicals of Concern (COCs) Associated with Soil at Area B109-B137, Chemtronics Superfund Site, Swannanoa, NC					
Chemical Group	**Chemical**	**Cleanup Level (µg/kg)**	**Source of Cleanup Level**	**Associated Routine Worker Vapor Intrusion Risk at this Level**	**Associated Routine Worker Vapor Intrusion HQ at this Level**
Volatile Organic Compounds	Naphthalene	7,600	Max detect; HI for respiratory system	1.9×10^{-5}	0.52
	1,2,4-Trimethyl-benzene	12,000	HI for blood	N/A	0.57
	1,3,5-Trimethyl-benzene	8,300	HI for blood	N/A	0.37
	Xylenes (total)	7,600	Max detect; HI for nervous system	N/A	0.29
Chemicals of Concern (COCs) Associated with Soil at Area B116, Chemtronics Superfund Site, Swannanoa, NC					
Volatile Organic Compounds	Benzene	6,300	Max detect; HI for immune system	3.6×10^{-5}	0.43
	Cyclohexane	1,300,000	HI for developmental effects	NA*	0.45
	1,2-Dichloroethane	1,500	HI for nervous system	3.0×10^{-5}	0.45
	Methylene chloride	4,800	Max detect	3.5×10^{-8}	0.016
	1,1,2-Trichloroethane	2,900	Max detect	3.4×10^{-5}	NA*
	Vinyl chloride	4,000	Max detect; HI for liver	1.3×10^{-5}	0.082

Key
N/A – COC is not a carcinogen
NA* – COC has no inhalation toxicity value of the relevant (cancer or noncancer) type.
Cleanup levels include the segregation of HQs by target organ/effect. The cleanup level is defined so that the total HI for a given target organ (including the HQ for all COCs with that target organ and the combined HQ of all non-COC chemicals) is no greater than 1.

Source: Table 14 of the 2016 ROD Amendment, PDF pg. 152.

Table E-2: Cleanup Levels for COCs in Groundwater

TABLE 15 CLEANUP LEVELS FOR CHEMICALS OF CONCERN IN GROUNDWATER

Chemical Group	Chemical	NC 2L	Health-Based Limit	Cleanup Level	Source of Cleanup Level
Volatile Organic Compounds	Acetone	6,000 µg/L	--	6,000 µg/L	NC 2L
	Benzene	1 µg/L	--	1 µg/L	NC 2L
	Bromoform (THM –Trihalomethane)	4 µg/L	--	4 µg/L	NC 2L
	Chloroform (THM)	70 µg/L	--	70 µg/L	NC 2L
	Carbon Tetrachloride	0.3 µg/L		0.3 µg/L	NC 2L
	Dibromochloromethane (THM) #	0.4 µg/L	--	0.4 µg/L	NC 2L
	1,2-Dichloroethane	0.4 µg/L	--	0.4 µg/L	NC 2L
	cis-1,2-Dichloroethene	70 µg/L	--	70 µg/L	NC 2L
	1,2-Dichloropropane	0.6 µg/L	--	0.6 µg/L	NC 2L
	Methyl acetate #	--	7,000 µg/L	7,000 µg/L	HB-NC
	Methyl-tert-butyl ether	20 µg/L	--	20 µg/L	NC 2L
	Methylene chloride	5 µg/L	--	5 µg/L	NC 2L
	t-Butyl alcohol	10 µg/L *	--	10 µg/L *	NC 2L (IMAC)
	Tetrachloroethylene	0.7 µg/L	--	0.7 µg/L	NC 2L
	Tetrahydrofuran	--	6000 µg/L	6,000 µg/L	HB-NC
	1,1,2-Trichloroethane	0.6 µg/L *	--	0.6 µg/L *	NC 2L (IMAC)
	Trichloroethylene	3 µg/L	--	3 µg/L	NC 2L
	Vinyl chloride	0.03 µg/L	--	0.03 µg/L	NC 2L
	2,4-Dinitrophenol	--	10 µg/L	10 µg/L	HB-NC
	1,2-Diphenylhydrazine #	--	0.04 µg/L	0.04 µg/L	HB-C
	Benzophenone #	--	30 µg/L	30 µg/L	HB-NC
	N-nitrosodimethylamine	0.0007 µg/L	--	0.0007 µg/L	NC 2L
	BZ (3-Quinuclidinyl benzilate)	--	0.8 µg/L	0.8 µg/L	HB-NC
PCB	PCBs (total) #	0.09 µg/L *	--	0.09 µg/L *	NC 2L (IMAC)
Nonhalogenated Organics	1,2-Diaminoethane	--	600 µg/L	600 µg/L	HB-NC
	Methanol	4,000 µg/L	--	4,000 µg/L	NC 2L
Nitroaromatics	2-Amino-4,6-dinitrotoluene	--	0.05 µg/L	0.05 µg/L	HB-C
	4-Amino-2,6-dinitrotoluene	---	0.05 µg/L	0.05 µg/L	HB-C
	1,3-Dinitrobenzene	--	0.7 µg/L	0.7 µg/L	HB-NC
	2,4-Dinitrotoluene	0.1 µg/L		0.1 µg/L	NC 2L (IMAC)
	2,6-Dinitrotoluene	--	0.1 µg/L	0.1 µg/L	HB-C
	RDX	--	0.3 µg/L	0.3 µg/L	HB-C
	3-Nitrotoluene	--	7 µg/L	7 µg/L	HB-NC
	2-Nitrotoluene	--	0.2 µg/L	0.2 µg/L	HB-C
	4-Nitrotoluene #	--	2 µg/L	2 µg/L	HB-C
	PETN	--	10 µg/L	10 µg/L	HB-NC
	Nitroglycerin	--	0.7 µg/L	0.7 µg/L	HB-NC
	2,4,6-Trinitrotoluene	--	1 µg/L	1 µg/L	HB-C
	Perchlorate	2 µg/L *		2 µg/L *	NC 2L (IMAC)

TABLE 15 CLEANUP LEVELS FOR CHEMICALS OF CONCERN IN GROUNDWATER

Notes:

Where available for a compound, the promulgated NC 2L standards are, in all instances, equal to or lower (i.e., more protective) than MCLs.

Health-based limits are provided if promulgated NC 2L standards are not available. Health-based limits were calculated during the baseline risk assessment. Health-based limits have been rounded to one significant figure to represent the level of precision.

Cleanup levels are based upon the North Carolina health-based NC 2L standards or health-based (HB) limits calculated using the formulas specified under the NC 2L regulations at 15 NCAC 02L.0202(d)(I) and (2) for those COCs without a NC 2L standard. Note that the COCs for which a NC 2L standard is not available also do not have Federal MCLs.

HB-C: Health-based limit that is based on a target cancer risk of 1×10^{-6}.

HB-NC: Health-based limit that is based on non-cancer effects at a target hazard quotient of 1.

* Value is an Interim Maximum Allowable Concentration (IMAC) established under 15A NCAC 02L .0202.

\# A COC only under the residential potable groudwater exposure scenario. COC may be removed from list once institutional controls are in place limiting groundwater exposure to industrial workers

Source: Table 15 of the 2016 ROD Amendment, PDF pg. 153.

APPENDIX F - INSTITUTIONAL CONTROLS

Figure F-1: Excerpt from 2022 Consent Decree

b. **Land, Water, or Other Resource Use Restrictions.** Other than activities in the approved SOW or O&M Plan, the following is a list of land, water, or other resource use activities that shall not occur at the Affected Property unless, prior to any such activity, they have been approved by EPA:

(1) Activities that could interfere with the RA;

(2) Use of contaminated groundwater;

(3) Activities that could result in exposure to contaminants that are in subsurface soils and groundwater; and

12

Case 1:20-cv-00272-MR Document 20 Filed 04/14/22 Page 14 of 47

(4) Construction of any new structures on the Site in a manner that could interfere with the RA.

Further, any new structures on the Site shall be constructed in a manner that will minimize potential risk of inhalation of contaminants.

Source: Section VIII. part b. of the 2022 Consent Decree.

Figure F-2: Excerpt from Draft DPLUR Language

PERPETUAL LAND USE RESTRICTIONS

Chemtronics, on behalf of itself, its heirs, successors, successors-in-title, and assigns, does hereby covenant and declare as follows. The Site shall be held, sold and conveyed subject to the covenants, conditions, and perpetual land use restrictions set forth below, which shall run with the land, and does give, grant, and convey to DEQ the right to enforce said use restrictions. The following covenants, conditions, and restrictions shall apply to the Site:

1. The Site shall be used only for commercial or industrial purposes but shall not be used for or contain child care facilities, schools, parks, recreational areas or athletic fields. The Site shall not be used for residential purposes, including but not limited to apartments, mixed use developments, condominiums, townhomes, single living homes, senior care homes, or hotels.

2. Groundwater underlying the Site shall not be used for any purpose other than investigation, remediation and monitoring of groundwater quality without prior written approval, not to be unreasonably withheld, by both DEQ and EPA. Groundwater wells or other devices for access to groundwater shall not be installed for any purpose at the Site other than the investigation, remediation, and monitoring of groundwater quality, without the prior written approval, not to be unreasonably withheld, of both DEQ and EPA.

3. No use or activity shall occur at the Site which will disturb or alter the remedial measures and engineering controls selected by EPA in ROD Amendment No. 2 or implemented at the Site, except upon the prior written permission of both DEQ and EPA. These remedial measures and engineering controls include, but are not

limited, to all engineered caps, waste containment cells, synthetic liners, soil and vegetative covers, solidified and stabilized waste materials, gas collection and ventilation systems, groundwater monitoring, treatment, remediation and extraction systems and wells, biological remediation systems, building slabs, soil excavation areas and remedies, signage, security fencing, and any other active or passive remedial systems implemented at the Site.

4. The multi-layer engineered caps (including synthetic liners) and other engineering controls at the areas of the Site referred to as Disposal Area #6, Disposal Area #7/8, Disposal Area# 9, Disposal Area # 10/11, Disposal Area #23 and the Acid Pit Area shall be maintained. They shall not be damaged, removed or disturbed in any way without written approval of both the EPA and the Superfund Section. Routine maintenance of the caps and engineering controls may be conducted without the EPA's or the Superfund Section's prior approval; provided that if such maintenance exposes contaminants of concern in the soil underlying the caps and engineering controls, the EPA and the Superfund Section shall be advised in writing how the exposure came about and how the exposure was eliminated. Planting of trees or other vegetation with deep root structures that could compromise the integrity of the caps and engineering controls is prohibited at the Site.

5. DEQ, EPA, Settling Defendants, and any affected contractors shall be notified prior to any facility improvements or other construction activities that could disturb the remedial measures. No action may be taken to implement any improvement or other such construction activity within the Site without prior written approval from both DEQ and EPA.

6. There shall be no digging, material disturbance, excavation or removal of any surface or subsurface native or fill earthen materials within the Site, including but not limited to, landscaping and surface regrading (with the exception of maintaining roads and the remedial measures and engineering controls selected by EPA in ROD Amendment No. 2., including caps, well pads, and any other remedial measures), without the prior written permission of both DEQ and EPA. Appropriate precautions shall be undertaken to ensure that all caps, engineering controls and other remedial measures within the Site are adequately maintained.

7. No person conducting environmental assessment or remediation at the Site, or involved in determining compliance with applicable land use restrictions, at the direction of DEQ or EPA, may be denied access to the Site for the purpose of conducting such activities. These activities include, but are not limited to:

a. Monitoring or implementing the Work required by the Consent Decree;

b. Verifying any data or information submitted to DEQ and EPA;

c. Conducting investigations relating to contamination at or near the Site;

d. Obtaining samples;

e. Conducting operation and maintenance of the remedial action, and assessing the need for, planning or implementing additional response actions at or near the Site;

f. Inspecting and copying records, operating logs, contracts, or other documents maintained or generated by the Settling Defendants or their agents;

g. Conducting periodic reviews of response actions at the Site required by applicable statutes and/or regulations, including but not limited to the five-year review requirements arising under CERCLA Section 121(c), and 40 CFR Part 300.430(f)(4);

h. Verifying that activities and conditions at the Site remain in compliance with the land use restrictions herein; and

i. Assessing the Settling Defendants' compliance with the Consent Decree.

8. The owner of any portion of the Site shall cause the instrument of any sale, lease, grant, or other transfer of any interest in such property to include a provision expressly requiring the lessee, grantee, or transferee to comply with this Declaration. The failure to include such provision shall not affect the validity or applicability of any land use restriction in this Declaration.

9. Each person who owns any portion of the Site shall submit a letter report, containing the notarized signature of the owner, in January of each year on or before January 31st, to the EPA and the Superfund Section, confirming the following:

    a. This Declaration is still recorded in the Office of the Buncombe County Register of Deeds.

    b. Activities and conditions at the Site remain in compliance with the land use restrictions herein.

    c. Whether any portion of the Site has been sold, leased, conveyed, or transferred since the last letter report submitted to the EPA and the Superfund Section.

Source: Appendix E of the 2022 Consent Decree.

Figure F-3: Example Off-Site Declaration of Land Use Restrictions

Doc ID: 027658830006 Type: CRP
Recorded: 12/01/2014 at 03:43:12 PM
Fee Amt: $26.00 Page 1 of 6
Workflow# 0000247218-0001
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 5265 PG 935-940

Prepared by and return to: Rebecca J. Reinhardt of Roberts & Stevens, P.A., Post Office Box 7647, Asheville, NC 28802 (Box 39)

STATE OF NORTH CAROLINA **DECLARATION OF RESTRICTIVE COVENANTS**

COUNTY OF BUNCOMBE

THIS DECLARATION OF RESTRICTIVE COVENANTS (hereinafter referred to as the "Declaration"), made this 12th day of September, 2013, by and between [redacted] (hereinafter referred to as "Owner") and CHEMTRONICS, INC., CNA HOLDINGS LLC, and NORTHROP GRUMMAN SYSTEMS CORPORATION (hereinafter referred to as "Performing Parties"). The Owner and Performing Parties may collectively be referred to as the "Parties" or individually as a "Party".

WITNESSETH:

WHEREAS, Owner is the Owner of that property described in a deed recorded in Book 4863 at Page 1505, Buncombe County Registry, with Buncombe County Tax Identification Number 9679-96-2708-00000 (the "Property"); and,

WHEREAS, Performing Parties are managing environmental response actions at that property described in a deed recorded in Book 1206 at Page 121, Buncombe County Registry, with Buncombe County Tax Identification Number 9780-04-5253-00000 which is in close proximity to the Property; and,

WHEREAS, Performing Parties have requested the Owner restricts the Property to prohibit the use of groundwater located thereon, and the Owner has agreed as set forth herein.

