Second Five-Year Review Report
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina
US EPA ID: NCD 044 447 589

Prepared for
US Environmental Protection Agency
Region 4

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Prepared by
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Superfund Division

9/28/17
Date

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LIST OF ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirements
BHHRA	Baseline Human Health Risk Assessment
bls	Below Land Surface
BRP	Blue Ridge Plating
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cis-1,2-DCE	cis-1,2-Dichloroethene
COC	Contaminant of Concern
1,1-DCA	1,1-Dichloroethane
1,2-DCA	1,2-Dichloroethane
1,1-DCE	1,1-Dichloroethene
ESD	Explanation of Significant Difference
EPA	Environmental Protection Agency
FYR	Five-Year Review
IC	Institutional Controls
MCL	Maximum Contaminant Level
Mg/kg	milligrams per kilograms
MNA	Monitored Natural Attenuation
MW	Monitoring Well
NC 2L	North Carolina Groundwater Standard
NCAC	North Carolina Administration Code
NC DENR	North Carolina Department of Environment and Natural Resources
NC DEQ	North Carolina Department of Environment Quality
NCP	National Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PCE	Tetrachloroethene
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SARA	Superfund Amendments and Reauthorization Act
SVOCs	Semi Volatile Organic Compounds
1,1,1-TCA	1,1,1-Trichloroethane
1,1,2-TCA	1,1,2-Trichloroethane
TCE	Trichloroethene
$\mu g/L$	micrograms per Liter
U.S.C.	United States Code
VOC	Volatile Organic Compound
yd^3	cubic yards

I. INTRODUCTION

The purpose of a Five-Year Review (FYR) is to evaluate the implementation and performance of a remedy in order to determine if the remedy 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. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The North Carolina Department of Environmental Quality (NC DEQ) prepared this FYR for the U.S. Environmental Protection Agency pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP) (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the second FYR for the Blue Ridge Plating Site (BRP Site or Site). The triggering action for this statutory review is the completion date of the previous FYR, September 26, 2012. A FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure. The Site consists of one operable unit (OU), which is addressed in this FYR. The OU addressed both contaminated soil and groundwater.

The BRP Site FYR was led by NC DEQ. Participants included Stephanie Grubbs (NC DEQ Hydrogeologist), Beth Hartzell (NC DEQ Environmental Engineer), Jon Bornholm (EPA Remedial Project Manager [RPM]), and Angela Miller (EPA Community Involvement Coordinator). The review began on January 1, 2017.

SITE BACKGROUND

The BRP Site is located at 171 Glenn Bridge Road, Arden, Buncombe County, North Carolina and occupies 3.06 acres. No structures remain on the property due to an emergency response action initiated in December 2014 by the EPA and completed in May 2015. The Site is bounded to the north by Glenn Bridge Road, to the east by an unnamed dead-end road, and to the south and west by wooded wetland areas. This wetland area has been designated as a wetland by the U.S. Army Corps of Engineers. The following figures can be found in Appendix D: Figure 1 is a Site Location Map and Figure 2 is a General Site Layout Map.

The BRP Company was a metal plating company, which operated business from 1974 to 2014 and used black oxide, cadmium, chromium, copper, cyanide, tin, and zinc in the electroplating processes. From 1974 to 1985, electroplating wastes were collected in drums located in the basement where plating sludges were filtered out and the wastewater was directed to a 70,000-gallon in-ground concrete lagoon located behind the shop. Plating sludges were shipped off Site for disposal and the wastewater was either sprayed on the ground or reused as process water.

Between 1985 and 1990 the wastewater was discharged to the local municipal sewer system. In 1990, the municipality suspended access to the sewer system because BRP was not meeting pretreatment requirements. After that suspension, BRP employed a closed loop reclamation system, which was located in the basement.

Land use around the Site is primarily rural to light industrial. The nearest school is 1.5 miles north and the nearest residence is approximately 500 feet to the west. Site drainage enters an unnamed tributary south of the former concrete lagoon area. The unnamed tributary flows from the Site through an area of forested wetlands into another unnamed tributary. This tributary drains into Lake Julian which empties into the French Board River. Both Lake Julian and the French Board River are classified and protected by the State of North Carolina as water supplies suitable for aquatic life propagation and survival, fishing, wildlife, secondary recreation and agricultural. Lake Julian was created to store cooling water for a power plant located on the lake's northeastern shore. Currently, the entire immediate area around the Site is connected to a municipal water supply system.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Blue Ridge Plating Site		
EPA ID: NCD044447589		
Region: 4	State: NC	City/County: Arden, Buncombe County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: US EPA		
Author name (Federal or State Project Manager): Beth Hartzell (NC DEQ-Engineer)/Stephanie Grubbs (NC DEQ-Hydrogeologist)/Jon Bornholm (US EPA-RPM)		
Author affiliation: NC DEQ and US EPA		
Review period: 01/01/2017 – 09/26/2017		
Date of site inspection: 02/09/2017		
Type of review: Statutory		
Review number: 2 (second)		
Triggering action date): 09/26/2012		
Due date *(five years after triggering action date)*: 09/26/2017		

II. RESPONSE ACTION SUMMARY

BASIS FOR TAKING ACTION

Potential complete exposure pathways to human and ecological receptors were identified in the 2004 Record of Decision (ROD) based on data collected for the 2004 Baseline Human Health Risk Assessment (BHHRA). The exposure scenarios are discussed further in the following section, Response Action-Summary of Pre-ROD Activities, of this FYR.

Contaminants found on the Site that warranted remedial action include:
<u>For Soil -</u>
<u>Volatile Organic Compounds (VOCs):</u>
- Tetrachloroethene (PCE)
- 1,1,1-Trichloroethane (1,1,1-TCA)

<u>Semi-Volatile Organic Compounds (SVOCs):</u>
- 2-Methylnaphthalene
- Naphthalene

<u>Inorganics:</u>
- Cadmium
- Chromium
- Cyanide
- Iron
- Manganese.

<u>For Groundwater -</u>
<u>Volatile Organic Compounds (VOCs):</u>
- Chloroform
- 1,1-Dichloroethane (1,1-DCA)
- 1,1-Dichloroethene (1,1-DCE)
- Trichloroethene (TCE)
- PCE
- 1,1,1-TCA

<u>Semi-Volatile Organic Compounds (SVOCs):</u>
- 2-Methylnaphthalene
- Naphthalene
- Pentachlorophenol

<u>Inorganics:</u>
- Arsenic
- Cadmium
- Cyanide
- Iron
- Manganese
- Nickel.

Based on historical records, the following areas of the Site were identified as sources of contamination:

- Contaminated soil at the backdoor of the workshop, an alleged location of illicit dumping,
- Contaminated soil behind the building near a broken pipe,
- Contaminated soil in the abandoned vat area, and
- Contaminated soil near the former concrete lagoon.

RESPONSE ACTIONS

Summary of Pre-ROD Activities:
BRP has been the subject of numerous investigations, warnings, violations, and court orders from the EPA and the North Carolina Department of Environment and Natural Resources (NCDENR, currently the NC Department of Environmental Quality, DEQ). In December 1980, NCDENR inspected the facility under Resource Conservation and Recovery Act (RCRA). Soil samples revealed the presence of 1,1,1-TCA, TCE, toluene, and cadmium. NCDENR sent BRP a compliance order in March 1987. In June 1989, NCDENR RCRA inspectors determined the facility had not address numerous aspects of the March 1987 compliance order. After 1990, BRP claimed the facility discontinued discharging wastewater to the sewer system. However, the Federal Bureau of Investigation ascertained the facility continued to discharge to the sewer system. In 1991, a federal court found BRP guilty of discharging heavy metals in excess of legal limits to the sewer system.

In 1993, NCDENR served another injunction to BRP for not submitting a closure plan. In 1997, NCDENR received a complaint that BRP was disposing of plating wastes by dumping them outside the back door and through cracks in the floor. Consequently, NCDENR requested the EPA to collect environmental samples at the facility. The April 1998 sampling effort found elevated levels of cadmium, chromium, copper, cyanide, nickel, tin, and zinc in samples collected from inside and outside the BRP building. As a result of this sampling effort, the facility was placed in Comprehensive Environmental Response, Compensation, and Liability Information System in October 1998.

NCDENR conducted the Preliminary Assessment/Site Inspection in July 1999 and an Expanded Site Investigation was conducted in September 2000. In an October 2002 correspondence, the NCDENR RCRA Program deferred the Site to the Superfund Program.

From September 2002 through September 2004, a Remedial Investigation/Feasibility Study (RI/FS) was conducted. The RI characterized the nature and probable extent of the hazardous waste at the Site in soil, groundwater, and surface water/sediment. The major key points of the RI are summarized below:

- Thirteen of the twenty surface soil sample locations indicate inorganic contamination higher than regulatory limits.
- Groundwater at the BRP Site contains inorganic and organic constituents at concentrations greater than the lowest regulatory screening values.
- The most important fate and transport processes acting on contaminants in the groundwater at the site are most likely: Adsorption and advection for inorganic contaminants; Biodegradation or other transformation reactions for volatile organic contaminants; and Adsorption and biodegradation for semi-volatile organic contaminants. Oxidizing conditions are likely to exist in the groundwater at the BRP Site as evidenced by the high redox and dissolved oxygen values

recorded during groundwater sampling; therefore, constituents such as chromium, nickel, and zinc may be the more susceptible inorganics to migrate in groundwater.
- Overall, inorganic contamination associated with the electroplating process is widespread throughout the various environmental media at the BRP Site. Based on surface water and sediment samples collected offsite, the only constituents that have appeared to migrate considerably in these media are copper, cyanide, and zinc.

A BHHRA was conducted as part of the RI. The BHHRA evaluated the contaminants associate with surface and subsurface soils; shallow and deep surficial groundwater; and surface water and sediment along exposure pathways and receptors. Risks were evaluated for the following four scenarios: future on-Site adult/child resident; on-Site industrial worker; construction worker; and adolescent trespasser. The results concluded there were no current unacceptable carcinogenic or non-carcinogenic risk for any of these four scenarios. None of these four scenarios resulted in an unacceptable future carcinogenic or non-carcinogenic risk for an adolescent trespasser. However, hypothetical exposure scenarios resulted in potential unacceptable risk for future construction worker and adult/child resident. The largest contributor for the construction worker was ingestion of and dermal contact with metals in the soil as well as metals ingestion in groundwater. The largest contributor to the future adult/child resident included ingestion of and dermal contact with polycyclic aromatic hydrocarbons and arsenic in the surface soil as well as ingestion and dermal contact of VOCs in the groundwater. An ecological risk assessment was also conducted and the area of concern for ecological risk coincides with the area of concern for human health. The conclusion reached in the *"Toxicity and Bioaccumulation Potential of Sediment Samples from BRP Site"* (August 2006) was while it was unclear if sediments would be toxic or bioaccumulate, the concentrations are above the alternative toxicity values, indicating a possible issue on the south side of the unnamed tributary.

On September 14, 2005, the Site was placed on the National Priorities List (NPL) established pursuant to 42 United States Code (U.S.C.) Section 9605(a)(8).

Remedial Action Objectives (RAOs):
The ROD for the Site was signed on September 29, 2004. As stated in the 2004 ROD Section VIII: RAOs, *"CERCLA, as amended by Section 121(b) of* Superfund Amendments and Reauthorization Act *(SARA), requires the selection of remedial actions that attain a degree of cleanup which ensures protection of human health and the environment, are cost effective, and use permanent solutions and alternative treatment technologies or resource technologies to the maximum extent practicable. To satisfy CERCLA requirements, RAOs were developed for the Blue Ridge Plating Site. RAOs will be used to develop general response actions for the Site that are protective of current and future construction worker, future Site residents, and the environment.*

The key contaminants of concern (COCs) *are metals along with a number of volatile organic compounds (VOCs) and semi- volatile organic compounds (SVOCs). The soil/sediment cleanup goals were derived from predominantly leachate models for the metals in order to be protective of the underlying groundwater along a health based risk level for chromium. The groundwater cleanup goals were based on Applicable or Relevant and Appropriate Requirements (ARARs) (North Carolina Groundwater Classifications and Standards (I5A NCAC 2L) (NC 2L)) or background concentrations. The following are Site-specific RAOs for each environmental medium:*

Surface Soil/Dry Sediment

- *Prevent ingestion, inhalation, or direct contact with soil containing contaminants at concentrations in excess of total hazard indices greater than 1 and/or a cumulative excess lifetime cancer risk greater than one out of one ten thousand (1 out of 10,000) for a future construction worker use scenario.*
- *Prevent migration of contaminants to prevent degradation of natural resources. The presence of the contaminants in the soil matrix presents a possible source for groundwater at the Site via leaching and surface water/sediment contamination at the Site via surface runoff.*

Groundwater

- *Prevent ingestion or direct contact with groundwater containing constituents at concentrations in excess of current NCAC 2L groundwater standards or federal regulatory drinking water standards* (Maximum Contaminant Levels) *MCLs and total Hazard Indices greater than 1.*
- *Prevent migration of contaminants to prevent degradation of natural resources."*

Table 1 is the Soil Remediation Levels as specified in the 2004 ROD along with the rationale for the remediation goal. Table 2 is the Groundwater Remediation Levels as specified in the 2004 ROD as modified by the 2008 Explanation of Significant Difference (ESD) along with the rationale for the remediation level. Appendix E presents a discussion of Site ARARs.

Remedy Components:

2004 ROD:

The 2004 ROD required the following cleanup activities:

- Excavation, treatment (if needed), and off-Site disposal for contaminated soils/sediments, which exceed cleanup levels.
- Monitored Natural Attenuation (MNA) for contaminated groundwater. In the event MNA cannot be substantiated after the removal of the contaminated soils, a groundwater contingency remedy includes in-situ chemical oxidation/reduction/immobilization and long-term monitoring. The decision to implement a contingent remedy will be made after three years of collecting groundwater data following the completion of the soil cleanup.
- Installation of additional groundwater monitoring wells and conducting groundwater modeling to assess MNA.
- Implementation of institutional controls (ICs).
- Conduct FYRs every five years until the levels of contaminants in the groundwater reach their specific cleanup level.

2008 Explanation of Significant Difference (ESD):

In June 2008, an ESD was issued for the Site to correct a transcription error in Table 18 of the 2004 ROD that listed the cleanup levels for COCs in the groundwater for 1,1-DCA. The cleanup goal for 1,1-DCA in the ROD was stated to be 0.38 micrograms per liter (µg/L) when the actual concentration should have been 700 µg/L, based on the 2004 NC 2L Groundwater Standard. This correction did not change, alter, or modify the groundwater remediation strategy or the anticipated cleanup time frame for the groundwater remedial action.

Table 1: Soil Remediation Levels

Contaminant	Leachability of Soil Contamination to Groundwater (mg/kg)	Remediation Level (mg/kg)	Rationale for Remediation Level
VOCs			
Tetrachloroethene (PCE)	7.4	7.4	1
1,1,1-Trichloroethane (1,1,1-TCA)	1,670	1,670	1
SVOCs			
2-Methylnaphthalene	1,720	1,720	1
Naphthalene	585	585	1
Inorganics			
Cadmium	2.7	2.7	1
Chromium	-	882	2
Cyanide	31.1	31.1	1
Iron	151	49,000	3
Manganese	65.2	772	4

NOTES:
1. mg/kg = milligrams per kilogram
2. Concentration of constituent that remain in soil without leachate adversely impacting groundwater quality above the NC 2L Standard
3. Construction worker scenario from Baseline Human Health Risk Assessment
4. Regional soil concentration obtained from NCDENR (currently NCDEQ)
5. Site specific background concentration

Table 2: Groundwater Remediation Levels

Contaminant	Remediation Level (μg/L)	Rationale for Remediation Level
VOC		
Chloroform	0.19	1
1,1-Dichloroethane (1,1-DCA)	700*	1
1,1-Dichloroethene (1,1-DCE)	7	1
Tetrachloroethene (PCE)	0.7	1
1,1,1-Trichloroethane (1,1,1-TCA)	200	1
Trichloroethene (TCE)	2.8	1
SVOC		
2-Methylnaphthalene	14	1
Naphthalene	21	1
Pentachlorophenol	0.3	1

Table 2: Groundwater Remediation Levels		
Contaminant	**Remediation Level** (µg/L)	**Rationale for Remediation Level**
Inorganics		
Arsenic	10	1
Cadmium	5	1
Cyanide	154	1
Iron	3,800	2
Manganese	300	2
Nickel	100	1

NOTES:
1. µg/L = micrograms per liter
2. North Carolina Administrative Code 15 NCAC 02L
3. Site Specific background concentration

* 2008 ESD changed Remediation Level from 0.38 micrograms per Liter to 700 micrograms per Liter

STATUS OF IMPLEMENTATION

Soil

Metals contamination appeared to be widespread in the surface soils and to a lesser extent in shallow subsurface soils, primarily 2 to 4 feet below land surface (bls). The following contaminants were identified as the BRP Site-specific COCs for soil media: PCE, 1,1,1-TCA, 2-methylnapthalene, naphthalene, cadmium, chromium, cyanide, iron, and manganese. The majority of the soil contamination was found within the top 1.5 feet. The remedial activities were conducted between December 2006 and June 2007 and included subdividing the 1.6 acres to be excavated into 50 feet by 50 feet grids (perimeter sampling expanded to approximately 2.1 acres). The remediated areas were backfilled, graded, and re-seeded. A total of 13,105 tons (8,737 cubic yards [yd^3]) of soil was removed and 6,105 tons (4,070 yd^3) of soil was backfilled and graded. Upon completion of soil remediation activities, analytical data indicated that 39 grids and the perimeter grids had been remediated to below the action levels. However, five grids were still slightly above action levels. Refer to Appendix D, Figure 3 for a map of the grid locations.

Excavation was terminated based on the fact that the results were near the remediation levels identified for the Site and the grids would be backfilled with a minimum of 2 feet of clean compacted soil. This 2 feet minimum compacted layer of clean backfill material would minimize human exposure and the threat to ecological receptors. On July 24, 2007, EPA personnel traveled to the Site to re-sample grid EG-8, which had soils notably above the remediation levels (cadmium at 21 mg/kg and manganese at 2,700 mg/kg). After marking out the boundary of the grid, two five-point composite soil samples were collected from this grid. To insure the soil cleanup effort was successful, this same sampling effort was duplicated for grids EG-16 and EG-17. The analytical results for all of the COCs for these soil samples were below cleanup levels. EPA determined that grid EG-8 met the cleanup levels. The average concentration of cadmium left on Site in all grids is approximately 1.2 mg/kg (omitting all non-detects), which is below the cleanup level. In addition, the former pond, which had silted in over the years on the adjacent downgradient property, was excavated to remove the contaminated sediment that had accumulated in the pond basin. At the request of the property owner, this excavation was not backfilled with clean fill. The property owner planned on repairing the earthen dike/dam and reforming the pond.

Groundwater

Volatile and semi-volatile organic contaminants were detected in isolated areas of the aquifer beneath the BRP Site. COCs for groundwater include: chloroform; 1,1-DCA; 1,1-DCE; PCE; 1,1,1- TCA; TCE; 2-methylnapthalene; naphthalene; pentachlorophenol; arsenic; cadmium; cyanide; iron; manganese; and nickel. Cadmium and manganese contamination delineate the boundaries of the plume. For the groundwater cleanup phase, the ROD selected MNA as the Remedial Action. However, injecting a reagent(s) in the underlying aquifer to oxidize/reduce/immobilize the contaminants in place along with long-term monitoring was included as a contingent remedy for groundwater.

Surface Water and Sediment

The BHHRA concluded that surface water was not a media of concern for any scenario; therefore, no COCs were selected. Cadmium, chromium, and iron were determined to be COCs in dry sediment/surface soil.

Institutional Controls (ICs)

The ROD called for ICs in the form of land use restrictions or restrictive covenants. As part of the negotiated agreement between EPA and the BRP Company, the BRP Company would place ICs on the BRP property using the State's Declaration of Perpetual Land Use Restrictions (DPLUR) process. ICs in the form of Land Use Restrictions were signed on March 13, 2017. Appendix H contains a copy of the DPLURs for the BRP property. Table 3 summarizes the ICs status and Figure 5 is an IC overlay map of the property boundary.

Groundwater contamination has been detected in off-Site monitoring wells, southwest of the property, above safe drinking water standards (NC 2Ls and/or MCLs). As stated previously, groundwater in the vicinity is not being used as a drinking water source. However, there are no instruments in place to prevent the installation of a drinking water well on the properties that have been impacted. ICs are needed on the properties were groundwater contamination is detected above safe drinking water standards.

Table 3: IC Summary Table					
Media	**ICs Needed**	**ICs Called for in the Decision Documents**	**IC Objective**	**Parcel and Deed Book/ Page(s)**	**Instrument in Place**
Groundwater Soil	Yes	Yes	ICs may include but not limited to deed restrictions or covenants. To limit the use of the property for exclusively commercial or industrial purposes	9644-91-4587-00000 Deed Book 5529 Deed Page 1745 Plat Book 0172 Plat Page 0150	Declaration of Perpetual Land Use Restrictions
Groundwater	Yes	Yes	ICs may include but not limited to deed restrictions or covenants or local ordinances to prevent installation of potable wells into contaminated groundwater.	9644-91-2501-00000 Deed Book 1395 Deed Page 0644 Plat Book 0000 Plat Page 0000 9644-91-0522-00000 Deed Book 1686 Deed Page 0571 Plat Book 0061 Plat Page 0184 9644-81-9812-00000 Deed Book 2092 Deed Page 0230 Plat Book 0047 Plat Page 0133	

System Operation/Operation and Maintenance (O&M)

The EPA tasked Versar (formerly J. M. Waller Associates) to collect annual groundwater samples from the Site's monitoring well network and prepare an Annual Data Evaluation Report based on the analytical data for each sampling event. The April 2017 Data Evaluation Report presents data and information obtained during the annual sampling event in June 2016 and compares it to groundwater data collected at the Site since 2007, the completion of the soil remediation action. The 2016 sampling event included collection of samples from 27 of the 28 on-Site monitoring wells. Monitoring well MW-19D, which is an off-Site well downgradient of the BRP property, was not sampled as the well was destroyed by construction activities. Three additional monitoring wells owned and maintained by Duke Energy were also sampled during the 2016 sampling event. These three wells are also downgradient of the BRP property and close to Lake Julian.

As provided by Versar, Table 4 below describes the O&M costs and the events conducted each year, which clarifies the fluctuations in O&M costs.

III. PROGRESS SINCE LAST FIVE-YEAR REVIEW

This is the second FYR Report. This section includes the protectiveness determinations and statements from the 2012 FYR and the current status of those recommendations.

Table 5 provides the protectiveness statement included in the 2012 FYR and Table 6 summarizes the issues and recommendations stated in the 2012 FYR report. Table 6 also provides the implementation status and/or completion of these recommendations.

Table 4: O&M Costs and Events Conducted from 2012-2016

Year	Cost (rounded off to nearest $100)	Activities
2016	$34,300	Annual groundwater sampling event including sampling of the three Duke Energy Wells. No MNA parameters collected.
2015	$49,200	Annual groundwater sampling event including sampling of the three Duke Energy Wells. Eliminated MNA parameter analyses. Costs for 2014 annual report were incurred in 2015.
2014	$63,400	Annual groundwater sampling event plus a second mobilization to sample three wells owned by Duke Energy. Costs for 2013 annual report were incurred in 2014.
2013	$52,400	Annual groundwater sampling event including new wells installed in 2012 plus disposal of 73 investigative derived waste drums from previous Site investigations.
2012	$88,100	Annual groundwater sampling event plus additional surface water and sediment sampling for 5-year review. Installed 5 new monitoring wells to further delineate downgradient groundwater contamination.