NOW, THEREFORE, the Owner hereby declares that the Property shall be held, conveyed, encumbered, leased, rented, used, occupied and improved subject to the following restrictive covenant:

1. **Restriction on Groundwater**. The Owner shall not use, extract, or otherwise access any groundwater located on the Property for any purpose. The Property is served by a water supply line running along Old Bee Tree Road, and therefore wells are not required or

permitted on the Property. Any existing wells shall be closed and prohibited from any further usage.

2. **Binding**. This restrictive covenant is to be a covenant and restriction running with the Property and shall be binding upon the Owner, their heirs, assigns, and successors in interest, and all parties, firms and corporations, claiming by, through or under them or otherwise acquiring any right, title or interest in and to the Property or any part or parts thereof.

3. **Waiver**. No provision contained in this Agreement shall be deemed to have been waived, abandoned, or abrogated by reason of failure to enforce them on the part of any person as to the same or similar future violations, no matter how often the failure to enforce is repeated.

4. **Amendment**. This Declaration may be modified or amended by a properly recorded and executed instrument signed by all the Parties hereto.

5. **Enforcement**. If any Owner shall violate, or attempt to violate, any provision contained herein, it shall be lawful for any Performing Party to prosecute any proceeding at law or in equity against the person or persons violating or attempting to violate any such provision, and to either enjoin such breach and/or to recover damages for such violation, including all costs, expenses, and reasonable attorney's fees incurred in prosecuting said action.

6. **Severability**. Invalidation of any provision contained herein by judgment or Court order shall in no way affect any of the other provisions which shall remain in full force and effect.

[signatures appear on following pages]

IN WITNESS WHEREOF, the undersigned have executed this instrument as of the day and year first above written.

OWNER:

[redacted] (SEAL)

_____ (SEAL)

* *

STATE OF North Carolina
COUNTY OF Buncombe

I, Sue V. Brewer, a Notary Public of the County and State aforesaid, certify that [redacted] personally appeared before me this day and acknowledged the execution of the foregoing instrument.

WITNESS my hand and official stamp or seal this 12th day of September.

SUE V. BREWER NOTARY PUBLIC McDOWELL COUNTY, NC (SEAL)

Sue V. Brewer
NOTARY PUBLIC

My Commission Expires:

Nov. 19, 2014

4

CHEMTRONICS, INC.

By: Myrtle Jones

Print Name: Myrtle Jones

Title: Sr. Vice President-Tax

****

STATE OF Texas
COUNTY OF Harris

I, Sharon Streiffert, a Notary Public of the County and State aforesaid, certify that myrtle Jones, who is the Sr Vice President-Tax of **Chemtronics, Inc., a North Carolina corporation**, personally appeared before me this day and acknowledged the execution of the foregoing instrument on behalf of the company.

WITNESS my hand and official stamp or seal this 25th day of November, 2013.

[SEAL]

SHARON STREIFFERT
Notary Public, State of Texas
My Commission Expires
October 05, 2016

NOTARY PUBLIC

My Commission Expires:

10-05-2016

CNA HOLDINGS LLC

By: Gary M Rowen

Print Name: GARY M ROWEN

Title: Assistant Secretary

****

STATE OF Texas
COUNTY OF Dallas

I, Kathleen C. Talley, a Notary Public of the County and State aforesaid, certify that Gary M. Rowen, who is the Assistant Secretary of CNA Holdings LLC, personally appeared before me this day and acknowledged the execution of the foregoing instrument on behalf of the company.

WITNESS my hand and official stamp or seal this 10 day of October, 2013.

[SEAL] KATHLEEN C. TALLEY MY COMMISSION EXPIRES May 30, 2014

Kathleen C Talley
NOTARY PUBLIC

My Commission Expires:

05-30-14

6

NORTHROP GRUMMAN SYSTEMS CORPORATION

By: [signature]

Print Name: Tiffany T. McConnell

Title: Assistant Secretary

* *

Commonwealth
~~STATE~~ OF Virginia
COUNTY OF Fairfax

I, Chanel Maelia Bradden, a Notary Public of the County and State aforesaid, certify that Tiffany T. McConnell, who is the Assistant Secretary of Northrop Grumman Systems Corporation, personally appeared before me this day and acknowledged the execution of the foregoing instrument on behalf of the company.

WITNESS my hand and official stamp or seal this 18th day of December, 2013.

[SEAL]

[signature]
NOTARY PUBLIC

My Commission Expires:

March 31, 2017

CHANEL MAELIA BRADDEN
NOTARY PUBLIC
REGISTRATION # 7568434
COMMONWEALTH OF VIRGINIA
MY COMMISSION EXPIRES
MARCH 31, 2017

CHANEL MAELIA BRADDEN NOTARY PUBLIC REGISTRATION # 7568434 COMMONWEALTH OF VIRGINIA MY COMMISSION EXPIRES 03-31-2017

APPENDIX G – PRESS NOTICE

The U.S. Environmental Protection Agency, Region 4 Announces the Fifth Five-Year Review for the Chemtronics, Inc. Superfund Site, Swannanoa, Buncombe County, North Carolina

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

Site Background: The 535-acre area is located in a rural area about 8 miles east of Asheville. From 1952 to 1994, several companies made explosives, incapacitating agents and chemical intermediates at the Site. Waste disposal practices contaminated soil and groundwater with volatile organic compounds, semi-volatile organic compounds and metals. Contamination affects two separate areas, known as the Front Valley and Back Valley. EPA added the Site to the Superfund program's National Priorities List (NPL) in 1983.

Cleanup Actions: EPA selected the Site's long-term remedy to address soil and groundwater contamination in the Site's 1988 Record of Decision (ROD). It included installation of a groundwater treatment system below the disposal areas in the Front Valley and the Back Valley, and capping and stabilization of contaminated soil in the disposal areas. It also included fencing of capped areas and monitoring to make sure site contaminants do not affect surface water. EPA updated the remedy with ROD Amendments in 1989 and 2016. The 1989 ROD Amendment removed the requirement for soil solidification in one of the disposal areas. It also selected installation of a multi-later cap over the disposal area, with the installation of a gas collection system, if necessary. The 2016 ROD Amendment included enhancement of in-place bioremediation with long-term monitoring and monitored natural attenuation, excavation and off-site disposal of contaminated soil from the Front Valley, institutional controls, and remedy performance monitoring and evaluation. The 2016 ROD Amendment also removed the requirement for groundwater extraction and treatment and eliminated the groundwater contingency plan outlined in the 1988 ROD.

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 fifth of the Five-Year Reviews for the Site will be completed by September 2022. When the Five-Year Review is completed, it will be available online at: www.epa.gov/superfund/search-superfund-five-year-reviews.

The 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:

Craig Zeller, EPA Remedial Project Manager
Phone: (404) 273-7072
Email: zeller.craig@epa.gov

Angela Miller, EPA Community Involvement Coordinator
Phone: (678) 575-8132
Email: miller.angela@epa.gov

Mailing Address: U.S. EPA Region 4, 61 Forsyth Street, S.W., 11th Floor, Atlanta, GA 30303-8960.
More information is available at the Site's local document repository, Warren Wilson College Library, located at 701 Warren Wilson Road in Swannanoa, North Carolina 28778, and online at www.epa.gov/superfund/chemtronics.

AN-GCI0802622-01

APPENDIX H – INTERVIEW FORMS

CHEMTRONICS, INC. SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Chemtronics, Inc.	
EPA ID: NCD095459392	
Interviewer name: Melissa Oakley	**Interviewer affiliation:** Skeo
Subject name: Beth Hartzell	**Subject affiliation:** NCDEQ
Subject contact information:	
Interview date: January 31st, 2022	**Interview time:** N/A (by email)
Interview location: N/A (by email)	
Interview format (circle one): In Person Phone Mail (Email) Other:	
Interview category: State Agency	

1. What is your overall impression of the project, including cleanup, maintenance and reuse activities (as appropriate)?
   The project has been on hold pending approval of the consent decree. The PRPs have been voluntarily continuing pilot programs at the site that have kept the site safe.

2. What is your assessment of the current performance of the remedy in place at the Site?
   The remedy is on hold pending approval of the consent decree. The pump and treat system required by the previous remedy has been shut down. The PRPs continue remediation at the site via pilot programs that they are running voluntarily.

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?
   Institutional controls will be implemented at the site upon approval of the consent decree.

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.

9. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?
   Yes.

CHEMTRONICS, INC. SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Chemtronics, Inc.	
EPA ID: NCD095459392	
Interviewer name: Melissa Oakley	**Interviewer affiliation:** Skeo
Subject name: Jim McGinty	**Subject affiliation:** PM Chemtronics, Inc.
Subject contact information: jim.mcginty@halliburton.com | (281) 221-4809	
Interview date: February 1, 2022	**Interview time:** N/A (by email)
Interview location: Houston, Texas	
Interview format (circle one): In Person Phone Mail (Email) Other:	
Interview category: Potentially Responsible Party (PRP)	

1. What is your overall impression of the remedial activities at the Site?
   A: My impression is that the remedial activities have been successful in preventing contact in source areas and limiting the plume to the site boundaries.

2. What have been the effects of this Site on the surrounding community, if any?
   A: I am aware of no negative effects that the site has had on the community. In contrast, the site has been a helpful neighbor during the recent flood when the bridge across the creek was washed out. In addition, the creation of the 500+ acre conservation easement has been a great benefit to the community.

3. What is your assessment of the current performance of the remedy in place at the Site?
   A: The current remedy had performed well for the known source areas. The new site-wide Record of Decision will transition to a new remedy for site groundwater.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?
   A: I am aware of no complaints or inquiries from residents.

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?
   A: I feel very well informed on the site activities and remedial progress and status.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   A: I have no comments.

7. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?
   A: I consent to having my name with my responses.

CHEMTRONICS, INC. SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Chemtronics, Inc.	
EPA ID: NCD095459392	
Interviewer name: Melissa Oakley	**Interviewer affiliation:** Skeo
Subject name: Eric H. Wiebe, P.G., C.E.G.	**Subject affiliation:** Technical representative for Northrop Grumman Systems Corporation (NGSC)
Subject contact information: eric.wiebe@equipoisecorp.com	
Interview date: February 1, 2022	**Interview time:** 3:01 p.m. (PST)
Interview location: N/A (by email)	
Interview format (circle one): In Person Phone Mail (Email) Other:	
Interview category: Potentially Responsible Party (PRP)	

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

   A: The capped and fenced waste disposal areas are meeting the expectations, and the enhanced insitu biodegradation (EISB) pilot studies have fully demonstrated applicability for the Chemtronics site (the Site).

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

   A: Based on all data collected to date, there has been no negative effect on the surrounding community, including the community outreach for approval to sample several offsite wells.

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

   A: The capped and fenced waste disposal areas are meeting the expectations, and the enhanced insitu biodegradation (EISB) pilot studies have fully demonstrated applicability for the Chemtronics site.

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

   A: No. I'm not aware of any complaints from residences regarding environmental issues or remedial actions at the Site. The Public has been briefed and is provided an opportunity to ask questions at the Public Meetings related to the Site.

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?

   A: Yes, I am very well informed regarding the Site's activities and remedial progress.

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

   A: No, I have no comments, suggestions, or recommendations regarding the management or operation of the Site's remedy as the I believe the PRP Group have a highly capable and motivated team of engineers and scientists working on the project.

7. Do you consent to have your name included along with your responses to this questionnairein the FYR report?

   A: Yes, I consent.

CHEMTRONICS, INC. SUPERFUND SITE FIVE-YEAR REVIEW INTERVIEW FORM	
Site Name: Chemtronics, Inc.	
EPA ID: NCD095459392	
Interviewer name: Melissa Oakley	**Interviewer affiliation:** Skeo
Subject name: Robert Cork	**Subject affiliation:** Anchor QEA of North Carolina, PLLC
Subject contact information: rcork@anchorqea.com	
Interview date: February 9, 2022	**Interview time:** written response
Interview location: written response	
Interview format (circle one): In Person Phone Mail (Email) Other:	
Interview category: O&M Contractor	

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

Elements of the Site remedy required by the 1988 Record of Decision (ROD) and its associated documents that are still in place (caps and fencing for the six Disposal Areas [DAs]) are well maintained and operating as designed. A comprehensive, voluntary groundwater and surface monitoring program continues to confirm protectiveness to public health and the environment. The Site is well maintained with (i) required maintenance and inspection of the DAs; (ii) inspection of Site monitoring wells at least annually with maintenance as required; (iii) appropriate levels of access provided to relevant portions of the Site; and (iv) Site security including signage and a security guard.

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

The DAs are functioning as intended. The comprehensive voluntary groundwater and surface water monitoring shows that the plumes are contained on Site and are not impacting surface water. Enhanced in situ bioremediation (EISB) and monitored naturalattenuation (MNA), which were demonstrated to be effective during the Remedial Investigation/Feasibility Study (RI/FS) pilot tests and desktop evaluations, will be implemented at the Site to supplement the current remedy once the Consent Decree becomes effective.

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 voluntary groundwater and surface water monitoring program is robust. For example, the latest monitoring event in fall 2021 included sampling of 75 monitoring wells and 12 surface water locations. Key trends in contaminant levels documented at theSite are:

- Groundwater
    - Monitoring of DAs for 23 years has confirmed that DA 6, DA 7/8, and DA 10/11 have not resulted in the need for remedial activities.
    - Ongoing Front Valley monitoring shows that the groundwater plume is stable or shrinking and has not advanced toward the property boundary.
    - Ongoing Back Valley monitoring and the hydrogeologic conceptual site model (HCSM) supports that impacted groundwater does not migrate off Site and the concentrations of many constituents are declining.
- Surface Water
    - Concentrations in Bee Tree Creek are less than the 2B standards with no historical exceedances detected off Site.
    - Concentrations of some constituents exceed 2B standards in tributaries to Bee Tree Creek within the Site boundary.

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 a frequent O&M presence on Site (usually weekly). The Site Project Coordinator, Robert Cork, routinely visits and inspects the Site (approximately every 2 weeks).

   Anchor QEA staff and subcontractors perform the following routine tasks on Site:
   - Mow and maintain DA caps including fencing, per the *1997 Operation and Maintenance Manual* (O&M Manual; Rust Environment and Infrastructure 1997).
   - Perform semiannual Site boundary and no-trespassing sign inspections.
   - Perform annual inspections of monitoring wells in addition to monitoring events, and maintain monitoring wells as required.
   - Maintain roads and monitoring well access.
   - Perform general Site maintenance including waste management and housekeeping activities.
   - Maintain the permitted Front Valley treatment system for intermittent treatment of groundwater from groundwater sampling, well construction and development, and pilot test activities.
   - Maintain a strong health and safety culture by keeping appropriate controls in place, performing periodic health and safety audits, hosting visitor and contractor orientations, and identifying and implementing continuous improvement opportunities.