Table 5: Protectiveness Determination/Statement from 2012 FYR		
Sitewide	**Protectiveness Determination**	**Protectiveness Statement**
Sitewide	Short-term Protective	The remedy at the Site currently protects human health and the environment in the short term because 1) the soil contamination was remediated through source removal and 2) currently, no human exposure pathways exist to contaminated groundwater as municipal water is supplied at and surrounding the Site. As this is the first FYR, MNA data is currently being gathered and the appropriateness of MNA needs to be determined. However, in order for the remedy to be protective in the long-term, the following actions need to be taken to ensure long-term protectiveness: implement institutional controls, complete delineation of the VOC plume, and issue an ESD to 1) allow the collection of additional groundwater data to complete the evaluation of monitored natural attenuation and 2) revise performance standards for 1,1-DCA and cyanide.

Table 6: Explanation and Discussion of Recommendations and Issues Highlighted 2012 FYR				
Issues	**Recommendations**	**Current Status**	**Current Implementation Status Description**	**Completion Date (if applicable)**
ICs have not been implemented (i.e., NCDENR Perpetual Land Use Restrictions)	Implement Perpetual Land Use Restrictions	Completed	Declaration of Perpetual Land Use Restrictions	March 13, 2017
Downgradient of the Site needs additional groundwater investigation	Install additional monitoring wells downgradient to complete plume delineation	Completed	Wells MW15S and MW15D installed	December 12, 2010
		Completed	Wells MW16S and MW16D installed	January 10, 2012
		Completed	Wells MW17, MW18, MW19, MW20 installed	December 06, 2013
Additional data is necessary in order to determine if implementing contingent groundwater remedy is necessary	Issue an ESD to allow the collection of additional groundwater data to complete the evaluation of monitored natural attenuation	Ongoing	Adjust the three-year MNA groundwater monitoring sampling schedule to begin after the completion of the 2015 Emergency Response Action	NA
Current performance standards for 1,1-DCA and cyanide are not protective of human health	Issue an ESD to revise performance standards for 1,1-DCA and cyanide	Ongoing	ESD needed	NA

In December 2013, the City of Asheville determined that the building on the BRP property was unsafe and advised no entry into the building, which subsequently closed the facility. Because of the presence of hazardous substances that remained on Site, the EPA initiated an emergency response action at the property. Based on the EPA Action Memorandum dated November 18, 2014, the City of Asheville, the EPA and the NCDEQ RCRA program documented building disrepair; numerous containers or vats of highly corrosive materials in poor condition; and evidence of suspected plating waste solid residue on the floor along the base of the plating line. The response action began in December 2014 and was completed in May 2015. The response action included a pre-demolition asbestos inspection, demolition of the building, removal of the concrete floor, removal of 3,950 tons of contaminated soil from under the footprint of the building, and abandonment of an old supply well.

IV. FIVE-YEAR REVIEW PROCESS

COMMUNITY NOTIFICATION, INVOLVEMENT, & SITE INTERVIEWS

The NC DEQ Superfund Section performed the second FYR process for the BRP Site. Beth Hartzell (Environmental Engineer) and Stephanie Grubbs (Hydrogeologist) from NC DEQ were responsible for gathering and reviewing data for this review and compiling all the information into the FYR Report for the EPA. Telephone and/or email discussions/interviews with Jon Bornholm (EPA RPM) were conducted.

The community was notified via a public notice in the local newspaper, The *Asheville Citizen Times*, on March 24, 2017 regarding the FYR process at the Site. A copy of the public notice is included in Appendix F. Due to a low level of interest, no community interviews were conducted for this review. This low community interest assessment was made by EPA during the emergency response action.

After the FYR has been approved and signed by the EPA, copies will be placed for the public to view at: the EPA Record Center, 11th Floor, 61 Forsyth Street, SW, Atlanta, GA 30303; the information repository for the Site located at the Buncombe Skyland Library, 260 Overlook Road, Asheville, North Carolina; and, on the EPA website (https://www.epa.gov/superfund/search-superfund-five-year-reviews).

DATA REVIEW

The annual Data Evaluation Reports by Versar were developed under an EPA task order for sampling and analytical support at the Site. As stated in the report, *"The goal is to collect groundwater and MNA data to evaluate whether the ongoing MNA is a viable remedy for the groundwater at the Site."*

<u>*Groundwater*</u>

Since the previous FYR, four annual sampling events have occurred, March 2013, August 2014, July 2015, and June 2016. During the most recent sampling event in June 2016, groundwater samples were collected from 27 of 28 monitoring wells. Monitoring wells located on the BRP property include: MW01S, MW01D, MW03S, MW04S, MW05S, MW06S, MW06D, MW07S, MW08S, MW09S, MW09D, MW10S, MW11S, MW12S, AND MW12D. Monitoring wells located off Site include: MW13S, MW13D, MW12S, MW14D, MW15S, MW15D, MW16S, MW16D, MW17S, MW17D, MW18D, MW19D, AND MW20D. The "S" indicates a monitoring well screened in the shallow region of the underlying aquifer and the "D" indicates a monitoring well screened in the deeper zone of the underlying aquifer. MW19D, an off-Site well, was not sampled as the well was destroyed during construction activities at the well location. In addition, three off-Site wells (AMW-3A, AMW-3B, and MW-10), which are owned and maintained by Duke Energy, were sampled in the 2016 sampling event. See Appendix D Figure 4 for a monitoring well location map. Appendix G, 2016 Data Evaluation Report, Table 3-1 is a table of all the Groundwater Analytical Data Summary from September 2007 through June 2016.

The following contaminants were detected above ROD cleanup levels during the 2016 sampling event:

- 1,1-DCE: MW01D, MW06S, MW08S, MW10S, MW11S, MW13D, MW15S, MW16D, MW20D
- Chloroform: MW06S, MW11S, MW12D, MW13D, MW16D, MW17S, MW20D
- PCE: MW01D, MW06D, MW06S, MW08S, MW09D/MW09S (upgradient wells), MW10S, MW11S, MW12D, MW12S, MW13D, MW14D, MW15D, MW15S, MW16D, MW17D, MW17S, MW20D
- TCE: MW06S, MW08S, MW11S, MW12D, MW12S, MW13D, MW16D, MW20D
- Cadmium: MW03S, MW05S, MW12S
- Iron: MW01D, MW04S
- Manganese: MW01S, MW03S, MW04S, MW05S, MW12S, MW16D, MW16S

The following contaminants were not detected above ROD cleanup goals but were detected above the 2013 amended North Carolina Groundwater Standards (NC 2L) during the 2016 sampling event:

- 1,1-DCA: MW06S, MW08S, MW10S, MW11S, MW12S, MW16D
- Cadmium: MW01S, MW16S
- Iron: MW01S, MW03S, MW13D, MW16S, MW17D, MW18D
- Manganese: MW01D, MW10S, MW11S, MW13S, MW15D, MW15S, MW17S, MW18D

In addition, the contaminants listed below were not detected during the Remedial Investigation and therefore included in the ROD but have been detected in the groundwater during recent groundwater sampling events above either current EPA MCLs or NC 2L:

- 1,4-Dioxane: MW01D, MW06D, MW06S, MW12D, MW13D, MW16D
- 1,1,2-Trichloroethane (1,1,2-TCA): MW6S, MW11S
- 1,2-Dichloroethane (1,2-DCA): MW6S
- Carbazole: MW01S
- Chromium: MW06S, MW10S
- Cobalt: MW01S, MW05S, MW06S, MW10S, MW12S, MW16S

Groundwater analytical results indicated that chlorinated VOCs were detected at concentrations above the ROD cleanup levels in 21 of the 30 wells sampled. In the 2016 data, the highest VOC concentrations were detected in MW06S. The metals cadmium, iron, and manganese were detected above ROD cleanup levels, with exceedances of cadmium in four wells (MW03S, MW05S, MW07S, and MW12S), iron in two wells (MW01D and MW04S), and manganese in eight wells (MW01S, MW03S, MW04S, MW05S, MW07S, MW12S, MW16D, and MW16S). Appendix G (Table 3-1) is a table of all the Groundwater

The Site Inspection Checklist notes that no vandalism was evident. All monitoring wells were located and in good condition. However, MW-7S, MW-14S, and MW-14D were unlocked and new locks for these wells are needed. The EPA said they would supply the new locks. Monitoring data is routinely submitted and the MNA groundwater monitoring is conducted annually. Appendix C is the completed Site Inspection Checklist.

V. TECHNICAL ASSESSMENT

QUESTION A: IS THE REMEDY FUNCTIONING AS INTENDED BY THE DECISION DOCUMENTS?

Yes. As stated in the 2016 Data Evaluation Report, Versar recommends continuing annual groundwater monitoring in accordance with the recommendations of the First FYR. Groundwater concentrations, based on statistical testing, suggest chlorinated VOC concentrations generally appear to be decreasing in most shallow wells. However, in the deep wells, either an increasing trend, stable trend, or no trend is evident. For inorganics, data indicates most wells display decreasing trend, stable trend, or no trend. The only metals data set with an increasing trend was iron in MW04S.

One of the unresolved, carry-over issues from the First FYR was the need for an ESD to allow for the collection of additional groundwater data to complete an evaluation of the MNA remedy. This issue as stated in the previous FYR was recommended due to the ROD requiring a decision to potentially implement a contingent remedy "*will be made after three years of collecting groundwater data following the completion of the soil cleanup*". However, as stated in the "Data Review" section, EPA/NC DEQ concur it is appropriate to continue MNA groundwater monitoring and to start the three-year MNA monitoring schedule from the completion of the 2015 Emergency Reponses Action. This three-year monitoring period would run from May 2015 to May 2018. Following the collection of this data, a decision on appropriateness of MNA at this site, using EPA's guidance on MNA, will be made.

Currently, no human exposure pathways exist to contaminated soil or groundwater. The remedy remains protective in the short-term in that ICs are in place on the BRP property and MNA groundwater monitoring is occurring annually. However, the groundwater plume has migrated off Site; therefore, it is recommended to identify and evaluate potential ICs on properties within the vicinity of the site.

QUESTION B: ARE THE EXPOSURE ASSUMPTIONS, TOXICITY DATA, CLEAN-UP LEVELS AND REMEDIAL ACTION OBJECTIVES (RAOS) USED AT THE TIME OF THE REMEDY STILL VALID?

No. The NC Classifications and Water Quality Standards Applicable to the Groundwater of North Carolina, NCAC Title 15A Subchapter 2L, on which some of the remedial levels are based, were last amended on June 1, 2013. CERCLA requires that the remedy comply with any standard, requirement, criteria, or limitation under any Federal environmental law (such as Federal MCLs here), as well as any promulgated State standard that is more stringent than any federal standard. Currently, six compounds have NC 2L standards more stringent than the ROD designated cleanup level. These compounds are 1,1-DCA, naphthalene, cadmium, cyanide, iron, and manganese. It should be noted that naphthalene and cyanide are currently not detected above the ROD cleanup levels or the new NC 2L. Table 9 presents a comparison of the 2005 ROD, as modified, remediation levels to groundwater current standards.

Table 8: Trend Evaluation of the Groundwater Data from 2007 to 2016

Contaminants	Wells with Decreasing or Probably Decreasing Trend	Wells with Increasing or Probably Increasing Trend	Wells with No Trend or Stable Trend
SVOC			
Naphthalene	None	None	MW01S
Pentachlorophenol	None	None	MW01S
Inorganics			
Cadmium	MW01S, MW06S, MW07S, MW08S	None	MW03S, MW05S, MW12S
Cyanide	MW06S	None	None
Iron	MW07S	MW04S	MW03S, MW05S, MW08S
Manganese	MW01S, MW03S, MW05S, MW06S, MW08S, MW10S, MW12D, MW13D, MW14D, MW15S, MW16S, MW16D, MW17S, MW17D, MW20D	None	MW04S, MW07S, MW12S, MW13S, MW18D

In June 2017, the US EPA reviewed the most recent groundwater data as part of the FYR. It was noted that the recent remedial action (the Emergency Response Action which occurred from December 2014 through May 2015 and included the demolition of the on-Site dilapidated building and removal of 3,950 tons of contaminated soil from under the footprint of the building) appears to have caused a brief increase in groundwater contaminant concentrations due to the increased groundwater recharge through the contaminated areas as the soils were being excavated or disturbed. This soil disturbance would only be reflected in the groundwater data from the most recent monitoring results, July 2015 and June 2016. Appendix I is a copy of the 2017 EPA Memorandum-Hydrogeology Review.

As stated in the ROD, the decision to implement a potential contingent remedy "*will be made after three years of collecting groundwater data following the completion of the soil cleanup*". Based on the 2014-2015 Emergency Response Action, which is a component of the soil cleanup as well as the assessment of increased groundwater recharge and subsequent increase in groundwater contaminant concentration, it would be appropriate to continue MNA groundwater monitoring for the three years as called for in the ROD and to start the three-year monitoring MNA schedule from the completion of the 2015 Emergency Reponses Action.

SITE INSPECTION

The inspection of the Site was conducted on February 02, 2017. In attendance were Jon Bornholm (EPA), and Beth Hartzell (NC DEQ). The purpose of the inspection was to assess the protectiveness of the remedy.

As stated within the 2016 Data Evaluation Report, 25 wells had enough data sets that qualified for statistical calculations. From these 25 wells, 100 data sets were analyzed to determine trends in concentrations of contaminants of concern over time. The data sets analyzed primarily were limited to those containing constituents exceeding the ROD cleanup levels. The Mann-Kendall statistical test was used to identify statistically significant trends in the groundwater contaminant concentrations generated from the sampling events that have occurred from September 2007 through June 2016. The Mann-Kendall test is a nonparametric test that can help identify changes in contaminant concentrations over time, for a minimum of four samples. This test cannot verify the rate at which concentrations are changing. Results of the trend evaluation are summarized in Table 8.

In the Conclusions and Recommendations for the 2016 Data Evaluation Report, it was noted that,

"Based on analysis of groundwater concentration trends at the Site using the Mann-Kendall statistical test, chlorinated VOC concentrations generally appear to be exhibiting a decreasing trend in most shallow wells but either an increasing trend, stable trend, or no trend in most deep wells. For metals, the Mann-Kendall test indicated that most wells display decreasing trend, stable trend, or no trend. The only metals data set with an increasing trend was iron in MW04S.

Based on groundwater monitoring data collected from 2007 through 2016, Versar recommends continuing annual groundwater monitoring in accordance with the recommendations of the First Five Year Review."

Table 8: Trend Evaluation of the Groundwater Data from 2007 to 2016

Contaminants	Wells with Decreasing or Probably Decreasing Trend	Wells with Increasing or Probably Increasing Trend	Wells with No Trend or Stable Trend
VOCs			
1,1,1-Trichloroethane	MW06S, MW10S, MW11S	None	None
1,1-Dichloroethane	MW06S, MW08S, MW10S, MW18D	MW12D, MW13D	MW01D, MW06D, MW11S, MW12D, MW16D, MW17S, MW20D
1,1-Dichloroethene	MW06S, MW08S, MW10S, MW18D		MW01D, MW06D, MW11S, MW16D, MW17S, MW20D
Chloroform	MW01S, MW05S, MW06S, MW08S, MW12D	MW11S	MW01D, MW12S, MW13D, MW15D, MW16D
Tetrachloroethene	MW08S, MW10S	MW12D, MW13D, MW15D	MW01D, MW06D, MW06S, MW09S, MW11S, MW13S, MW14D, MW15S, MW16D, MW17S, MW17D, MW20D
Trichloroethene	MW08S, MW10S	MW13D	MW06S, MW11S, MW12S, MW12D, MW13S, MW15S, MW16D, MW17S, MW20D

Analytical Data Summary from September 2007 through June 2016. Table 7 lists the COCs detected above remedial levels and/or NC 2Ls between the following years: 2013-2016.

Table 7: COCs Detected Above Remedial Levels and/or NC 2Ls (2013-2016)

COC	ROD Remedial Level (µg/L)	2013 NC 2L (µg/L)	Maximum Detected Concentration (µg/L)			
			2013	2014	2015	2016
VOCs						
1,1-Dichloroethene	7	7	**160**	**120**	**190J**	**120**
Chloroform	0.19	70	1.8	1.9	1.8	1.7
Tetrachloroethene	0.7	0.7	**100**	**130**	**140J**	**150**
Trichloroethene	2.8	3	**35**	**38**	**33**	**26**
Inorganics						
Cadmium	5	2	**37**	**14**	**12**	**19**
Cyanide	154	70	**110**	**110**	36	41
Iron	3,800	300	**6,200**	**18,000**	**10,000**	**10,000**
Manganese	300	50	**2,400**	**2,700**	**2,400**	**2,900**
Contaminants not Specified in the ROD						
1,1-Dioxane	NE	3	-	**10**	**26**	**42**
1,1,2-Trichloroethane	NE	0.6	**2.3**	**0.94**	**6.7**	**2.7**
1,2-Dichloroethane	NE	0.4	**0.68J**	**0.54**	**2.3**	**0.57J**
Vinyl Chloride	NE	0.03	**0.5**	0.25J	-	-
Carbazole	NE	2	-	**11**	**6.9**	**3.5**
Barium	NE	700	**860**	**940**	690	560
Chromium	NE	10	**230**	**60**	**56**	**45**
Cobalt	NE	1	**34**	**28**	**28**	**29**
Vanadium	NE	0.3	**17**	**16**	**12**	**6.2**

Analytical results exceeding the ROD Cleanup Levels are shaded
Bold Print - Analytical results exceeding the NC 2L Groundwater Standard are **Bold Print**
µg/L - micrograms per Liter

Three nested wells located northwest of the BRP Site near the southern end of Lake Julian (AMW-3A, AMW-3B, and MW-10) are owned and maintained by Duke Energy. These wells have been sampled annually with the permission of Duke Energy since November 2014 to support monitoring of the Site. MW-10 is completed across the water table in the upper part of the saprolite aquifer, AMW-3A is completed to the top of bedrock at the base of the saprolite aquifer, and AMW-3B is completed in the bedrock aquifer. The only exceedances of ROD cleanup levels in these wells in June 2016 were the chloroform concentrations in AMW-3A (estimated 0.44 µg/L) and AMW-3B (estimated 0.32 µg/L). Additionally, chromium (59 µg/L) and vanadium (6.2 µg/L) exceeded NC 2L in AMW-3A, and manganese (190 µg/L) exceeded the standard in MW-10.

In addition to the compounds with amended NC 2Ls, there are nine compounds, which were not specified in the ROD as COCs, which do not have cleanup levels. These nine compounds (1,4-dioxane, 1,1,2-trichloroethane, 1,2-dichloroethane, vinyl chloride, carbazole, barium, chromium, cobalt, and vanadium) have been detected above either the NC 2L or federal MCLs in one or more wells. Table 10 lists these nine contaminants along with their current MCL and/or NC 2L groundwater standard.

Table 9: ARAR Comparison of Remediation Levels and Current Standards

Contaminant	Cleanup Level (µg/L)	Current NC 2L (As of June 1, 2013) (µg/L)	Current Federal MCL (µg/L)	Change in ARAR? Yes/No
VOC				
Chloroform	0.19	70	-	Yes
1,1-Dichloroethane	700	6	-	**Yes**
1,1-Dichloroethene	7	350[1]	7	Yes
Tetrachloroethene	0.7	0.7	5	No
1,1,1-Trichloroethane	200	200	200	No
Trichloroethene	2.8	3	5	Yes
SVOC				
2-Methylnaphthalene	14	30	-	Yes
Naphthalene	21	6	-	**Yes**
Pentachlorophenol	0.3	0.3	1	No
Metals				
Arsenic	10	10	10	No
Cadmium	5	2	5	**Yes**
Cyanide	154	70	200	**Yes**
Iron	3,800	300	300[2]	**Yes**
Manganese	300	50	50[2]	**Yes**
Nickel	100	100	-	No

[1] This is the federal MCL. Where private drinking water well or public water supply system is impacted, the applicable standard is 7, 15A NCAC 02L .0202
[2] Secondary Drinking Water Regulation
BOLD indicated the new standard is more stringent than the ROD Cleanup Goal
(µg/L)- micrograms per Liter

The EPA emergency response action left the BRP property as a vacant parcel. In March 2017, the BRP property was sold. Currently, there have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy. The exposure assumptions, toxicity data, RAOs used at the time of the remedy are still protective of human health and the environment and land use restrictions have been implemented on the property.

QUESTION C: HAS ANY OTHER INFORMATION COME TO LIGHT THAT COULD CALL INTO QUESTION THE PROTECTIVENESS OF THE REMEDY?

No additional information has come to light that could call into question the protectiveness of the remedy.

Table 10: Groundwater Standards for Compounds Not-Specified in the ROD and Currently Detected in Groundwater

Contaminant	**Current NC 2L (As of June 1, 2013)** (micrograms per Liter)	**Current Federal MCL** (micrograms per Liter)
VOC		
1,2-Dichloroethane	0.4	5
1,4-Dioxane	3	-
1,1,2-Trichloroethane	-	5
Vinyl Chloride	0.03	2
SVOC		
Carbazole	-	-
Metals		
Barium	700	2,000
Chromium	10	100
Cobalt	-	-
Vanadium	-	-

VI. ISSUES

Two issues have been identified during this review. These two issues are summarized below and are included in Table 11 which captures the issues and recommendations specified in this FYR.

- The NC 2L groundwater standards, on which several of the cleanup levels are based, were amended on June 1, 2013. Several ROD designated COCs currently have standards more stringent than the ROD cleanup levels. In addition, nine compounds, which were not specified in the ROD as COCs, do not have cleanup levels. An ESD is needed to amend the cleanup levels for the Site.
- Groundwater contamination has migrated off of the Site at concentrations that exceed either MCLs and/or NC 2Ls standards. It is recommended to identify and evaluate potential ICs on properties within the vicinity of the Site.

Table 11: 2017 Issues and Recommendations				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): Sitewide Groundwater	**Issue Category: Monitoring**			
	Issue: NC 2L Groundwater Standards were amended in 2013 and some of these new standards are more stringent than the cleanup levels specified in the 2005 ROD, as modified. As well, nine additional COCs have been detected in groundwater and cleanup standards for these COCs need to be specified.			
	Recommendation: A decision document is needed to amend the cleanup levels for the Site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA/State	09/26/2018
OU(s): Sitewide Groundwater	**Issue Category: Institutional Controls**			
	Issue: Groundwater contamination has migrated off of the Site at concentrations that exceed either MCLs and/or NC 2Ls standards.			
	Recommendation: Identify and evaluate potential ICs on properties within the vicinity of the site.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Implementing Party**	**Oversight Party**	**Milestone Date**
No	Yes	EPA/State	EPA/State	09/26/2019

OTHER FINDINGS

An additional recommendation was identified during the FYR. This recommendation does not affect current and/or future protectiveness.

- Determine if a Groundwater Remedy Completion Strategy evaluation is warranted. This evaluation will help ensure a good strategy is in place to address potential, future groundwater issues (i.e., if MNA is a viable alternative for groundwater at the site (refer to the following website for guidance: https://www.epa.gov/superfund/superfund-groundwater-groundwater-response-completion).