   In addition to access to parts of the Site being restricted by fencing and a secured front and back gate, there is currently an on-Site security guard presence for at least 8 hours per day, 7 days per week.

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.

Since the *Fourth Five-Year Review Report* (U.S. Environmental Protection Agency [USEPA] 2017), USEPA approved the potentially responsible parties' (PRPs) request to remove the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) compliance groundwater sampling requirement from the O&M Manual. The issuance of the 2016 ROD Amendment No. 2 (USEPA 2016) eliminated the requirementfor pumping and treating groundwater in both valleys, and hence, the CERCLA samplingrequirement is no longer applicable. Additionally, in 2018, the 14 extraction wells that were a component of the former groundwater pump-and-treat systems were decommissioned, with four of these wells in the Back Valley converted to monitoring wells. These USEPA-approved changes do not affect the protectiveness or effectiveness of the remedy as confirmed by the comprehensive Site monitoring program.

In April 2018, the process for redefinition of the Site was completed with 526.1 acres of the Chemtronics property being deeded to the Southern Appalachian Highlands Conservancy to be held as a perpetual conservation easement. This resulted in the Chemtronics Site being redefined to 541.9 acres total.

EISB pilot testing, which has promoted contaminant mass treatment, and treatability studies have continued in five areas of interest. Pilot test continuation is providing data tosupport the remedial design following the Consent Decree becoming effective. From 2017 through 2021, 28 monitoring wells (including four converted from former extraction wells) have been installed in the Back Valley.

In 2019 and 2020, the PRPs added a stormwater control structure to the cap on the southend of the Acid Pits Area (APA) disposal area. The structure, in addition to modified stormwater control to the north and west of the APA, provided diversion of stormwater into adjacent surface water tributaries to reduce potential infiltration downgradient of the APA.

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.

Since the *Fourth Five-Year Review Report*, the PRPs have replaced two road culverts to maintain access to the Site's Back Valley.

The continued response to the COVID-19 pandemic, including the implementation of social distancing and enhanced hygiene and cleaning activities, has resulted in some minor changes to the sequence and approach for O&M activities. These changes have nothad a material change in O&M effectiveness or costs.

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.

With USEPA approval in 2019, the groundwater sampling method was modified to useno-purge HydraSleeve samplers for many locations and have been shown to provide analytical data consistent to that collected by purge techniques. Use of HydraSleeve samplers has reduced sample collection time, waste generation, and expenses related tolabor and consumables.

The PRPs have conducted pollinator pilot tests that replaced mown grass with pollinator-friendly species of vegetation in localized areas of the Site. The goal is to enhance ecological benefits while investigating options to reduce O&M costs related tomowing.

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

No

9. Do you consent to have your name included along with your responses to this questionnairein the FYR report?

Yes

APPENDIX I – SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Chemtronics, Inc.	**Date of Inspection:** 01/11/2022
Location and Region: Swannanoa, North Carolina, 4	**EPA ID:** NCD095459392
Agency, Office or Company Leading the Five-Year Review: EPA	**Weather/Temperature:** Sunny/46 degrees

Remedy Includes: (check all that apply)

- ☒ Landfill cover/containment
- ☒ Access controls
- ☒ Institutional controls
- ☐ Groundwater pump and treatment
- ☐ Surface water collection and treatment
- ☒ Monitored natural attenuation
- ☐ Groundwater containment
- ☐ Vertical barrier walls
- ☒ Other: The original groundwater remedy, as established by the Site's 1988 ROD, included the extraction and treatment of contaminated groundwater and the capping of six former disposal areas. The revised remedy, as established by the Site's 2016 ROD Amendment, includes enhanced in-situ bioremediation, long-term monitoring and MNA to address groundwater contamination at specific site areas; excavation and off-site disposal of contaminated soil at two FV locations; and institutional controls to restrict site land uses to commercial/industrial uses only and to prohibit the use of site groundwater.

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager** — Robert Cork (Name) — Project Manager with Anchor QEA of North Carolina, PLLC (Title) — 2/9/2022 (Date)
   Interviewed ☐ at site ☐ at office ☒ by email Phone: _____
   Problems, suggestions ☒ Report attached: Interview question responses can be found in Appendix H and summarized in Section IV.

2. **O&M Staff** — _____ (Name) — _____ (Title) — _____ (Date)
   Interviewed ☐ at site ☐ at office ☐ by email 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 NCDEQ
   Contact Beth Hartzell (Name) — Project Manager (Title) — 1/31/2022 (Date) — 919.707.8335 (Phone)
   Problems/suggestions ☒ Report attached: Interview question responses can be found in Appendix H and summarized in Section IV.

   Agency _____
   Contact _____ (Name) — _____ (Title) — _____ (Date) — _____ (Phone)
   Problems/suggestions ☐ Report attached: _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone
Problems/suggestions ☐ Report attached: _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone
Problems/suggestions ☐ Report attached: _____

Agency _____
Contact _____ _____ _____ _____
Name Title Date Phone
Problems/suggestions ☐ Report attached: _____

4. **Other Interviews** (optional) ☒ Report attached: Interview question responses can be found in Appendix H and summarized in Section IV.

Eric H. Wiebe, P.G., C.E.G. – Technical representative for Northrop Grumman Systems Corporation

Jim McGinty – Project Manager, Chemtronics Inc., (PRP)

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: PRP contractor maintains hard copies of the Site's O&M Plan and site-related maintenance logs and inspection forms on site in the FV maintenance shed. As-built drawings can be found in remedial design documents.

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: PRP contractor maintains hard copies of the Site's site-specific health and safety plans and emergency response plan on site in the FV maintenance shed.

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

Remarks: PRP contractor maintains hard copies of O&M and OSHA training records and certifications on site in the FV maintenance shed.

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: The Site discharges any treated water from the FV groundwater treatment system to the MSD under an active MSD permit (#G-006-13).

5. **Gas Generation Records** ☐ Readily available ☐ Up to date ☒ N/A

Remarks: _____

6. **Settlement Monument Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: PRP contractor performs cap settlement surveys every five years. The last survey took place in 2022. No evidence of excessive settlement was observed. The next settlement survey is scheduled to take place in 2027.

7. **Groundwater Monitoring Records** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: Since the shutdown of the Site's groundwater extraction in 2014, groundwater and surface water has been monitored semi-annually. Monitoring also includes active sampling of EISB pilot-test study areas. Until 2020, the PRP contractor also performed CERCLA compliance monitoring defined in the 1997 O&M Manual, until discontinued with approval by the EPA. All monitoring records are readily available and are submitted to the EPA for review.

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: PRP contractor submits discharge compliance records to the MSD as required.

10. **Daily Access/Security Logs** ☒ Readily available ☒ Up to date ☐ N/A

Remarks: Daily access/security logs are maintained at the secuirty guard hut at the site entrance. All individuals who enter the Site are required to sign in at the guard gate.

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

☒ PRP contractor Anchor QEA of North Carolina PLLC performs all site-related O&M activities.

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

From: _____ To: _____ _____ ☐ Breakdown attached

Date Date Total cost

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

Describe costs and reasons: _____

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

A. Fencing

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

Remarks: All site fencing appears to be in good condition. Gates are secured with locks.

B. Other Access Restrictions

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

Remarks: The front gate and on-site access are monitored by a security guard stationed in a guard hut at the site entrance. The front gate is clearly posted with warning signage. The Site is manned by security personnel in 12-16 hour shifts. Security personnel perform routine site security inspections.

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): Not applicable

Frequency: _____

Responsible party/agency: The PRPs and NCDEQ are responsible for implementing institutional controls.

Contact _____ _____ _____ _____

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 ☒ See remarks below

Remarks: The 2016 ROD Amendment requires institutional controls to, at a minimum, limit land uses to commercial/industrial uses, restrict groundwater use and prevent the use of on-site groundwater for potable purposes. The 2022 Consent Decree meets most of the institutional control requirements established by the 2016 ROD Amendment by prohibiting the following: use of contaminated groundwater, activities that could result in exposure to contaminants that are in subsurface soil and groundwater, and activities that could interfere with the remedy, including the construction of any new structures without prior approval from the EPA. The 2015 HHRA identified unacceptable future risk to industrial workers and on-site residents via direct contact with vapors from subsurface soil and vapor intrusion. However, under current conditions, there are no complete vapor intrusion exposure pathways, and the 2022 Consent Decree provides consideration that any new structures on site shall be constructed in a manner that will minimize potential risk of inhalation of contaminants. Additional planned institutional controls, in the form of a North Carolina DPLUR, will be implemented under the 2022 Consent Decree. The draft DPLUR language prohibits residential land use, prohibits the use of groundwater and installation of groundwater wells for any non-remedial purpose, prohibits activities that could disturb the remedy, and

prohibits digging, material disturbance, excavation or removal of any surface or subsurface soil. The draft DPLUR language was also included in Appendix E of the 2022 Consent Decree. The PRPs will file and record the final DPLUR with Buncombe County according to the schedule outlined in the 2022 Consent Decree.

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: In 2018, a conservation easement was placed on portions of the Chemtronics property around the Site.The conservation easement permanently protects the land adjoining Pisgah National Forest.

VI. GENERAL SITE CONDITIONS

A. Roads ☒ Applicable ☐ N/A

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

   Remarks: Site roads seem adequate. They are inspected and maintained as part of routine site O&M activities.

B. Other Site Conditions

Remarks: _____

VII. LANDFILL COVERS ☒ Applicable ☐ N/A

A. Landfill Surface

1. **Settlement** (low spots) ☐ Location shown on site map ☒ Settlement not evident

   Area extent: _____ Depth: _____

   Remarks: Settlement was not observed on any of the six disposal area caps. PRP contractor performs cap settlement surveys every five years. The last survey took place in 2022. No evidence of excessive settlement was observed. The next settlement survey is scheduled to take place in 2027.

2. **Cracks** ☐ Location shown on site map ☒ Cracking not evident

   Lengths: _____ Widths: _____ Depths: _____

   Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

   Area extent: _____ Depth: _____

   Remarks: _____

4. **Holes** ☐ Location shown on site map ☒ Holes not evident

   Area extent: _____ Depth: _____

   Remarks: Site inspection participants observed several minor areas on DA-10/11 where wildlife has dug under the fence to access the capped area. These holes are filled and seeded, as needed, as part of O&M maintenance activities.

5. **Vegetative Cover** ☒ Grass ☒ Cover properly established

   ☒ No signs of stress ☐ Trees/shrubs (indicate size and locations on a diagram)

   Remarks: Site inspection participants observed several minor areas on DA-10/11 where wildlife has

	dug under the fence to access the capped area. These holes are filled and seeded, as needed, as part of O&M maintenance activities.		
6.	**Alternative Cover** (e.g., armored rock, concrete)		☒ N/A
	Remarks: _____		
7.	**Bulges**	☐ Location shown on site map	☒ Bulges not evident
	Area extent: _____		Height: _____
	Remarks: _____		
8.	**Wet Areas/Water Damage**	☒ Wet areas/water damage not evident	
	☐ Wet areas	☐ Location shown on site map	Area extent: _____
	☐ Ponding	☐ Location shown on site map	Area extent: _____
	☐ Seeps	☐ Location shown on site map	Area extent: _____
	☐ Soft subgrade	☐ Location shown on site map	Area extent: _____
	Remarks: _____		
9.	**Slope Instability**	☐ Slides	☐ Location shown on site map
	☒ No evidence of slope instability		
	Area extent: _____		
	Remarks: _____		
B. Benches		☐ Applicable ☒ N/A	
	(Horizontally constructed mounds of earth placed across a steep landfill side slope to interrupt the slope in order to slow down the velocity of surface runoff and intercept and convey the runoff to a lined channel.)		
1.	**Flows Bypass Bench**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
2.	**Bench Breached**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
3.	**Bench Overtopped**	☐ Location shown on site map	☐ N/A or okay
	Remarks: _____		
C. Letdown Channels		☐ Applicable ☒ N/A	
	(Channel lined with erosion control mats, riprap, grout bags or gabions that descend down the steep side slope of the cover and will allow the runoff water collected by the benches to move off of the landfill cover without creating erosion gullies.)		
1.	**Settlement** (Low spots)	☐ Location shown on site map	☐ No evidence of settlement
	Area extent: _____		Depth: _____
	Remarks: _____		
2.	**Material Degradation**	☐ Location shown on site map	☐ No evidence of degradation
	Material type:_____		Area extent: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ No evidence of erosion

Area extent: _____ Depth: _____

Remarks: _____

4. **Undercutting** ☐ Location shown on site map ☐ No evidence of undercutting

Area extent: _____ Depth: _____

Remarks: _____

5. **Obstructions** Type: _____ ☐ No obstructions

☐ Location shown on site map Area extent: _____

Size: _____

Remarks: _____

6. **Excessive Vegetative Growth** Type: _____

☐ No evidence of excessive growth

☐ Vegetation in channels does not obstruct flow

☐ Location shown on site map Area extent: _____

Remarks: _____

D. Cover Penetrations ☒ Applicable ☐ N/A

1. **Gas Vents** ☐ Active ☒ Passive

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

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

Remarks: There are passive gas vents in the APA cap. The vents have been sampled twice to determine if the disposal area beneath the cap emits gases. Gases have never been detected. The vents are no longer monitored.

2. **Gas Monitoring Probes**

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

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: _____

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

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

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: With the exception of two wells located on the outer edge of DA-23, monitoring wells are not located in the surface of the capped waste disposal areas.

4. **Extraction Wells Leachate**

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

☐ Evidence of leakage at penetration ☐ Needs maintenance ☒ N/A

Remarks: _____

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

Remarks: PRP contractor performs cap settlement surveys every five years. The last survey took place in 2022. No evidence of excessive settlement was observed. The next settlement survey is scheduled to take place in 2027.