VII. PROTECTIVENESS STATEMENT

Sitewide Protectiveness Statement	
Protectiveness Determination: Short-Term Protective	***Addendum Due***: NA
Protectiveness Statement: The EPA and the State of North Carolina have determined that all of the remedial action construction activities were performed in accordance to specifications. The remedy at the Site currently protects human health and the environment in the short term as there are no human exposure pathways to contaminated soil or groundwater. ICs in the form of Land Use Restrictions have been implemented on the BRP property and the groundwater is being monitored on a regular basis. However, in order for the remedy to be protective in the long term, the following actions need to be taken: identify the appropriate ICs to be implemented for the properties within the vicinity of the Site where groundwater contamination has migrated to and modify the groundwater cleanup levels to reflect the revised NC 2L standards and the additional contaminants being detected in the groundwater.	

VIII. NEXT REVIEW

The next FYR for the Blue Ridge Plating Site is required five years from completion date of this review.

APPENDIX A
Reference List

APPENDIX A
Reference List

U.S. Environmental Protection Agency, Region IV. August 2004. Feasibility Study, Blue Ridge Plating Site, Arden, North Carolina.

U.S. Environmental Protection Agency, Region IV. August 2004. Remedial Investigation Report, Blue Ridge Plating Site, Arden, North Carolina.

U.S. Environmental Protection Agency, Region IV. September 29, 2004. Record of Decision, Blue Ridge Plating Site, Arden, North Carolina.

U.S. Environmental Protection Agency, Region IV. September 26, 2012. First Five-Year Review Report, Blue Ridge Plating Site, Arden, North Carolina.

NC DEQ, April 1, 2013, NCAC Title 15A, Subchapter 2L section, Classifications and Water Quality Standards Applicable to the Groundwaters of North Carolina.

JM Waller Associates, February 2014. Draft 2013 Data Evaluation Report. Blue Ridge Plating Site, Arden, North Carolina.

U.S. Environmental Protection Agency, Region IV. November 18, 2014. Action Memorandum, Request for a Time-Critical Removal Action. Blue Ridge Plating Site, Arden, North Carolina.

Crossroads Environmental, January 2, 2015. Comprehensive Asbestos Inspection Report. Blue Ridge Plating Site, Arden, North Carolina.

JM Waller Associates, December 2015. Draft 2014 Data Evaluation Report. Blue Ridge Plating Site, Arden, North Carolina.

Versar, July 2016. Draft 2015 Data Evaluation Report. Blue Ridge Plating Site, Arden, North Carolina.

Versar, December 2016. Draft 2016 Data Evaluation Report. Blue Ridge Plating Site, Arden, North Carolina.

U.S. Environmental Protection Agency, Region IV. June 19, 2017. Memorandum Hydrogeology Review, Blue Ridge Plating Site, Arden, North Carolina.

APPENDIX B
Site Chronology

APPENDIX B
Site Chronology

Event	Date
Initial Site discovery	December 17, 1998
Preliminary Assessment and Site Inspection completed	January 25, 2000
Expanded Site Inspection completed	March 15, 2001
Approval of Remedial Investigation (RI)/Feasibility Study (FS) Work Plan (Final Sampling and Analysis Plan)	April 2003
RI Report	August 2004
RI and FS completed	September 29, 2004
ROD signed	September 29, 2004
Proposal to the National Priories List (NPL)	April 27, 2005
Final Listing on NPL completed	September 14, 2005
Remedial Design completed	March 14, 2006
Remedial Action initiated	November 2006
First Groundwater sampling event for MNA	September 2007
PCOR signed	September 27, 2007
Second Groundwater sampling event	January 2008
Remedial Action Report completed	March 31, 2008
Third Groundwater sampling event	June 2008
ESD signed	June 27, 2008
Fourth Groundwater sampling event	January 2009
Annual Groundwater sampling event	January 2010
Annual Groundwater sampling event	January 2011
Annual Groundwater sampling event	January 2012
Annual Groundwater sampling event	March 2013
City of Asheville determined the BRP building was unsafe and advised no entry into the building.	December 2013
Annual Groundwater sampling event	August 2014
EPA Action Memorandum dated 11/8/2014 to document disrepair and evidence of improper storage.	November 18, 2004
Response Action for pre-asbestos inspection, demolition, removal of concrete floor, removal of 3,950 tons of contaminated soil, abandonment of old supply well.	December 2014- May 2015
Annual Groundwater sampling event	July 2015
Annual Groundwater sampling event	June 2016

APPENDIX C
Site Inspection Checklist

SITE INSPECTION CHECKLIST

FIVE-YEAR REVIEW SITE INSPECTION CHECKLIST

I. SITE INFORMATION

Site Name: Blue Ridge Platying Site	**Date of Inspection: February 09, 2017**
Location and Region: Concord NC, US EPA Region 4	**EPA ID: NCD044447589**
Agency, Office or Company Leading the Five-Year Review: NC DEQ	**Weather/Temperature: Not recorded**

Remedy Includes: (Check all that apply)

- ☐ Landfill cover/containment
- ☐ Access controls
- ☒ Institutional controls
- ☐ Ground water pump and treatment
- ☐ Surface water collection and treatment
- ☐ Other:
- ☒ Monitored natural attenuation
- ☐ Ground water containment
- ☐ Vertical barrier walls

Attachments: ☒ Inspection team roster attached ☐ Site map attached

II. INTERVIEWS (check all that apply)

1. **O&M Site Manager**

Name Title Date

Interviewed ☐ at site ☐ at office ☐ by phone : _____

Problems, suggestions ☐ Report attached: _____

2. **O&M Staff**

_____ Name _____ Title _____ Date

Interviewed ☐ at site ☐ at office ☐ by phone : _____

Problems/suggestions ☐ Report attached: _____

4. **Other Interviews** (optional) ☐ Report attached: _____

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: In office/off-site

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: In office/off-site			
3.	**O&M and OSHA Training Records**	☒ Readily available	☐ Up to date	☐ N/A
	Remarks: In office/off-site			
4.	**Permits and Service Agreements**			
	☐ Air discharge permit	☐ Readily available	☐ Up to date	☒ N/A
	☐ Effluent discharge	☐ Readily available	☐ Up to date	☒ N/A
	☐ Waste disposal, POTW	☐ Readily available	☐ Up to date	☒ N/A
	☐ Other permits: _____	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
5.	**Gas Generation Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
6.	**Settlement Monument Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
7.	**Ground Water Monitoring Records**	☒ Readily available	☒ Up to date	☐ N/A
	Remarks: In office/off-site			
8.	**Leachate Extraction Records**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
9.	**Discharge Compliance Records**			
	☐ Air	☐ Readily available	☐ Up to date	☒ N/A
	☐ Water (effluent)	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			
10.	**Daily Access/Security Logs**	☐ Readily available	☐ Up to date	☒ N/A
	Remarks: _____			

IV. O&M COSTS

1. **O&M Organization**

☐ State in-house ☐ Contractor for state
☐ PRP in-house ☐ Contractor for PRP
☐ Federal facility in-house ☒ Contractor for Federal facility
☐ _____

2. **O&M Cost Records**

☒ Readily available ☒ Up to date
☐ Funding mechanism/agreement in place ☐ Unavailable
Original O&M cost estimate: _____ ☐ Breakdown attached

Total annual cost by year for review period if available

From: 2012 (Date)	To: _____ (Date)	$88,147 (Total cost)	☐ Breakdown attached
From: 2013 (Date)	To: _____ (Date)	$52,357 (Total cost)	☐ Breakdown attached
From: 2014 (Date)	To: _____ (Date)	$63,409 (Total cost)	☐ Breakdown attached
From: 2015 (Date)	To: _____ (Date)	$49,172 (Total cost)	☐ Breakdown attached
From: 2016 (Date)	To: _____ (Date)	$34,348 (Total cost)	☐ Breakdown attached

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

Describe costs and reasons: NA

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

A. Fencing

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

Remarks:

B. Other Access Restrictions

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

Remarks:

C. Institutional Controls (ICs)

1. **Implementation and Enforcement***

Site conditions imply ICs not properly implemented ☐ Yes ☒ No ☐ N/A

Site conditions imply ICs not being fully enforced ☐ Yes ☒ No ☐ N/A

Type of monitoring (e.g., self-reporting, drive by: annual certification

Frequency: Annual

Responsible party/agency: Haywood Vocational opportunities

Contact	George Marchall		
	Name	Title	Date	Phone no.

Reporting is up to date	☒ Yes	☐ No	☐ N/A
Reports are verified by the lead agency	☒ Yes	☐ No	☐ N/A
Specific requirements in deed or decision documents have been met	☒ Yes	☐ No	☐ N/A
Violations have been reported	☐ Yes	☐ No	☒ N/A

Other problems or suggestions: ☐ Report attached

2. **Adequacy** ☒ ICs are adequate ☐ ICs are inadequate ☐ N/A

Remarks: Institutional controls signed and recorded March13, 2017

D. General

1. **Vandalism/Trespassing** ☐ Location shown on site map ☒ No vandalism evident

Remarks:

2. **Land Use Changes On Site** ☒ N/A

Remarks: None

3. **Land Use Changes Off Site** ☒ N/A

Remarks: None

VI. GENERAL SITE CONDITIONS

A. Roads ☐ Applicable ☒ N/A

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

Remarks: ______

B. Other Site Conditions

Remarks: NA

VII. LANDFILL COVERS ☐ Applicable ☒ N/A			
A. Landfill Surface			
1.	**Settlement** (low spots) Arial extent: _____ Remarks: _____	☐ Location shown on site map	☐ Settlement not evident Depth: _____
2.	**Cracks** Lengths: _____ Remarks: _____	☐ Location shown on site map Widths: _____	☐ Cracking not evident Depths: _____
3.	**Erosion** Arial extent: _____ Remarks: _____	☐ Location shown on site map	☐ Erosion not evident Depth: _____
4.	**Holes** Arial extent: _____ Remarks: _____	☐ Location shown on site map	☐ Holes not evident Depth: _____
5.	**Vegetative Cover** ☐ No signs of stress Remarks:	☐ Grass ☐ Trees/shrubs (indicate size and locations on a diagram)	☐ Cover properly established
6.	**Alternative Cover** (e.g., armored rock, concrete) Remarks:		☐ N/A
7.	**Bulges** Arial extent: _____ Remarks: _____	☐ Location shown on site map	☐ Bulges not evident Height: _____
8.	**Wet Areas/Water Damage** ☐ Wet areas ☐ Ponding ☐ Seeps ☐ Soft subgrade Remarks: _____	☐ Wet areas/water damage not evident ☐ Location shown on site map ☐ Location shown on site map ☐ Location shown on site map ☐ Location shown on site map	 Arial extent: _____ Arial extent: _____ Arial extent: _____ Arial extent: _____
9.	**Slope Instability** ☐ No evidence of slope instability	☐ Slides	☐ Location shown on site map

	Arial 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
	Arial extent: _____		Depth: _____
	Remarks: _____		
2.	**Material Degradation**	☐ Location shown on site map	☐ No evidence of degradation
	Material type:_____		Arial extent: _____
	Remarks: _____		
3.	**Erosion**	☐ Location shown on site map	☐ No evidence of erosion
	Arial extent: _____		Depth: _____
	Remarks: _____		
4.	**Undercutting**	☐ Location shown on site map	☐ No evidence of undercutting
	Arial extent: _____		Depth: _____
	Remarks: _____		
5.	**Obstructions**	Type: _____	☐ No obstructions
	☐ Location shown on site map	Arial 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	Arial 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: _____			
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: _____			
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: _____			
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:

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: _____		
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. GROUND WATER/SURFACE WATER REMEDIES ☐ Applicable ☒ N/A			
A. Ground Water Extraction Wells, Pumps and Pipelines ☐ Applicable ☒ N/A			
1.	**Pumps, Wellhead Plumbing and Electrical** ☐ Good condition ☐ All required wells properly operating ☐ Needs maintenance ☐ N/A Remarks: _____		
2.	**Extraction System Pipelines, Valves, Valve Boxes and Other Appurtenances** ☐ Good condition ☐ Needs maintenance Remarks: _____		
3.	**Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks: _____		
B. Surface Water Collection Structures, Pumps and Pipelines ☐ Applicable ☒ N/A			