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

1. **Gas Treatment Facilities**

   ☐ Flaring ☐ Thermal destruction ☐ Collection for reuse

   ☐ Good condition ☐ Needs maintenance

   Remarks: _____

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

   ☐ Good condition ☐ Needs maintenance

   Remarks: _____

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

   ☐ Good condition ☐ Needs maintenance ☐ N/A

   Remarks: _____

F. Cover Drainage Layer ☐ Applicable ☒ N/A

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

   Remarks: _____

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

   Remarks: _____

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

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

   ☐ Siltation not evident

   Remarks: _____

2. **Erosion** Area extent: _____ Depth: _____

   ☐ Erosion not evident

   Remarks: _____

3. **Outlet Works** ☐ Functioning ☐ N/A

   Remarks: _____

4. **Dam** ☐ Functioning ☐ N/A

   Remarks: _____

H. Retaining Walls ☐ Applicable ☒ N/A

1. **Deformations** ☐ Location shown on site map ☐ Deformation not evident

   Horizontal displacement: _____ Vertical displacement: _____

   Rotational displacement: _____

   Remarks: _____

2. **Degradation** ☐ Location shown on site map ☐ Degradation not evident

   Remarks: _____

I. Perimeter Ditches/Off-Site Discharge ☒ Applicable ☐ N/A

1. **Siltation** ☐ Location shown on site map ☐ Siltation not evident

Area extent: _____ Depth: _____

Remarks: Not applicable/

2. **Vegetative Growth** ☐ Location shown on site map ☒ N/A

☐ Vegetation does not impede flow

Area extent: _____ Type: _____

Remarks: _____

3. **Erosion** ☐ Location shown on site map ☒ Erosion not evident

Area extent: _____ Depth: _____

Remarks: _____

4. **Discharge Structure** ☒ Functioning ☐ N/A

Remarks: In 2019, the EPA approved the addition of a stormwater control structure on the downgradient edge of the APA cap area to intercept stormwater runoff and divert it to the western tributary of Gregg Branch, rather than allowing runoff to flow directly off the cap and infiltrate into the BV. The structure was completed in August 2020. Site inspection participants observed the new structure. Everything seemed to be in working order. Since the conceptual plans were approved, additional solar-powered electrical fencing was added to surround the structure and prevent wildlife from disturbing it.

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

1. **Settlement** ☐ Location shown on site map ☐ Settlement not evident

Area extent: _____ Depth: _____

Remarks: _____

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

☐ Performance not monitored

Frequency: _____ ☐ Evidence of breaching

Head differential: _____

Remarks: _____

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

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

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

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

Remarks: Per the EPA's approval, the original FV and BV groundwater extraction and treatment systems are no longer in operation. Currently, injection and extraction wells are operated as part of pilot-test areas identified in the 2016 ROD Amendment as needing active remediation.

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: Bag

   ☐ 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 groundwater treated annually: _____

   ☐ Quantity of surface water treated annually: _____

   Remarks: _____

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

   ☐ N/A ☒ Good condition ☐ Needs maintenance

   Remarks: _____

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

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

   Remarks: The tanks and storage vessels in the FV groundwater treatment system buildings are clearly labeled and appear to be in good condition. The floor of the building is coated and designed to serve as secondary containment for the system.

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: Site groundwater is no longer being extracted and treated. Section E below provides well condition information related to MNA.

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☒ Groundwater plume is effectively contained ☐ Contaminant concentrations are declining

E. Monitored Natural Attenuation

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

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

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

Remarks: All monitoring wells were secured with locks, clearly labeled and appeared to be in good condition.

X. OTHER REMEDIES

If there are remedies applied at the site and not covered above, attach an inspection sheet describing the physical nature and condition of any facility associated with the remedy. An example would be soil vapor extraction.

XI. OVERALL OBSERVATIONS

A. Implementation of the Remedy

Describe issues and observations relating to whether the remedy is effective and functioning as designed. Begin with a brief statement of what the remedy is designed to accomplish (e.g., to contain contaminant plume, minimize infiltration and gas emissions).

The remedy selected in the Site's 1988 ROD included groundwater extraction and treatment and capping of disposal areas. The placement of caps over the six disposal areas identified in the 1988 ROD has effectively eliminated the potential exposure to soil contamination. The groundwater on site is not used; therefore, there is no complete direct exposure pathway for site groundwater. Off-site residents along Bee Tree Road have been connected to the public water supply and restrictive covenants are in place to prevent future use of groundwater for those properties. The revised remedy, as selected in the 2016 ROD Amendment, includes EISB and MNA to address groundwater contamination at selected FV and BV areas; excavation and off-site disposal of contaminated soil from two FV locations; institutional controls to restrict site land uses to commercial/industrial uses only and to prevent the use of groundwater on site; maintenance of the caps and engineering controls for the six DAs, as required by the 1988 ROD; and performance monitoring. The 2016 sitewide remedy has not yet been implemented, but is expected to address remaining site contamination and to be protective of human health and the environment once implemented.

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.

No issues were observed related to O&M implementation. The capped areas, fencing, signage, roads and equipment associated with remedial activities seem to be well maintained. Site monitoring is performed in accordance with all site-related monitoring requirements. Section 7.2 of the 2016 ROD Amendment established specific monitoring requirements to ensure that site conditions do not pose unacceptable risks to ecological receptors. Most of the those monitoring requirements are already being voluntarily implemented. Now that the 2022 Consent Decree has been finalized, all required monitoring requirements will be implemented and incorporated into the formal Site-Wide Performance Monitoring Plan.

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 have been no issues or observations that suggest that protectiveness of the remedy may be compromised in the future.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. The PRPs are currently exploring ways for pollinator habitats to potentially minimize site-related O&M (mowing) in areas.

APPENDIX J – SITE INSPECTION PHOTOS

Gate and signage at site entrance

Security guard hut at front entrance gate

Exterior of the FV maintenance shed

Interior of the FV maintenance shed

Exterior of the FV groundwater treatment system building

Interior of the FV groundwater treatment system building

One of the FV pollinator habitats

Closeup of pollinator habitat plants

FV pilot-test area B104

Fence and cap at DA-10/11 (FV)

FV pilot treatment area B105

FV soil remediation area B109

DA-23 (FV)


Remnants of former FV site buildings

Location of FV soil remediation area B116

BV pilot treatment area P5 – downgradient of the APA

DA-7/8 (BV)


Areas filled with gravel to address bears digging on the surface of DA-7/8 (BV)

APA with new stormwater diversion swale

APA stormwater diversion swale discharge area

Solar-powered electric fence installed around APA stormwater diversion culvert to deter wildlife

DA-9 (BV)

DA-6 (BV)


Exterior of the BV groundwater treatment system building

Interior of the BV groundwater treatment system building (the system has been decommissioned)

Gregg Branch (BV)

BV well cluster that includes MW172-T32D

Bee Tree Creek near well MW172-T32D (BV)

Gregg Branch surface water sampling location (BV)

Installation of new BV wells downgradient from the MW172-T32D area
(this downgradient area of new well installation is referred to as “the Narrows”)

APPENDIX K – DETAILED ARARS REVIEW TABLES

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 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. In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed.

Surface Water ARARs
The 2016 ROD Amendment established NCAC 2B standards as surface water ARARs for Bee Tree Creek. While the 2016 ROD Amendment did not establish surface water COCs or associated cleanup levels, surface water sampling results are compared to current NCAC 2B standards.

Groundwater ARARs
According to the Site's 2016 ROD Amendment, groundwater ARARs include NCAC 2L standards and federal Safe Drinking Water Act maximum contaminant levels (MCLs) (40 CFR Part 141). Most groundwater cleanup levels established by the 2016 ROD Amendment were based on NCAC 2L standards. Health-based limits were established for COCs for which NCAC 2L standards are not available (Appendix L). Table K-1 compares the groundwater cleanup levels based on NCAC 2L standards to current standards. The more stringent of the MCL and NCAC 2L values are listed as the current standards. When available for a compound, the promulgated NCAC 2L standards are, in all instances, equal to or lower than MCLs. Table K-1 shows that NCAC 2L standards for groundwater COCs have not changed.

Table K-1: Groundwater ARARs Review

Chemical Group	COC	2016 ROD Amendment Cleanup Level (µg/L)[a]	Current NCAC 2L Standard (µg/L)[b]	Change
VOCs	Acetone	6,000	6,000	No change
	Benzene	1	1	No change
	Bromoform (THM – Trihalomethane)	4	4	No change
	Chloroform (THM)	70	70	No change
	Carbon Tetrachloride	0.3	0.3	No change
	Dibromochloromethane (THM)	0.4	0.4	No change
	1,2-DCA	0.4	0.4	No change
	Cis-1,2-DCE	70	70	No change
	1,2-DCP	0.6	0.6	No change
	Methyl-tert-butyl ether	20	20	No change
	Methylene chloride	5	5	No change
	t-Butyl alcohol	10	10[c]	No change
	Tetrachloroethylene	0.7	0.7	No change
	1,1,2-Trichloroethane	0.6	0.6[c]	No change
	Trichloroethylene	3	3	No change
	Vinyl chloride	0.03	0.03	No change
	N-nitrosodimethylamine	0.0007	0.0007	No change
PCB	PCBs (total)	0.09	0.09[c]	No change

Chemical Group	COC	2016 ROD Amendment Cleanup Level (µg/L)[a]	Current NCAC 2L Standard (µg/L)[b]	Change
Nonhalogenated Organics	Methanol	4,000	4,000	No change
Nitroaromatics	2,4-Dinitrotoluene	0.1	0.1[c]	No change
	Perchlorate	2.0	2.0	No change

Notes:

a. Source is Table 15 of 2016 ROD Amendment (PDF pg. 153).
b. Source is 15A NCAC 02L .0202 standards (unless otherwise noted), available at: https://files.nc.gov/ncdeq/documents/files/02L%20Groundwater%20Standards%20Table%205-21%202013_0.pdf (accessed 1/15/2022).
c. Source is Interim Maximum Allowable Concentrations established under 15A NCAC 02L .0202 standards, available at: https://files.nc.gov/ncdeq/Water%20Quality/Planning/CSU/Ground%20Water/APPENDIX_I_IMAC_2-01-21.pdf (accessed 1/15/2022).

µg/L = micrograms per liter

APPENDIX L – SCREENING-LEVEL RISK REVIEW

Soil

The soil cleanup levels identified in the 2016 ROD Amendment were based on protecting future construction/industrial workers from direct contact and vapor inhalation. Cleanup levels included the segregation of HQs by target organ/effect and were defined so that the total HQ for a given target organ is no greater than 1. To evaluate if soil cleanup levels remain valid, a screening-level risk evaluation was completed for soil COCs. The screening-level risk review for soil was conducted by comparing the 2016 ROD Amendment cleanup levels to the EPA's 2021 composite worker soil RSLs using the EPA's established current toxicity values. Table L-1 shows that the soil cleanup levels are equivalent to risks below the EPA's upper bound of the cancer risk management range (1×10^{-4}) and result in HQs below the EPA's threshold of 1.0. Cleanup levels for soil remain valid.

Table L-1: Screening-Level Risk Evaluation of the 2016 ROD Amendment Soil Cleanup Levels

Chemical Group	COC	Cleanup Level[a] (µg/kg)	RSL (µg/kg)[c]		Screening-Level Evaluation[b]	
			Risk-Based (1×10^{-6})	Noncancer (HQ=1)	Risk	HQ
COCs Associated with Soil at Area B109-B137						
VOCs	Naphthalene	7,600	8,600	590,000	8.8×10^{-7}	0.013
	1,2,4-Trimethyl-benzene	12,000	--	1,800,000	--	0.007
	1,3,5-Trimethyl-benzene	8,300	--	1,500,000	--	0.006
	Xylenes (total)	7,600	--	2,500,000	--	0.003
COCs Associated with Soil at Area B116						
VOCs	Benzene	6,300	5,100	420,000	1.2×10^{-6}	0.015
	Cyclohexane	1,300,000	NA	27,000,000	--	0.049
	1,2-DCA	1,500	2,000	140,000	7.5×10^{-7}	0.011
	Methylene chloride	4,800	100,000	3,200,000	4.8×10^{-8}	0.002
	1,1,2-Trichloroethane	2,900	5,000	6,300	5.8×10^{-7}	0.460
	Vinyl chloride	4,000	1,700	310,000	2.4×10^{-6}	0.013
				Total	5.85×10^{-6}	0.948

Notes:

a. *Source:* Table 14 of the 2016 ROD Amendment (PDF pg. 152).

b. Screening-level risk evaluation: risk = (cleanup criterion/risk-based RSL) (1×10^{-6}) and HQ = (cleanup criterion/noncancer RSL).

c. Values are the EPA's 2021 composite worker soil RSLs for carcinogenic and noncancer effects, available at: https://semspub.epa.gov/work/HQ/401643.pdf (accessed 1/25/2022).

-- = not applicable, toxicity value not established for this COC

µg/kg = micrograms per kilogram

Groundwater

According to the Site's 2016 ROD Amendment, groundwater ARARs include NCAC 2L and federal MCLs. Most of the groundwater cleanup levels established by the 2016 ROD Amendment were based on NCAC 2L standards. Health-based limits were established for COCs for which NCAC 2L standards are not available. To evaluate if the non-ARAR based groundwater cleanup levels remain valid, a screening-level risk evaluation was completed for groundwater COCs for which NCAC 2L standards or MCLs were not established. The screening-level risk review for groundwater was conducted by comparing the 2016 ROD Amendment cleanup levels to the EPA's 2021 tapwater RSLs using the EPA's established current toxicity values. Table L-2 shows that most of the health-based groundwater cleanup levels are equivalent to risks below the EPA's upper boundary of the cancer risk management range (1×10^{-4}) and result in HQs below the EPA's threshold of 1.0. The health-based groundwater

cleanup levels for tetrahydrofuran and 3-nitrotoluene are associated with risk above the EPA's threshold of 1.0 (Table L-2). However, the cleanup levels for tetrahydrofuran and 3-nitrotoluene are based on more rigorous Site- and COC-specific health-based standards calculated during the HHRA. The EPA approved these cleanup levels and they have not changed since the submittal of the HHRA. In addition, tetrahydrofuran and 3-nitrotoluene are not primary risk or remedial-drivers, there is no complete exposure pathway and the 2022 Consent Decree prohibits use of contaminated groundwater and any activities that could result in exposure to contaminants in groundwater.

Table L-2: Screening-Level Risk Evaluation of the 2016 ROD Amendment Groundwater Cleanup Levels

Chemical Group	COC	2016 ROD Amendment Cleanup Level (µg/L)[a]	Basis of Cleanup Level	RSL (µg/L)[c]		Screening-Level Evaluation[b]	
				Risk-based (1×10^{-6})	Noncancer (HQ=1)	Risk	HQ
VOCs	Methyl acetate	7,000	HB-NC	--	20,000	--	0.35
	Tetrahydrofuran	6,000	HB-NC	--	3,400	--	**1.76**
	2,4-Dinitrophenol	10	HB-NC	--	39	--	0.26
	1,2-Diphenylhydrazine	0.04	HB-C	0.078	--	5.13×10^{-7}	--
	Benzophenone	30	HB-NC	--	--	--	--
	BZ	0.8	HB-NC	--	--	--	--
Nonhalogenated Organics	1,2-Diaminoethane[d]	600	HB-NC	--	1,800	--	0.33
Nitroaromatics	2-Amino-4,6-dinitrotoluene	0.05	HB-C	--	1.9	--	0.03
	4-Amino-2,6-dinitrotoluene	0.05	HB-C	--	1.9	--	0.03
	1,3-Dinitrobenzene	0.7	HB-NC	--	2	--	0.35
	2,6-Dinitrotoluene	0.1	HB-C	0.049	5.7	2.0×10^{-6}	0.02
	RDX	0.3	HB-C	0.97	80	3.09×10^{-7}	0.004
	3-Nitrotoluene	7.0	HB-NC	--	1.7	--	**4.12**
	2-Nitrotoluene	0.2	HB-C	0.31	16	6.45×10^{-7}	0.013
	4-Nitrotoluene	2.0	HB-C	4.3	71	4.65×10^{-7}	0.03
	PETN	10	HB-NC	17	170	5.88×10^{-7}	0.06
	Nitroglycerin	0.7	HB-NC	4.5	2	1.56×10^{-7}	0.35
	2,4,6-Trinitritiluene	1.0	HB-C	2.5	9.8	4.0×10^{-7}	0.10
					Total	5.1×10^{-6}	**7.80**

Notes:

a. *Source:* Table 15 of the 2016 ROD Amendment (PDF pg. 153).
b. Screening-level risk evaluation: risk = (cleanup criterion/risk-based RSL) (1×10^{-6}) and HQ = (cleanup criterion/noncancer RSL).
c. Values are the EPA's 2021 Resident Tapwater RSLs for carcinogenic and noncancer effects, available at: https://semspub.epa.gov/src/document/HQ/401655 (accessed 1/25/2022).
d. 1,2-Diaminothane is also known as Ethylene diamine.

HB-C = health-based limit that is based on a target cancer risk of 1×10^{-6}
HB-NC = health-based limit that is based on non-cancer effects at a target HQ of 1
NC 2L IMAC = value is an interim maximum allowable concentration (IMAC) established under 15A NCAC 02L .02020
Bold values = risk outside of the EPA's acceptable risk range

APPENDIX M – ADDITIONAL DATA REVIEW TABLES AND FIGURES

Table M-1: FV Property Boundary Monitoring Well Results (Fall 2020)

Monitoring Well	Analyte (µg/L)								
	Perchlorate	Chloroform	PCE	Cis-1,2-DCE	1,2-DCA	Bromoform	TCE	Acetone	MTBE
Cleanup Level	**2.0**	**70**	**0.7**	**70**	**0.4**	**4.0**	**3.0**	**6000**	**20**
MW154-O44C	--	--	--	--	--	--	--	--	--
MW157-M44C	0.44 J	0.093 J	--	--	--	--	--	--	--
MW177-M44D	0.15 J	--	0.065 J	--	--	--	--	--	--
MW177-M44F	--	--	0.29 J	0.25 J	0.16 J	0.61 J	0.55	--	--
MW202-P45EF	--	--	0.084 J	0.084 J	--	--	0.19 J	--	--
MW192-P41CD	--	--	--	--	--	--	--	1.7 J	--
MW193-Q40CD	--	--	--	--	--	--	0.075 J	--	--
MW194-Q38CD	--	--	--	--	--	--	--	0.9 J	0.096 J

Notes:
-- = analyte not detected
J = estimated value. The result is greater than or equal to the method detection limit and less than the limit of quantitation
Source: Site's 2020 Annual Assessment Monitoring Report.

Table M-2: Surface Water Exceedances of NCAC 2B Standards (2018 to 2021)

COC	Units	NCAC 2B Standard	2018		2019[c]	2020[d]	2021[e]
			Spring[a]	Fall[b]	Fall	Fall	Spring
Perchlorate	µg/L	2.8	4.3 (UBW 4-137) 3.8 (UBW 3-K39) 3.5 (UBW 1-O44) 14 (GBW 2-M27) 11 (GBW 1C-Q28)	3.6 (UBW 4-I37) 3.1 (UBW 3-K39) 3.0 (UBW 1-O44) 13 (GBW 2-M-27) 8.3 (GBW 1 C-Q28)	4.0 (UBW 3-K39) 4.6 (UBW 1-O44)	3.0 (UBW 1-O44) 9.1 (GBW 1C-Q28)	--
TCE		30.0	35 (GBW-2M27)	44 (GBW 2-M27)	--	33 (GBW 2-M27)	--

Notes:
a. Source is Table 4 of Spring 2018 Groundwater and Surface Water Assessment Monitoring Summary (PDF pg. 18).
b. Source is Table 4 of 2018 Annual Assessment Monitoring Report (PDF pg. 51).
c. Source is Table 4 of 2019 Annual Assessment Monitoring Report (PDF pg. 42).
d. Source is Table 4 of 2020 Annual Assessment Monitoring Report (PDF pf. 46).
e. Source is Table 4 of the Spring 2021 Groundwater/Surface Water Performance Monitoring Summary (PDF pg. 22).
-- = not applicable, concentration did not exceed cleanup levels

Table M-3: COC Detections in Bee Tree Creek Surface Water (2018 to 2021)

Analyte	NC 2B Standard[a] (µg/L)	2018		2019	2020	Spring 2021[f]
		Spring[b]	Fall[c]	Fall[d]	Fall[e]	
BTW 1-P44						
Perchlorate	2.8	--	1.1	0.23 J	--	NS
1,2-DCA	650	-	--	0.08 J	8.5	
Chloroform	2,000	--	0.3 J	0.1 J	0.35 J	
TCE	30	--	0.1 J	--	0.28 J	
RDX	11	--	0.87	--	--	
Acetone	2,000	--	2.1 J	--	1.4 J	
Cis-1,2-DCE	720	--	--	--	0.4 J	
PCE	3.3	--			0.061 J	
BTW 1-P45						
Perchlorate	2.8	1.2 J	0.28 J	0.61 J	0.41 J	NS
1,2-DCA	650		--	0.06 J		
Acetone	2,000		1.5 J	--	1.2 J	
Chloroform	2,000	0.1 J	--	0.1 J		
Hexachlorocyclohexane (BHC), beta-	0.014		--	--	0.0056 J	
RDX	11	1.9	--	--	--	
BTW 3-U30						
Acetone	2,000	--	--	--	2.2 J	--
BTW 2A-T35						
Chloromethane	96	--	0.1 J	--	--	NS
Acetone	2,000	--	--	1.2 J	1.8 J	
BTW 2-S35						
Perchlorate	2.8	0.63 J	0.37 J	0.37 J	0.38 J	NS
1,2-DCA	650	0.3 J	0.1 J	0.1 J	0.15 J	
Acetone	2,000	--	1.3 J	1.4 J	2.0 J	
Methyl-tert-butyl ether	1,500	--	--	0.08 J	0.097 J	
Tert-butyl alcohol	NE	--	--	1.2 J	--	

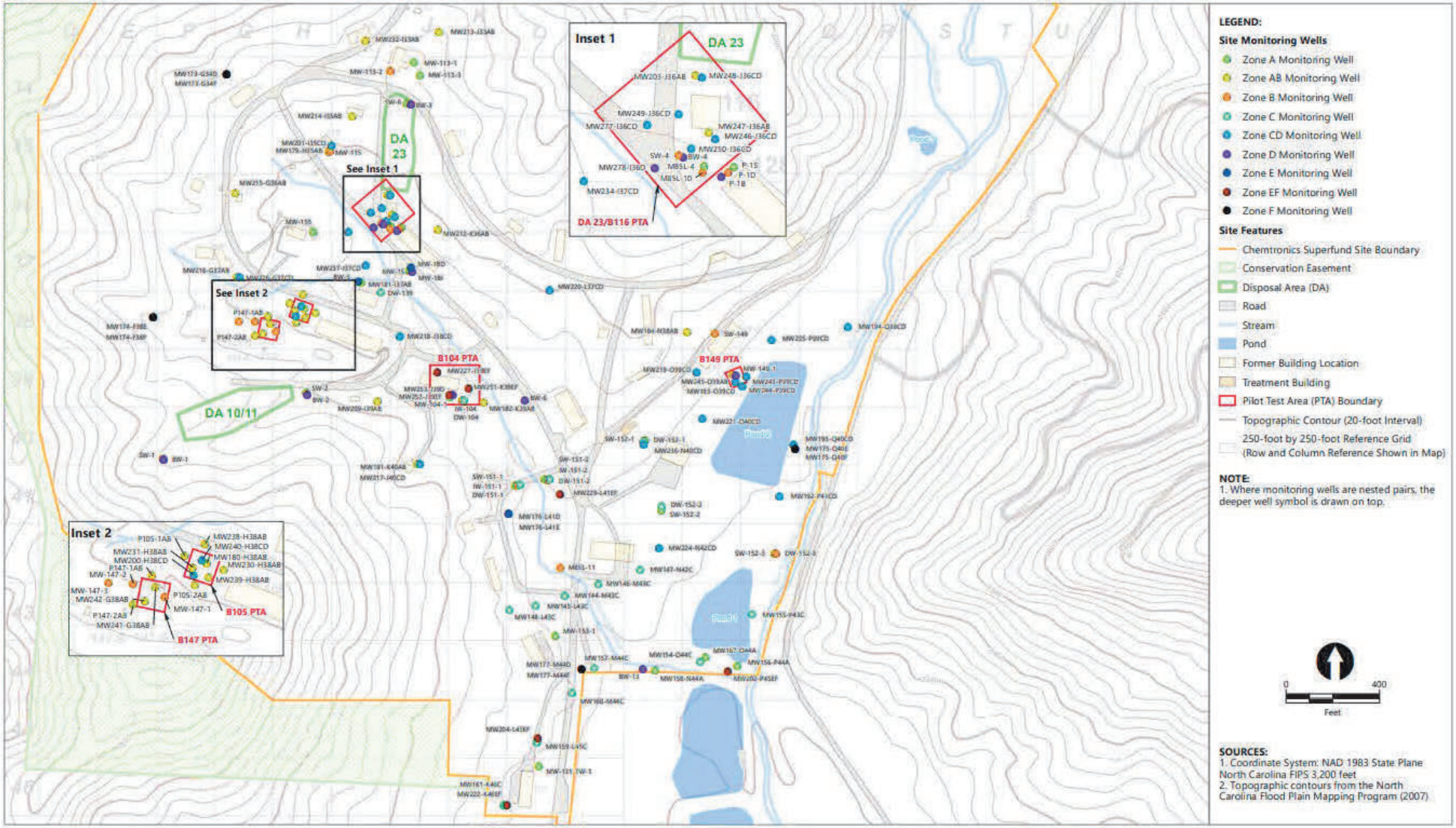
Notes:

a. If more than sample was taken, the higher of the two results was reported.
b. Source is Table 4 of Spring 2018 Groundwater and Surface Water Assessment Monitoring Summary (PDF pg. 18).
c. Source is Table 4 of 2018 Annual Assessment Monitoring Report (PDF pg. 51).

d. Source is Table 4 of 2019 Annual Assessment Monitoring Report (PDF pg. 42).
e. Source is Table 4 of 2020 Annual Assessment Monitoring Report (PDF pf. 46).
f. Source is Table 4 of the Spring 2021 Groundwater/Surface Water Performance Monitoring Summary (PDF pg. 22).

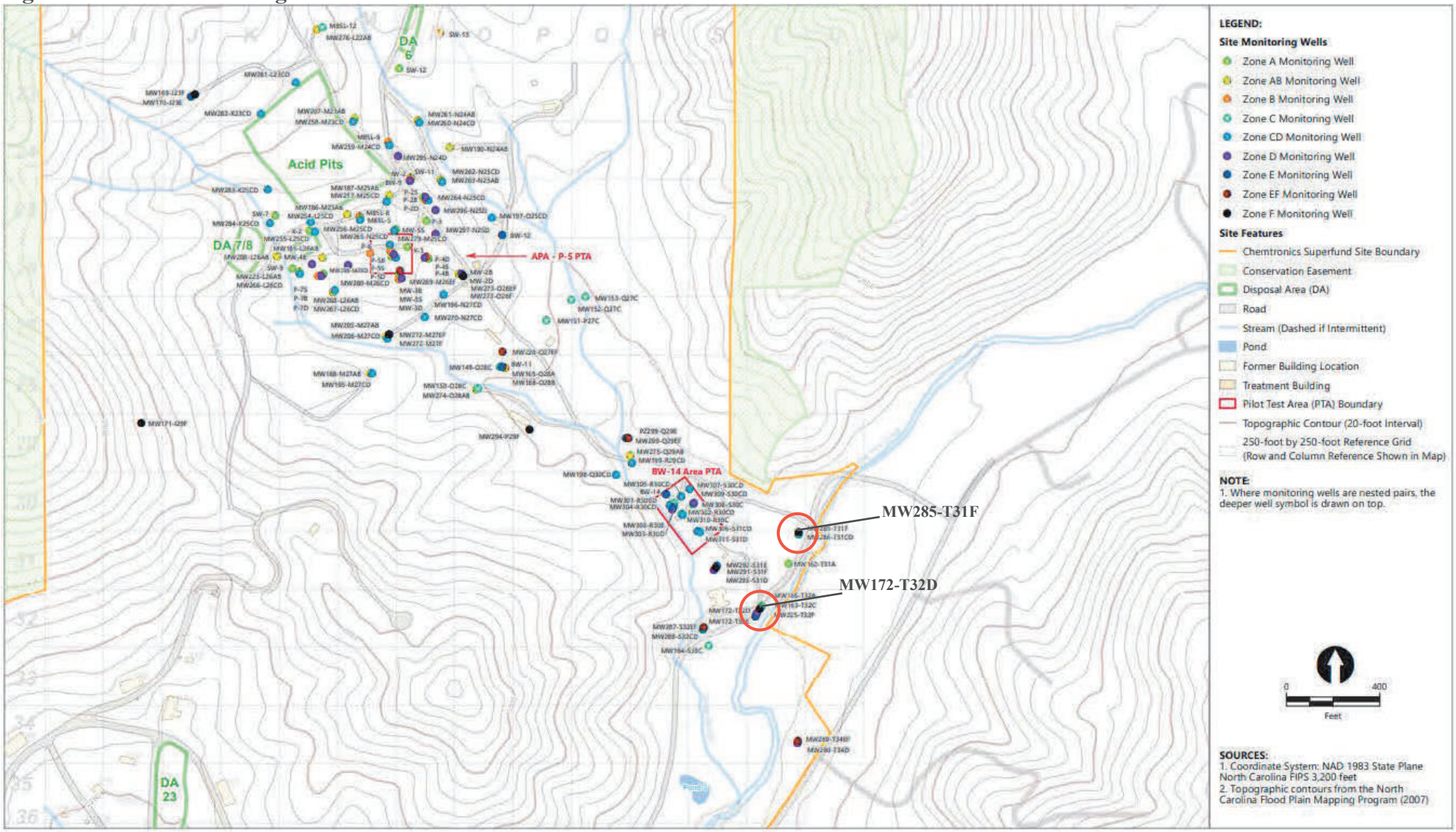
NS = not sampled
-- = not detected
NE = not established
J = estimated value. The result is greater than or equal to the method detection limit and less than the limit of quantitation