1.	**Collection Structures, Pumps and Electrical** ☐ Good condition ☐ Needs maintenance Remarks: _____
2.	**Surface Water Collection System Pipelines, Valves, Valve Boxes and Other Appurtenances** ☐ Good condition ☐ Needs maintenance Remarks: _____
3.	**Spare Parts and Equipment** ☐ Readily available ☐ Good condition ☐ Requires upgrade ☐ Needs to be provided Remarks: _____
C. Treatment System	☐ Applicable ☒ N/A
1.	**Treatment Train** (check components that apply) ☐ Metals removal ☐ Oil/water separation ☐ Bioremediation* ☐ Air stripping ☐ Carbon adsorbers ☐ In-situ chemical oxidation* ☐ Filters: _____ ☐ Monitored natural attenuation* ☐ Additive (e.g., chelation agent, flocculent): _____ ☐ Others: _____ ☐ Good condition ☐ Needs maintenance ☐ Sampling ports properly marked and functional ☐ Sampling/maintenance log displayed and up to date ☐ Equipment properly identified ☐ Quantity of ground water treated annually: _____ ☐ Quantity of surface water treated annually: _____ Remarks:
2.	**Electrical Enclosures and Panels** (properly rated and functional) ☐ N/A ☐ Good condition ☐ Needs maintenance Remarks: _____
3.	**Tanks, Vaults, Storage Vessels** ☐ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs maintenance Remarks: _____
4.	**Discharge Structure and Appurtenances** ☐ N/A ☐ Good condition ☐ Needs maintenance

Remarks: _____

5. **Treatment Building(s)**

☐ N/A ☐ Good condition (esp. roof and doorways) ☐ Needs repair

☐ Chemicals and equipment properly stored

Remarks: _____

6. **Monitoring Wells** (pump and treatment remedy)

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

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

Remarks: _____

D. Monitoring Data

1. **Monitoring Data**

☒ Is routinely submitted on time ☒ Is of acceptable quality

2. **Monitoring Data Suggests:**

☐ Ground water plume is effectively contained ☒ Contaminant concentrations are declining

E. Monitored Natural Attenuation*

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

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

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

Remarks: MW-7S, MW-14S, and MW-14D need new locks-they were not locked during the Site Inspection. EPA has said they will provide new locks.

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).

B. Adequacy of O&M

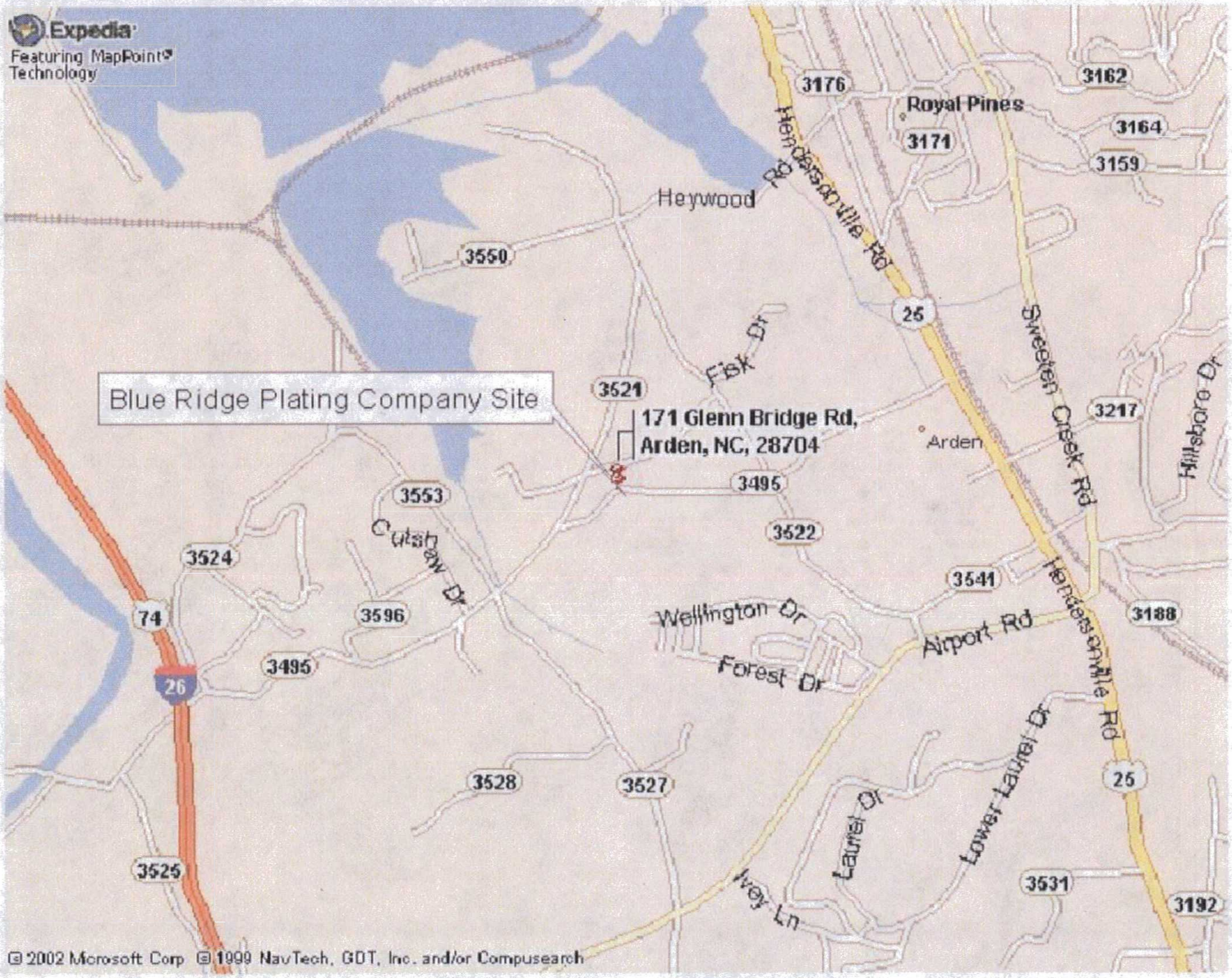
Describe issues and observations related to the implementation and scope of O&M procedures. In particular, discuss their relationship to the current and long-term protectiveness of the remedy.
O&M procedures are adequate for current and long-term protectiveness of the remedy.

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.
D.	**Opportunities for Optimization**
	Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy.

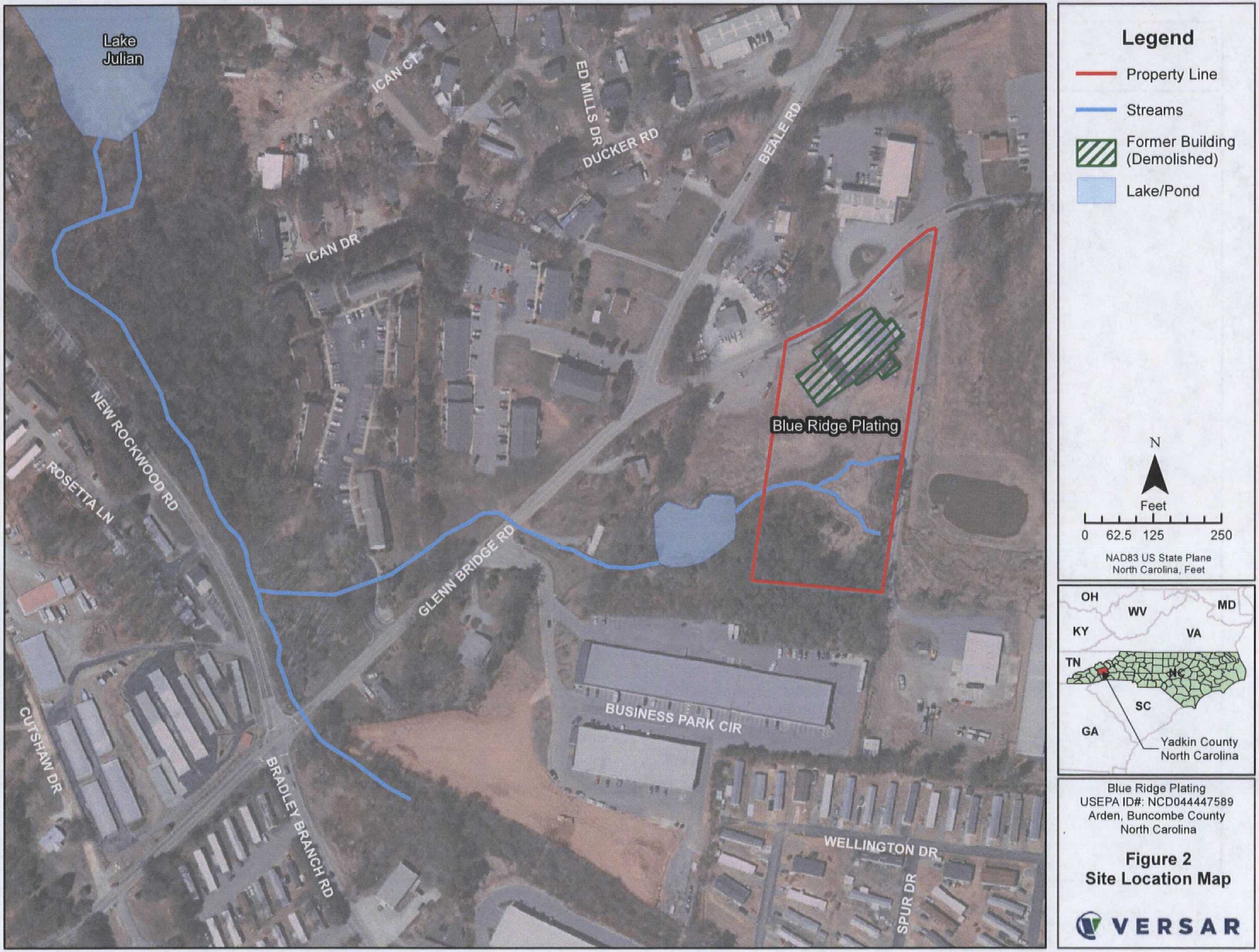
Site Inspection Participants

Jon Bornholm, US EPA Remedial Project Manager
Nile Testerman, NC DEQ Superfund Section Environmental Engineer (Retired 2/28/2017)
Beth Hartzell, NC DEQ Superfund Section Environmental Engineer

APPENDIX D
Figures



	Blue Ridge Plating Company Arden, Buncombe County, NC Screening Level Ecological Risk Assessment	Figure 1 Site Location