Figure M-1: FV Monitoring Well Locations



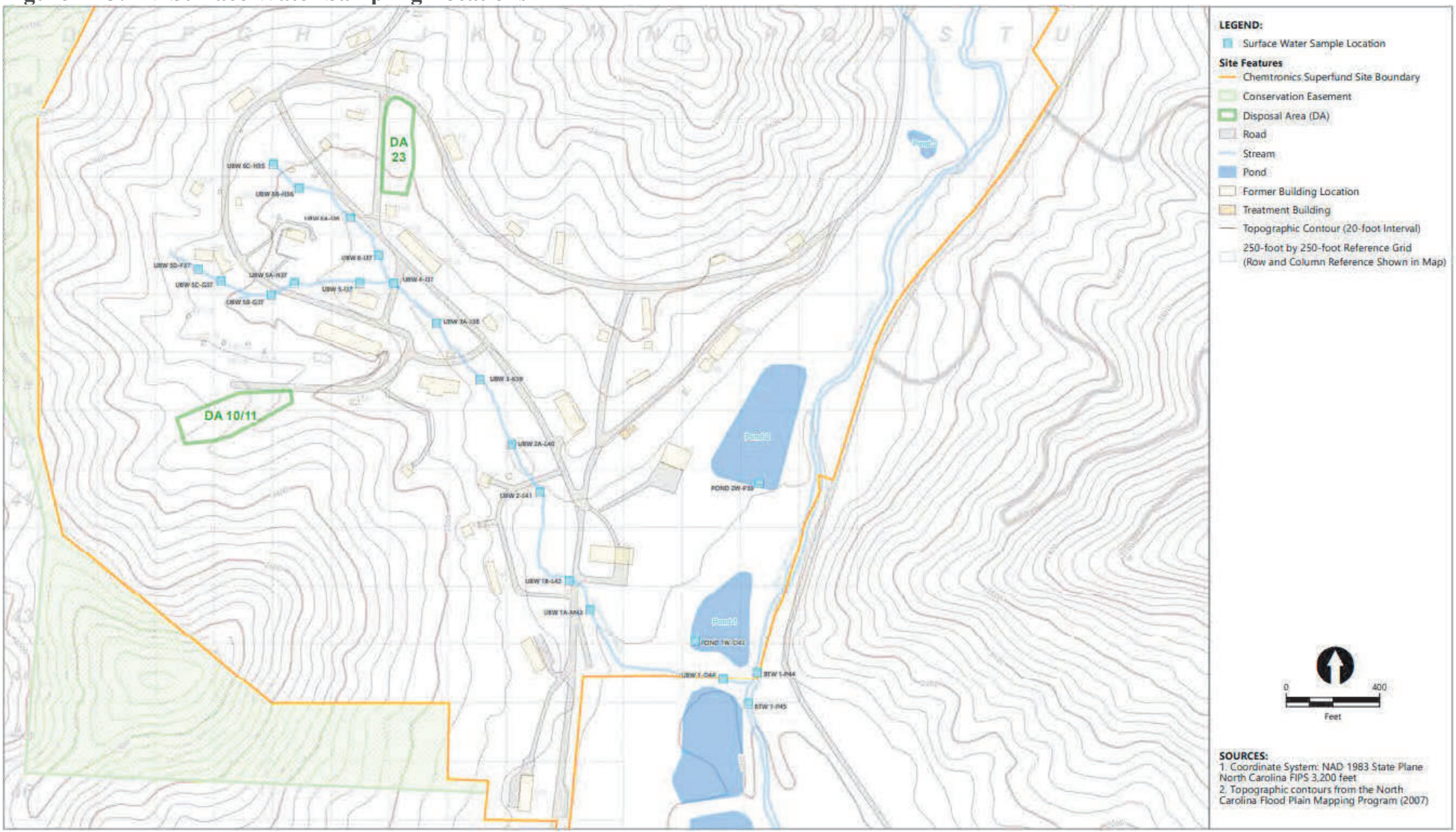
Source: Figure 2 of the 2020 Annual Assessment Monitoring Report (PDF pg. 50).

Figure M-2: BV Monitoring Well Locations



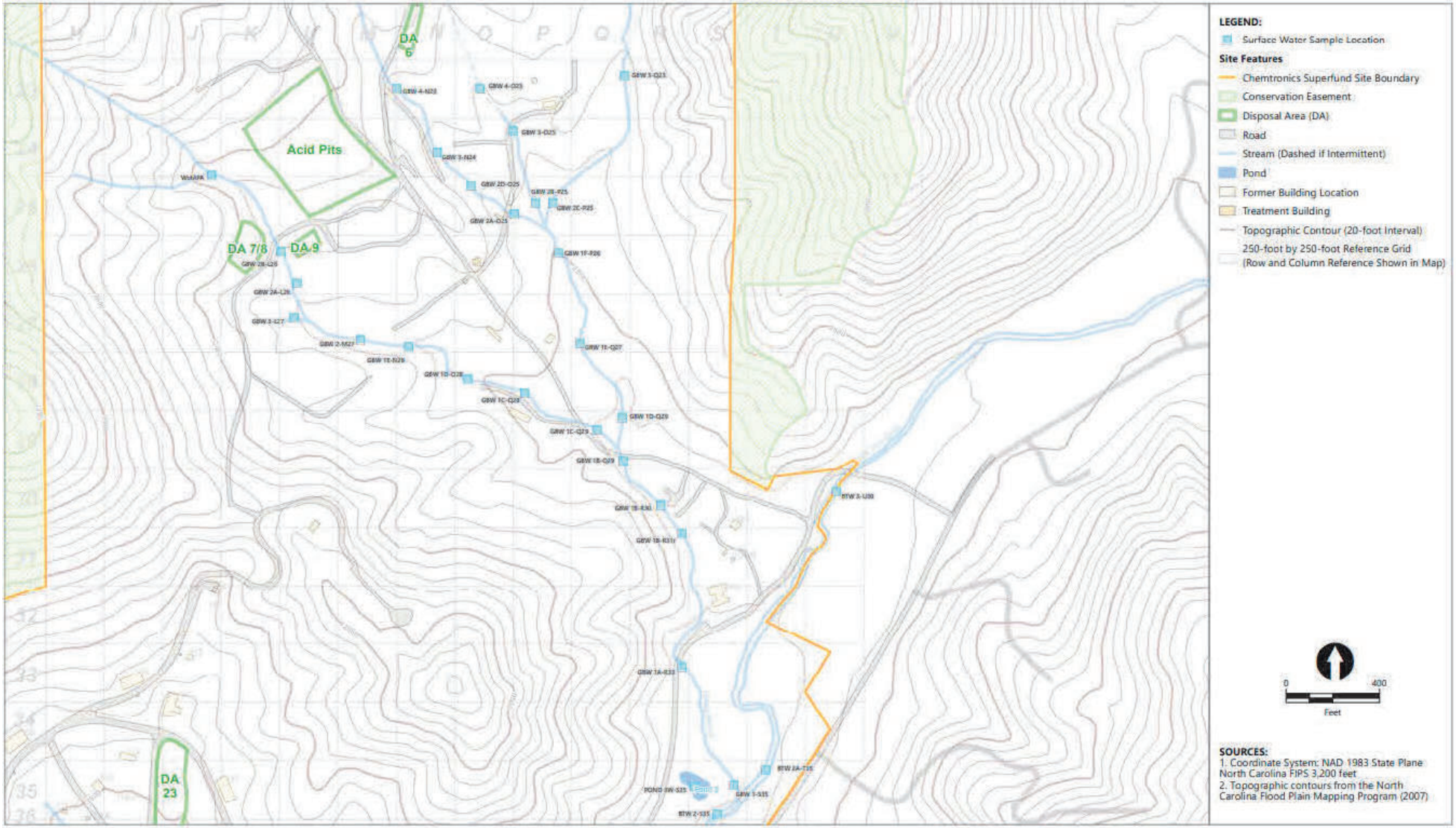
Source: Figure 3 of the 2020 Annual Assessment Monitoring Report (PDF pg. 51).

Figure M-3: FV Surface Water Sampling Locations



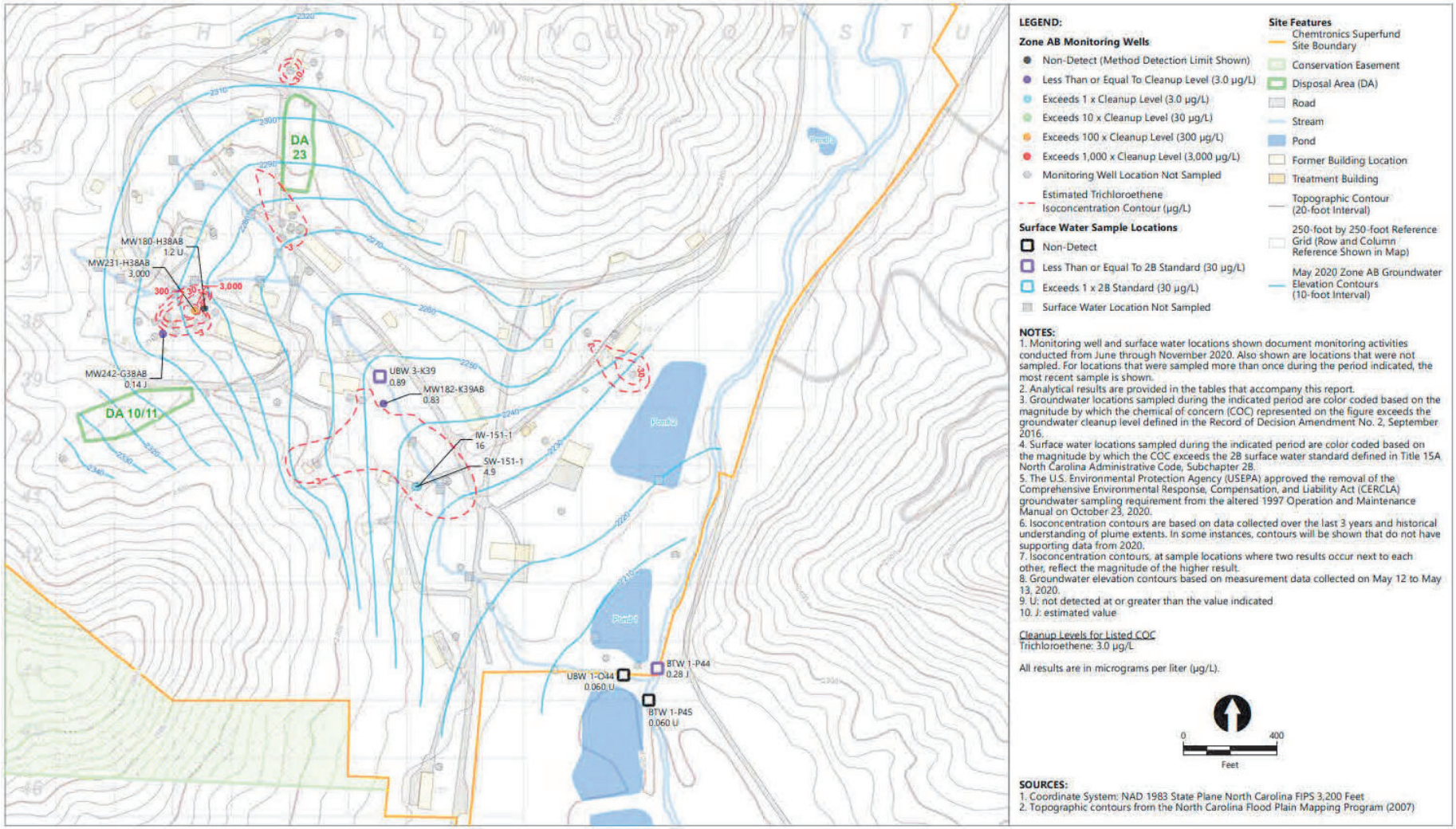
Source: Figure 4 of the 2020 Annual Assessment Monitoring Report (PDF pg. 52).

Figure M-4: BV Surface Water Sampling Locations



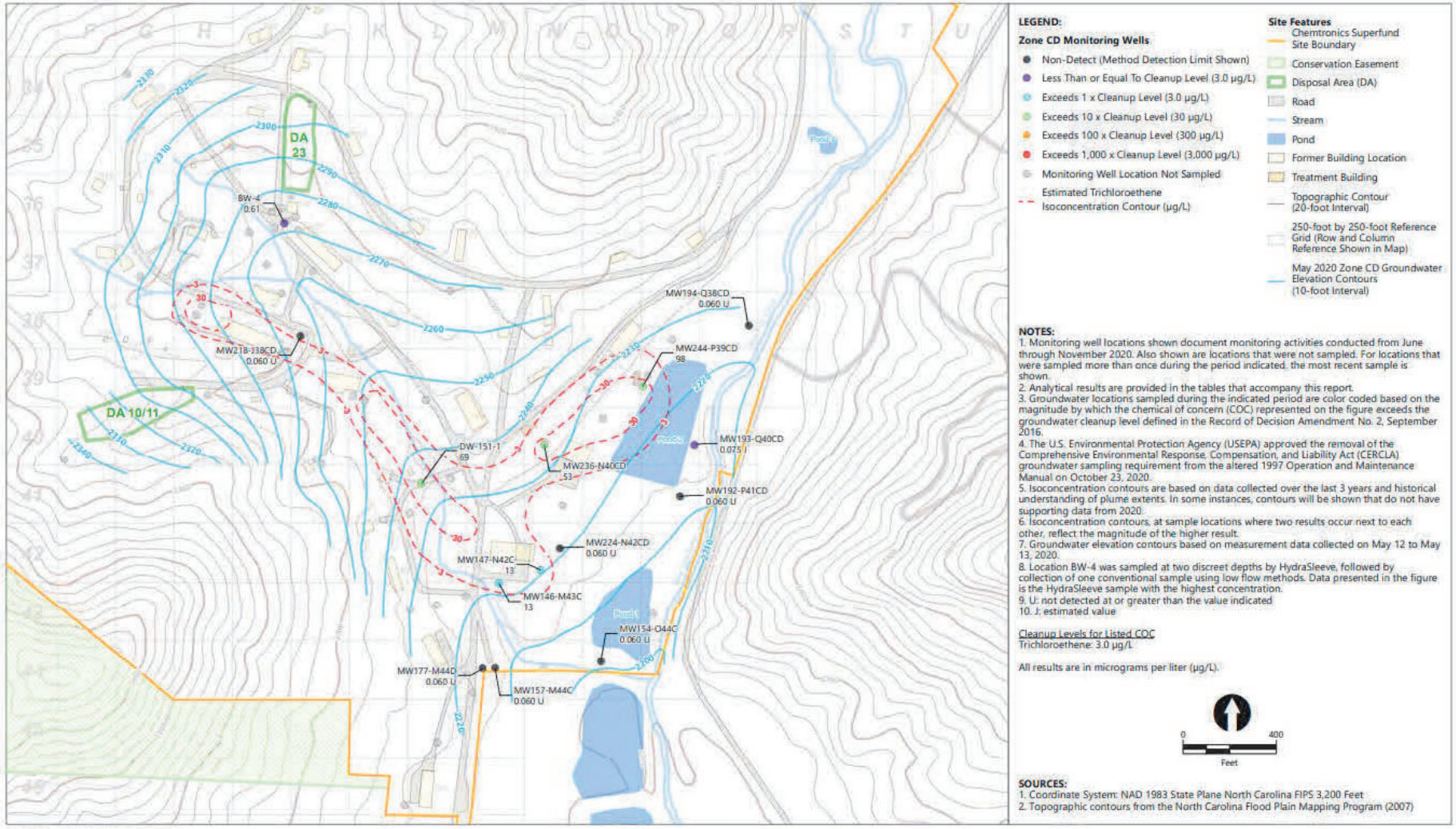
Source: Figure 5 of the 2020 Annual Assessment Monitoring Report (PDF pg. 53).

Figure M-5: FV Zone AB TCE Isopleth Map (Fall 2020)



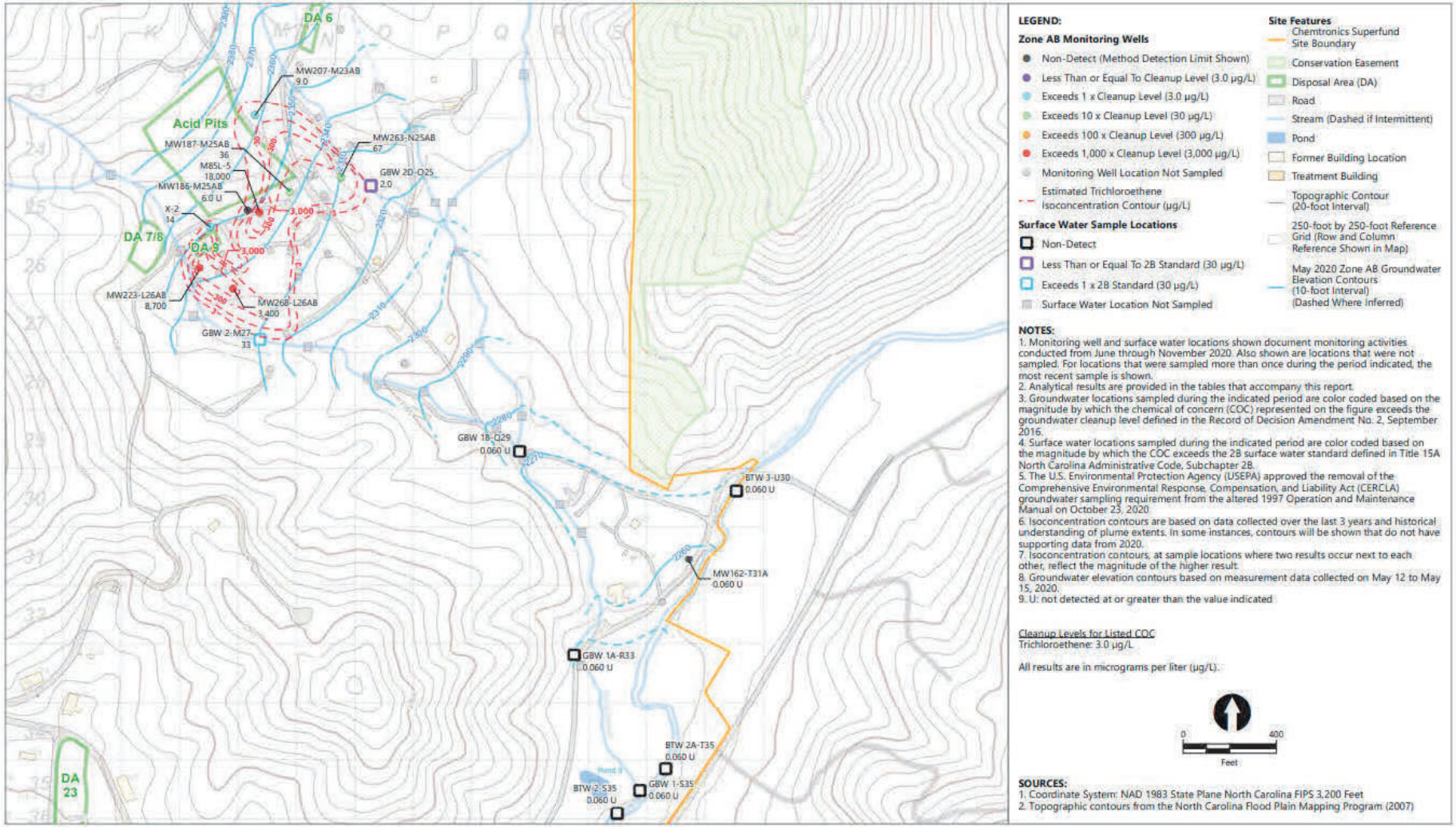
Source: Figure 8 of the 2020 Annual Assessment Monitoring Report (PDF pg. 56).

Figure M-6: FV Zone CD TCE Isopleth Map (Fall 2020)



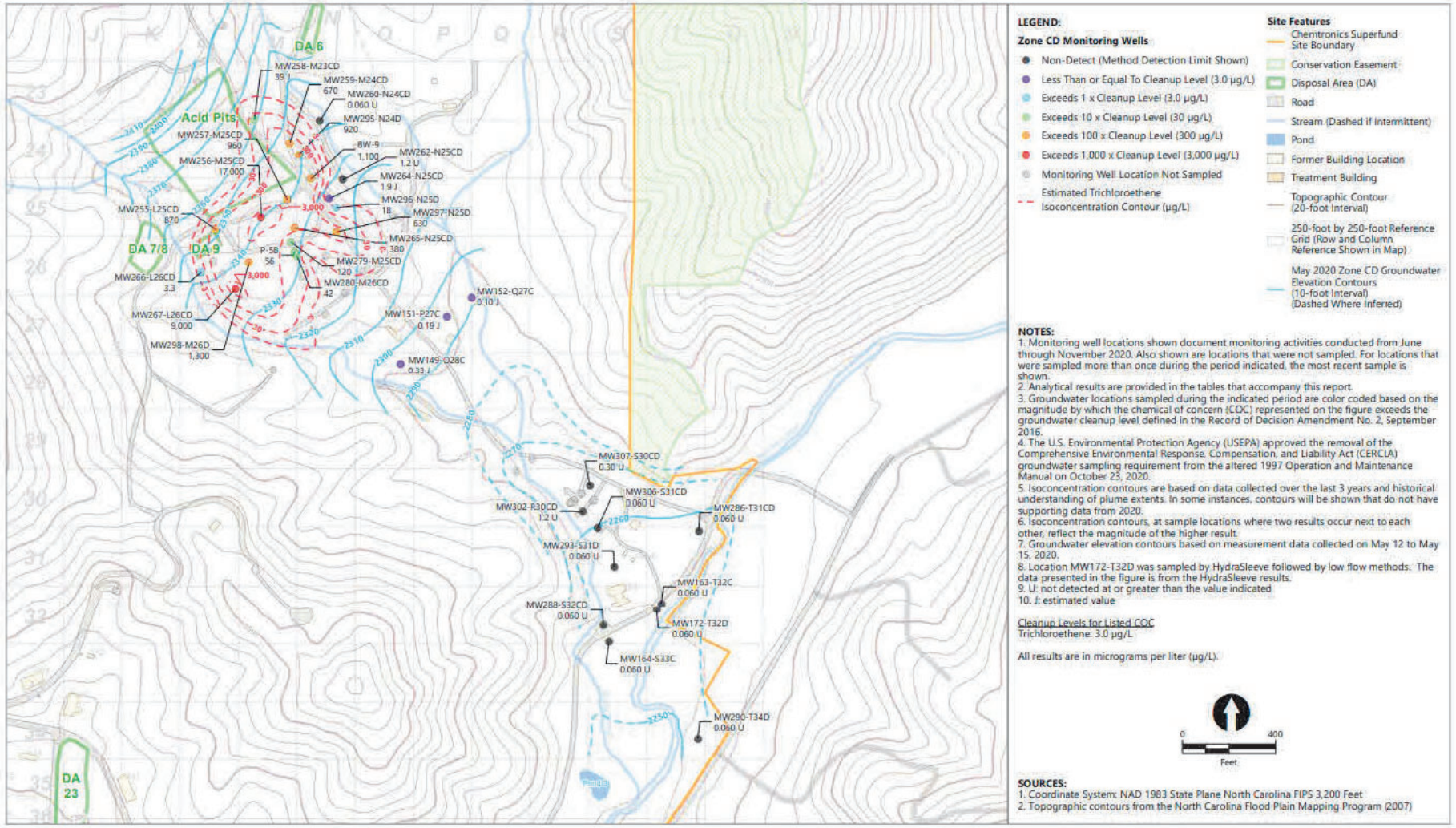
Source: Figure 9 of the 2020 Annual Assessment Monitoring Report (PDF pg. 57).

Figure M-7: BV Zone AB TCE Isopleth Map (Fall 2020)



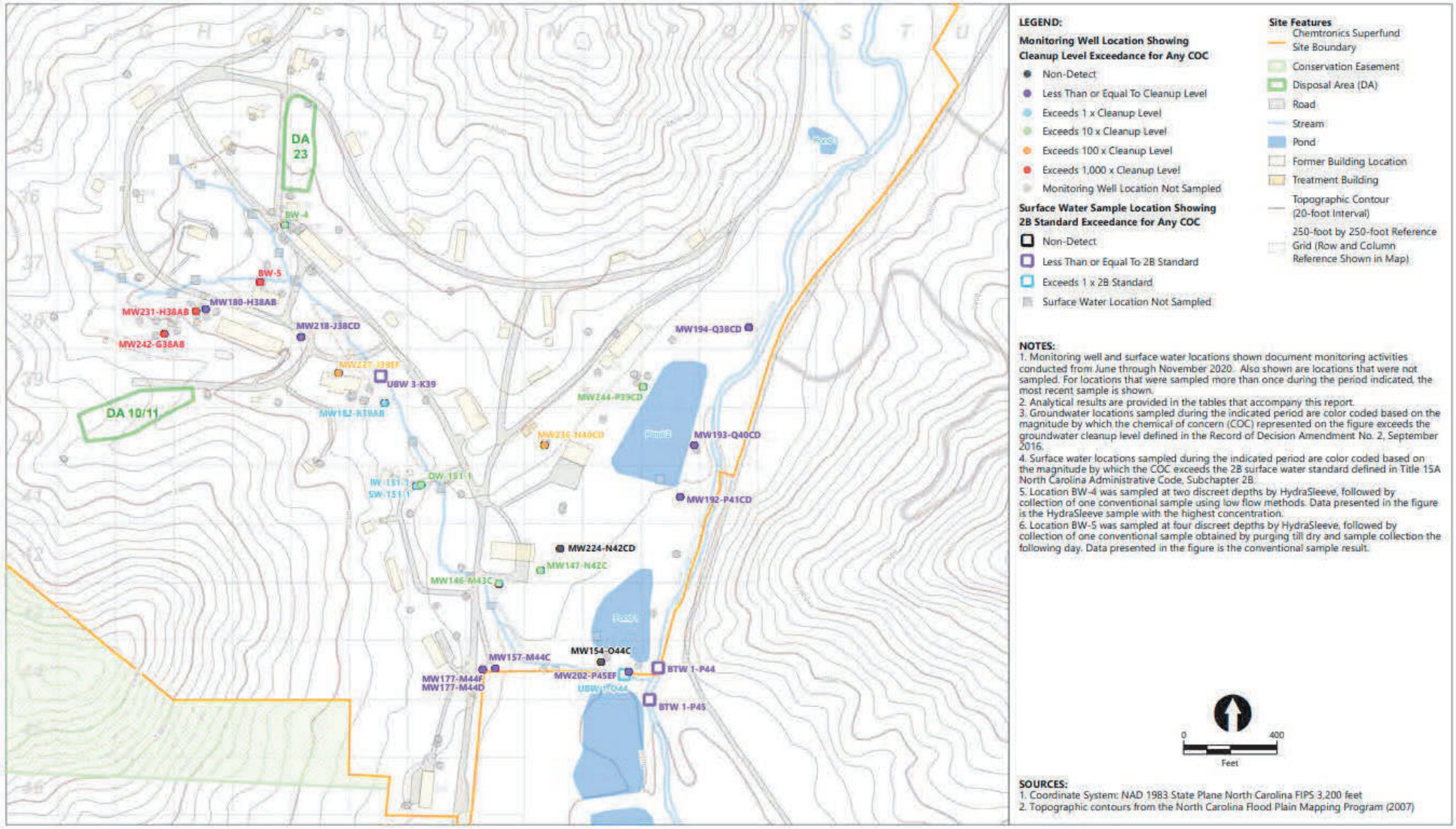
Source: Figure 17 of the 2020 Annual Assessment Monitoring Report (PDF pg. 65).