Blue Ridge Plating
USEPA ID#: NCD044447589
Arden, Buncombe County
North Carolina

Figure 2
Site Location Map

VERSAR

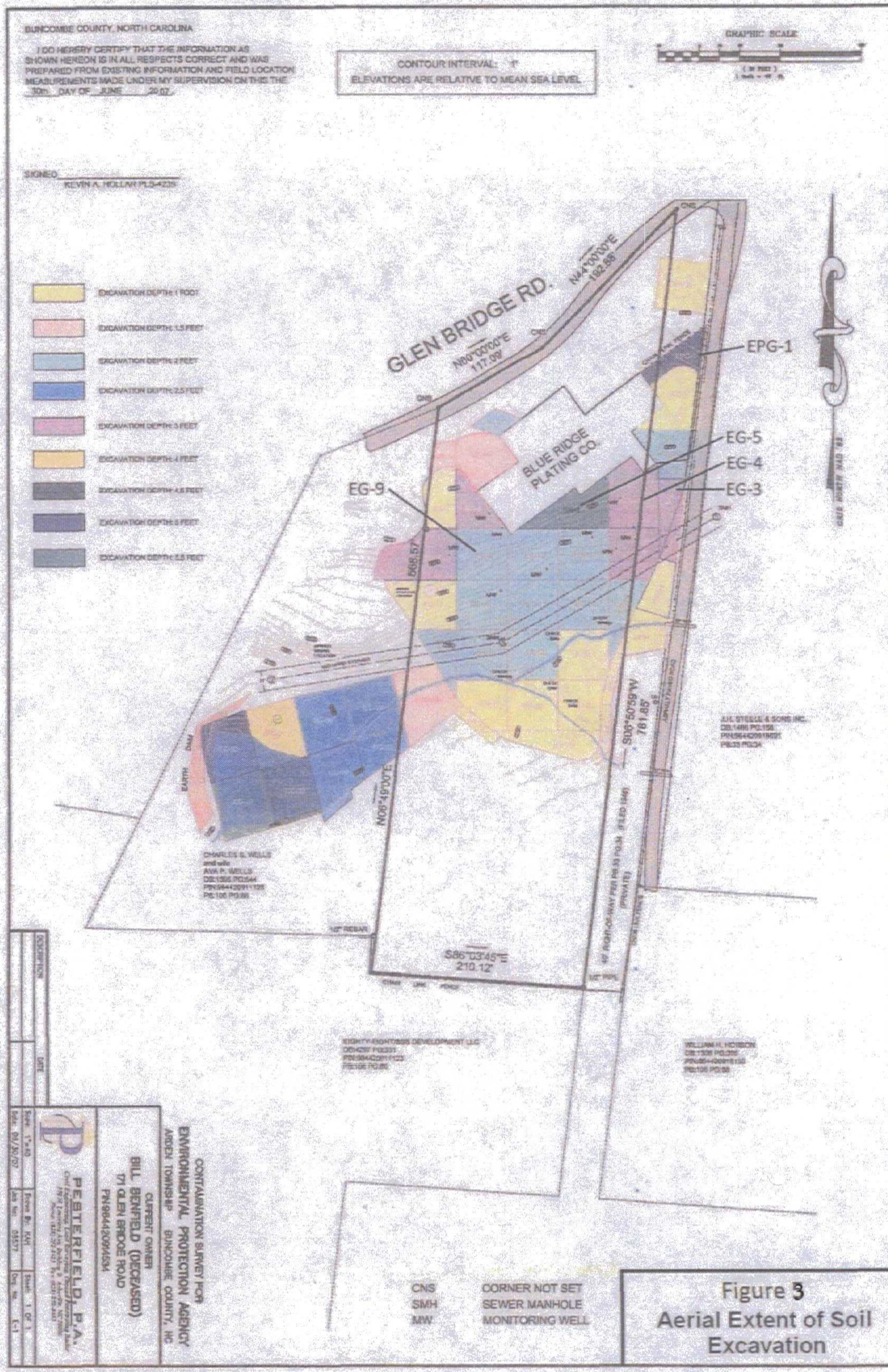
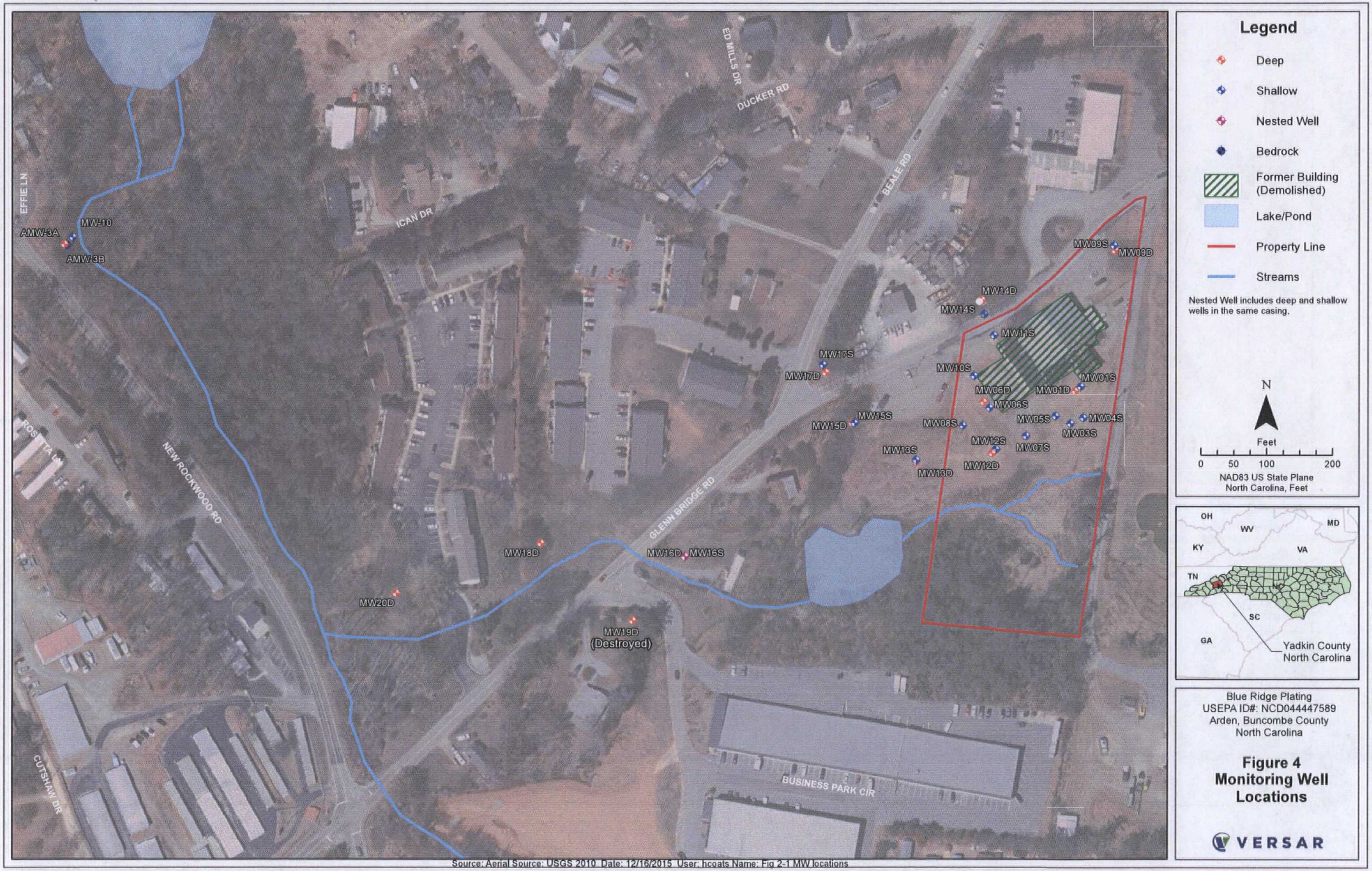


Figure 3
Aerial Extent of Soil Excavation



Source: Aerial Source: USGS 2010 Date: 12/16/2015 User: hcoats Name: Fig 2-1 MW locations

LEGEND

SHALLOW MONITORING WELL

DEEP MONITORING WELL

NESTED MONITORING WELL

Boundary o Blue Ridge Property

Disclaimer: This map and any boundary lines within the map are approximate and subject to change. The map is not a survey. The map is for informational purposes only regarding the EPA's response actions at the Site and is not intended for any other purpose.

GRAPHIC SCALE

0' 100' 200' 400'

1" = 200'

IC OVERLAY MAP
BLUE RIDGE PLATING
ARDEN, BUNCOMBE COUNTY, NC

PROJECT NO: NA	CHECKED BY: BH	DATE: 8/11/17	
SCALE: 1"=200'	DRAWN BY: SKG	FIGURE NO. 5	

APPENDIX E
ARAR List

APPENDIX E
ARAR Review

Section 121 (d)(2)(A) of CERCLA specifies that Superfund remedial actions must meet any federal standards, requirements, criteria, or limitations that are determined to be legally ARARs. Applicable or Relevant and Appropriate Requirements are those standards, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, action, location, or other circumstance at a CERCLA site. To-Be-Considered criteria (TBCs) are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary level of cleanup for protection of human health or the environment. While TBCs do not have the status of ARARs, EPA's approach to determining if a remedial action is protective of human health and the environment involves consideration of TBCs along with ARARs. Chemical-specific ARARs are specific numerical quantity restrictions on individually listed contaminants in specific media. Examples of chemical-specific ARARs include the MCLs specified under the Safe Drinking Water Act (SDWA) as well as the ambient water quality criteria that are enumerated under the Clean Water Act. Because there are usually numerous contaminants of potential concern for any site, various numerical quantity requirements can be ARARs.

In performing the FYR for compliance with ARARs, only those ARARs that address the protectiveness of the remedy are reviewed. Because the remedy at the Site currently addresses only groundwater contamination, this FYR will discuss compliance with chemical-specific groundwater ARARs only.

The 2004 ROD identified the following Federal and State chemical-specific ARARs:

Federal ARARs

- 40 CFR Parts 262 promulgated under the authority of RCRA, Standards Applicable to Generators and Transporters of Hazardous Waste
- Hazardous Materials Transportation Regulations (49 CFR USC Sect 1801 -1813; 49 CFR 107, 171-177)
- Clean Air Act (42 USC Section 7401-7642)
- National Ambient Air Quality Standards (40 CFR Part 50; 40 CFR Part 53; 40 CFR Part 61)
- Endangered Species Act (16 USC 1531; 50 CFR 200 and 402)
- Fish and Wildlife Coordination Act (16 USC 2901 et seq)
- Noise Control Act of 1972 (42 USC Sect. 4901 et seq)
- National Historic Preservation Act (16 USC 470; 40 CFR 6.301(b); 36 CFR 800)
- Archeological and Historic Preservation (16 USC 469; 40 CFR 6 301(c))
- Migratory Bird Treaty Act (16 USC 703)
- Executive Order No. 11,990 40 CFR 6.302(a) and Appendix A
- Clean Water Act (Part 301(b))
- National Primary Drinking Water Standards (40 CFR Part 141)
- National Pollutant Discharge Elimination System Requirements (CWA Part 402, 40 CFR Part 122)

State ARARs

- Regulations for the Management of Hazardous Waste promulgated under the authority of the NC Waste Management Act (North Carolina Administrative Code (NCAC) Title 15A, Chapter 13A)
- NC Drinking Water and Groundwater Standards; Groundwater Classifications and Standards (NCAC Title 15 Chapter 2L)
- NC Surface Water Quality Standards Classification and Water Quality Standards (NCAC Title 15A Chapter 2B)
- Well Construction Standards (NCAC Title 15A Subchapter 2C 0100)
- NC Air Pollution Control Regulations (NCAC Title 15A Chapter 2D, 2H, and 2Q)
- Inactive Hazardous Program Guidelines for Assessment and Cleanup, NC, Superfund Section, Jan 2003
- NC Solid Waste Management Regulations (15A NCAC 4B)
- NC Erosion and Sedimentation Control Rules (NCAC Title 15A Subchapter 4B)

It is the EPA's policy that ARARs are generally "frozen" at the time of the ROD signature unless a "new or modified requirement calls into question the protectiveness of the selected remedy", 55 Fed. Reg. 8757 (March 8, 1990). The NC Classifications and Water Quality Standards Applicable to the Groundwater of North Carolina, NCAC Title 15A Subchapter 2L, (NC 2L) on which several of the remedial levels are based were last amended on June 2013.