Figure M-8: BV Zone CD TCE Isopleth Map (Fall 2020)



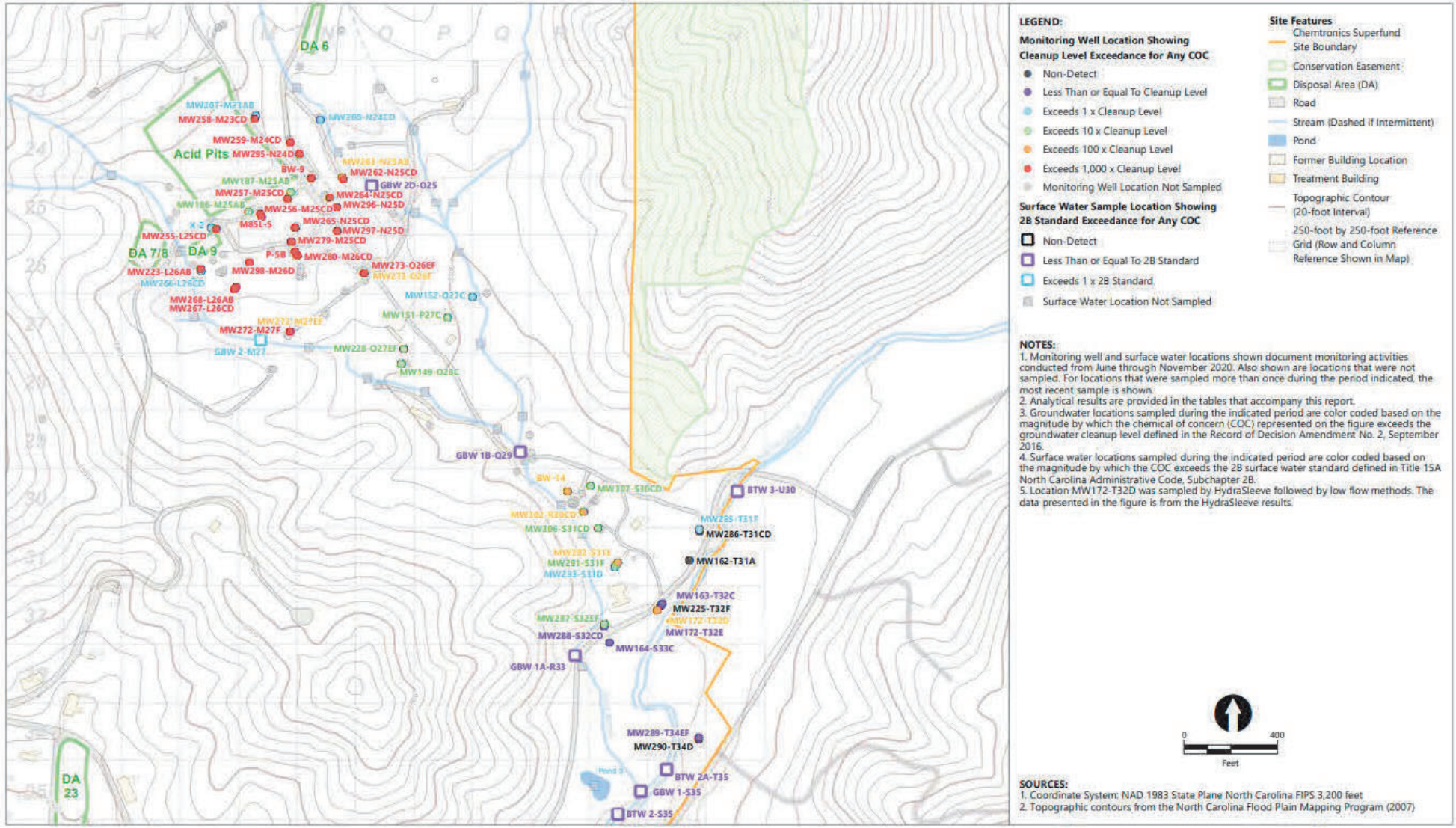
Source: Figure 18 of the 2020 Annual Assessment Monitoring Report (PDF pg. 66).

Figure M-9: FV Analytical Data Summary (Fall 2020)



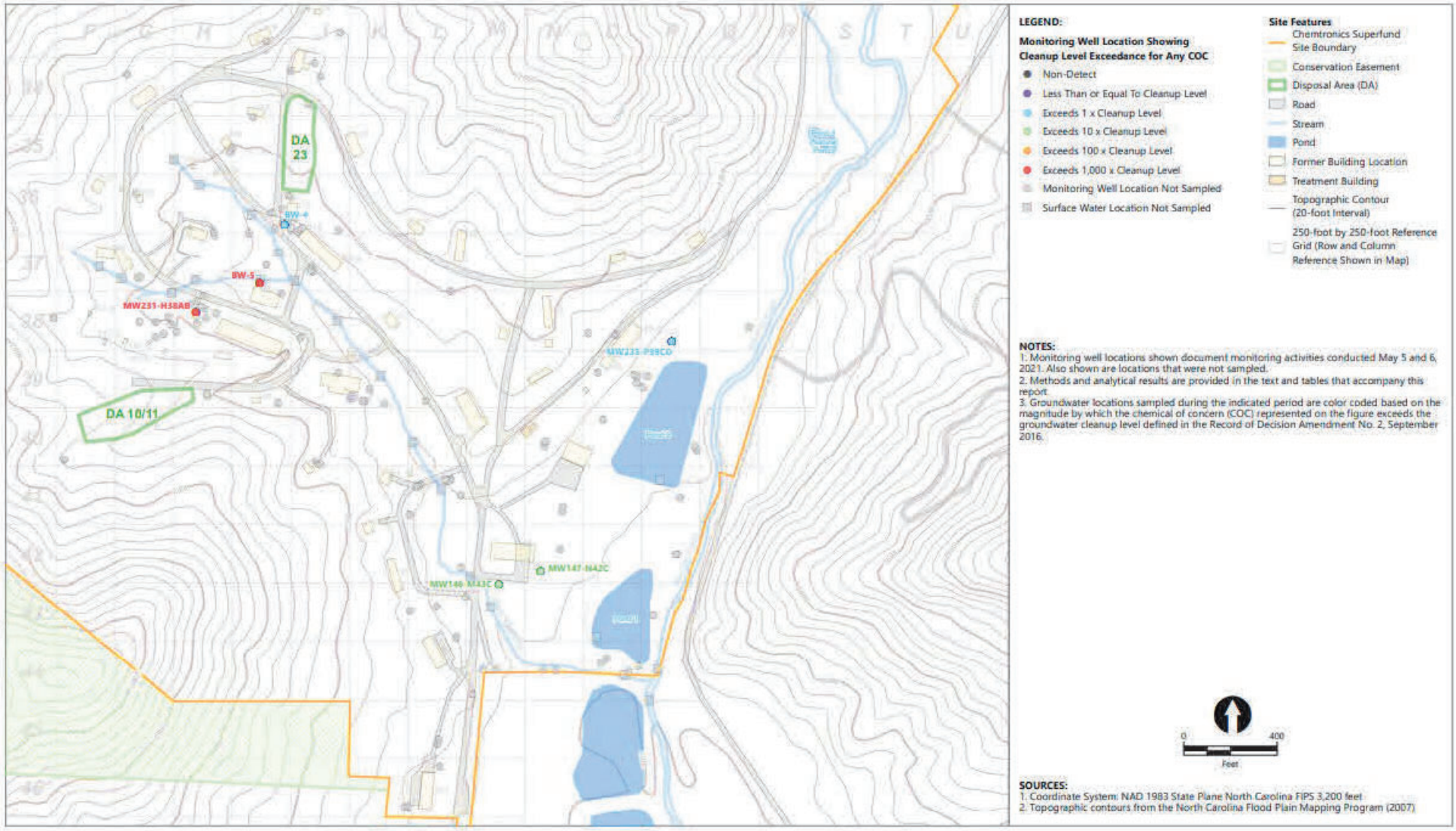
Source: Figure 6 of the 2020 Annual Assessment Monitoring Report (PDF pg. 54).

Figure M-10: BV Analytical Data Summary (Fall 2020)



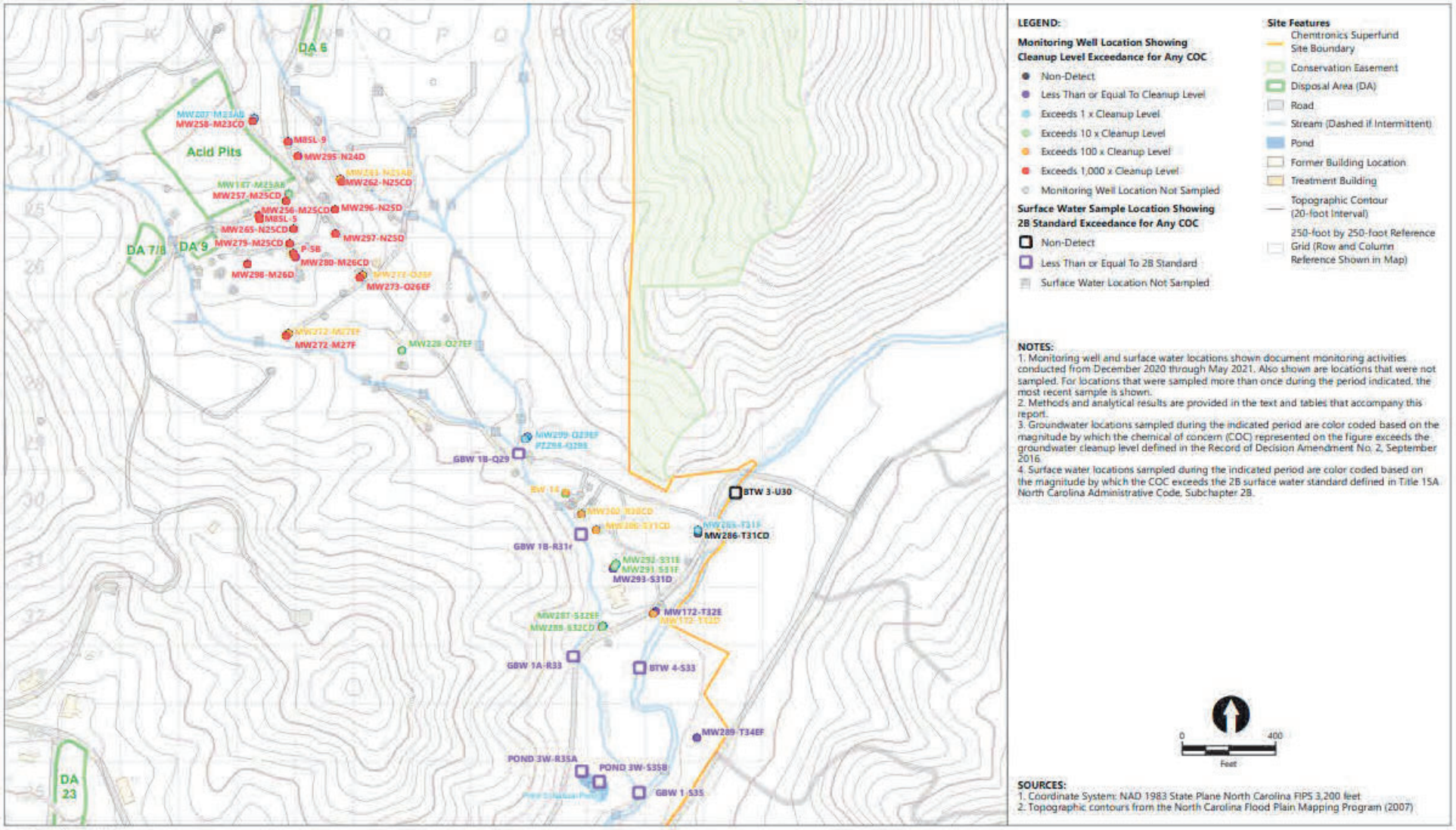
Source: Figure 7 of the 2020 Annual Assessment Monitoring Report (PDF pg. 55).

Figure M-11: FV Analytical Data Summary (Spring 2021)



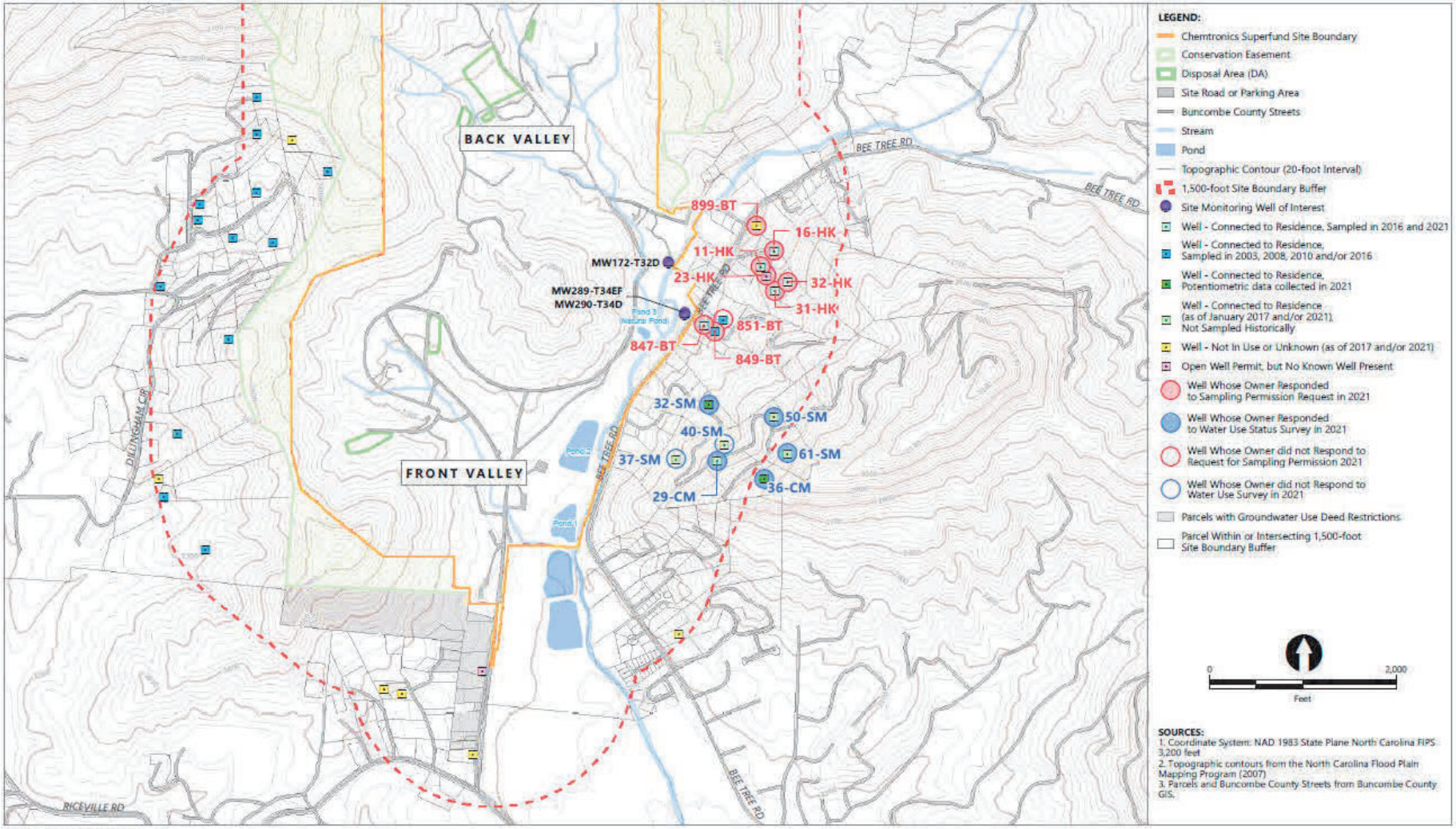
Source: Figure 5 of the Spring 2021 Groundwater/Surface Water Performance Monitoring Summary (PDF pg. 28).

Figure M-12: BV Analytical Data Summary (Spring 2021)



Source: Figure 6 of the Spring 2021 Groundwater/Surface Water Performance Monitoring Summary (PDF pg. 29).

Figure M-13: Summary of 2021 Domestic Well Survey



Source: Figure 1 of the 2022 Summary of Voluntary Off-Site Domestic Well Investigation and Monitoring (PDF pg. 9).