COC	ROD Remedial Goal	2013 NC 2L	Maximum Detected Concentration (µg/L)			
			2013	2014	2015	2016
VOCs						
1,1-Dichloroethene	7	7	160	120	190J	120
Chloroform	0.19	70	1.8	1.9	1.8	1.7
Tetrachloroethene	0.7	0.7	100	130	140J	150
Trichloroethene	2.8	3	35	38	33	26
Metals						
Cadmium	5	2	37	14	12	19
Cyanide	154	70	110	110	36	41
Iron	3,800	300	6,200	18,000	10,000	10,000
Manganese	300	50	2,400	2,700	2,400	2,900
Contaminants not Specified in the ROD						
1,1-Dioxane	NE	3	-	10	26	42
1,1,2-Trichloroethane	NE	0.6	2.3	0.94	6.7	2.7
1,2-Dichloroethane	NE	0.4	0.68J	0.54	2.3	0.57J
Vinyl Chloride	NE	0.03	0.5	0.25J	-	-
Carbazole	NE	2	-	11	6.9	3.5
Barium	NE	700	860	940	690	560

COC	ROD Remedial Goal	2013 NC 2L	Maximum Detected Concentration (µg/L)			
			2013	2014	2015	2016
Chromium	NE	10	230	60	56	45
Cobalt	NE	1	34	28	28	29
Vanadium	NE	0.3	17	16	12	6.2
Analytical results exceeding the ROD Cleanup Goals are shaded Red Analytical results exceeding the NCAC Groundwater Standard are red						

As stated previously the performance standards for the soil remediation has been completed based upon the cleanup levels established within the ROD.

The 2004 ROD stated, *"CERCLA, as amended by Section 121(b) of SARA, requires the selection of remedial actions that attain a degree of cleanup which ensures protection of human health and the environment, are cost effective, and use permanent solutions and alternative treatment technologies or resource technologies to the maximum extent practicable. To satisfy CERCLA requirements, RAOs were developed for the Blue Ridge Plating site. RAOs will be used to develop general response actions for the Site that are protective of current and future construction worker, future Site residents, and the environment.*

The key contaminants of concern (COCs) are metals along with a number of volatile organic compounds (VOCs) and semi- volatile organic compounds (SVOCs). The soil/sediment cleanup goals were derived from predominantly leachate models for the metals in order to be protective of the underlying groundwater along a health based risk level for chromium. The groundwater cleanup goals were based on ARARs (North Carolina Groundwater Classifications and Standards (ISA NCAC 2L) (NC2L)) or background concentrations.

APPENDIX F
Newspaper Ad and Interviews

APPENDIX F
Newspapers Ad and Interviews

The U.S. Environmental Protection Agency, Region 4 Announces a Five-Year Review for the Blue Ridge Plating Site in Arden, Buncombe County, North Carolina

The U.S. Environmental Protection Agency is conducting its second Five-Year Review of the remedy for the Blue Ridge Plating Site located in Arden, Buncombe County, North Carolina. The purpose of the Five-Year Review is to ensure that the selected cleanup actions effectively protect human health and the environment.

The soil cleanup phase occurred between December 2006 and June 2007. Approximately 8,737 cubic yards of contaminated soil were excavated and transported to an off-site facility for disposal.

Four additional groundwater monitoring wells were installed in August-September 2007. EPA issued the Preliminary Closeout Report in September 2007. Groundwater was last sampled in March 2012 and the next annual ground water sampling event will occur in 2013. Due to Site related contaminants being detected in the furthest downgradient monitoring wells, two additional monitoring wells (one shallow and one deep) were installed in April 2011 and were initially sampled in June 2011. These wells were last sampled in July 2016.

In December 2013, the City of Asheville determined that the building on the Blue Ridge property was unsafe and advised occupants to stay out which basically closed the business. Because of the presence of hazardous substances remained onsite, EPA initiated an emergency response action at the property. The response action began in December 2014 and was completed in May 2015. The response action included talking down the building, removing the concrete floor, removing 3,950 tons of contaminated soil from under the footprint of the building, and abandoning an old supply well.

The National Contingency Plan (NCP) requires 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 be reviewed every five years to ensure the protection of human health and the environment. The Five-Year Reviews for the site will be completed by September 2017.

A copy of the final report will be placed in the information repository located at the Skyland South Buncombe Branch Library, 260 Overlook Road in Asheville, for the public to review.

For further information, please contact Jon Bornholm, EPA Remedial Project Manager via email at bornholm.jon@epa.gov or Angela Miller, EPA Community Involvement Coordinator via email miller.angela@epa.gov or directly at (678) 575-8132.

Blue Ridge Plating Site
Arden, Buncombe County, NC
EPA ID: NCD044447589
Second Five-Year Review Report

Interview Questionnaire
Completed by Jon Bornholm, EPA RPM

1. What is your overall impression of the project? (general sentiment)
   The cleanup has been slow but positive progress is being made. The structure was recently removed as part of the emergency response EPA conducted at the Site in 2015.

2. What effects have site operations had on the surrounding community?
   To the best of my knowledge, recent Site related activities have not had any effect of the surrounding community.

3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details.
   No

4. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office?
   No

5. Do you feel well informed about the site's activities and progress?
   Yes

6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation?
   No

7. What is the current status of construction (*e.g.*, budget and schedule?
   All planned remedial activities have been completed at the site. The only activity occurring is the annual groundwater monitoring event.

8. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD?
   No

9. Have any problems or difficulties been encountered which have impacted construction progress or implementability?
No. Remedial action activities were reported in the July 2007 Remedial Action Report and the September 2007 Preliminary Close-Out Report.

10. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)?
No

11. Is the remedy functioning as expected? How well is the remedy performing?
Yes, groundwater quality in the vicinity of where the building use to stand may be adversely impacted due to the recent soil disturbance that occurred during the 2015 Emergency response Action.

12. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing?
The following text comes from the July 2016 2015 Data Evaluation Report,

Groundwater analytical results from July 2015 indicated that chlorinated VOCs were detected at concentrations above the ROD cleanup goals in 24 of the 30 wells sampled. The highest VOC concentrations were detected in MW11S. No SVOCs were detected in excess of the cleanup goals. The metals cadmium, iron, and manganese were detected above ROD cleanup goals, with exceedances of cadmium in four wells (MW03S, MW05S, MW07S, and MW12S), iron in one well (MW04S), and manganese in eight wells (MW01S, MW03S, MW04S, MW05S, MW07S, MW12S, MW16D, and MW16S).

In addition to the site contaminants with cleanup goals established by the 2004 ROD and 2008 Explanation of Significant Difference, there were several other constituents detected in site groundwater in July 2015 at concentrations exceeding current EPA MCLs or North Carolina groundwater standards. These constituents are: 1,1,2-trichloroethane, 1,2-dichloroethane, 1,4-dioxane, carbazole, chromium, cobalt, and vanadium.

Based on analysis of groundwater concentration trends at the site using the Mann-Kendall statistical test, chlorinated VOC concentrations generally appear to be exhibiting a decreasing trend in most shallow wells but either an increasing trend, stable trend, or no trend in most deep wells. For metals, the Mann-Kendall test indicated that most wells display decreasing trend, stable trend, or no trend. The only metals data set with an increasing trend was iron in MW04S. The Mann-Kendall test indicated no trend for the SVOCs pentachlorophenol and naphthalene in MW01S, although concentrations of these constituents did not exceed ROD cleanup levels in MW01S during the July 2015 sampling event.

13. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities.
    No, groundwater samples are collected from the groundwater monitoring network on an annual basis.

Blue Ridge Plating Site
Arden, Buncombe County, NC
EPA ID: NCD 044 447 589
Second Superfund Five-Year Review Report

Interview Questionnaire
Completed by Nile Testerman, (Former/Retired) NC DEQ RPM

1. What is your overall impression of the project? (general sentiment) The site is in good condition.
2. What effects have site operations had on the surrounding community? No impact with the current remedy of MNA.
3. Are you aware of any community concerns regarding the site or its operation and administration? If so, please give details. None.
4. Have there been any complaints, violations, or other incidents related to the site requiring a response by your office? No.
5. Do you feel well informed about the site's activities and progress? Yes.
6. Do you have any comments, suggestions, or recommendations regarding the site's management or operation? None.
7. What is the current status of construction (*e.g.*, budget and schedule? Construction is complete.
8. Have any problems been encountered which required, or will require, changes to this remedial design or this ROD? No.
9. Have any problems or difficulties been encountered which have impacted construction progress or implementability? No problems after building was demolished.
10. Do you have any comments, suggestions, or recommendations regarding the project (i.e., design, construction documents, constructability, management, regulatory agencies, etc.)? None.
11. Is the remedy functioning as expected? How well is the remedy performing? The gw remedy of MNA is functioning,
12. What does the monitoring data show? Are there any trends that show contaminant levels are decreasing? Most contaminant levels are decreasing or not increasing.

13. Is there a continuous on-site O&M presence? If so, please describe staff and activities. If there is not a continuous on-site presence, describe staff and frequency of site inspections and activities. GW is being monitored on an annual basis.

APPENDIX G
2016 Annual Data Evaluation Report

DRAFT
2016 DATA EVALUATION REPORT

BLUE RIDGE PLATING SITE
ARDEN, BUNCOMBE COUNTY, NORTH CAROLINA
NCD044447589

PREPARED FOR:

U.S. ENVIRONMENTAL PROTECTION AGENCY

REMEDIAL ACTION CONTRACT II LITE
REGION 4
EPA CONTRACT NO. EP-S4-08-03
TASK ORDER 008
DCN 008DER122316-DRAFT

PREPARED BY:

VERSAR

December 2016

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Versar, Inc.

December 2016

Jane Traylor	12/23/16	Arnold Ostrofsky	12/23/16
Jane Traylor Versar Project Manager	Date	Arnold Ostrofsky, P.E. Versar Program Manager	Date

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ACRONYMS AND ABBREVIATIONS

AFCEC	Air Force Civil Engineering Center
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
CF	Confidence Factor
CLP	Contract Laboratory Program
COV	Coefficient of Variation
°C	Degrees Celsius
DER	Data Evaluation Report
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
ESI	Expanded Site Investigation
FBI	Federal Bureau of Investigation
IDW	Investigation Derived Waste
J. M. Waller	J. M. Waller Associates, Inc.
MAROS	Monitoring and Remediation Optimization System
MCL	Maximum Contaminant Limit
µg/L	Micrograms per Liter
mg/L	Milligrams per Liter
MNA	Monitored Natural Attenuation
mV	Millivolt
n	Number of Sampling Events
NCDENR	North Carolina Department of Environment and Natural Resources
NPL	National Priorities List
ORP	Oxidation Reduction Potential
p	Probability

ACRONYMS AND ABBREVIATIONS (continued)

PARCC	Precision, Accuracy, Representativeness, Comparability, and Completeness
PA/SI	Preliminary Assessment/Site Inspection
PVC	Polyvinyl Chloride
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPD	Relative Percent Difference
RPM	Remedial Project Manager
S	Mann-Kendall Statistic
SAP	Sampling and Analysis Plan
SVOCs	Semivolatile Organic Compounds
TAL	Target Analyte List
TCL	Target Compound List
TOC	Total Organic Carbon
VOCs	Volatile Organic Compounds

1.0 INTRODUCTION

This Data Evaluation Report (DER) has been developed by Versar, Inc. (Versar) for the United States Environmental Protection Agency (EPA) under Contract Number EP-S4-08-03, Task Order 08, for sampling and analytical support at the Blue Ridge Plating Site in Arden, Buncombe County, North Carolina. The purpose of this task order is to provide support for overall planning, coordination, and the collection of groundwater samples for analysis of volatile and semivolatile organic compounds, metals, cyanide, and monitored natural attenuation (MNA) parameters. The goal is to collect groundwater data to evaluate whether MNA is a viable remedy for the groundwater at the site.

1.1 Purpose and Scope

This DER presents data and information obtained during the annual sampling event conducted by Versar in June 2016 and compares it to groundwater data collected at the site since September 2007. The collected information is presented in summary form and includes the following:

- Field measurements including groundwater water quality parameters and water levels;
- Analytical results summary tables and full data validation laboratory reports;
- Trend analysis using Mann-Kendall statistics.

1.2 Site Background

The Blue Ridge Plating Site occupies 3.06 acres located at 171 Glenn Bridge Road in Arden, Buncombe County, North Carolina. EPA is the lead agency for this site and the Site Identification Number is NCD 044 447 589. The southern portion of the site lies within the boundary of a U.S. Army Corps of Engineers designated wetland. A site location map is shown as Figure 1-1.

Blue Ridge Plating started business in 1974 and has used raw materials such as cadmium, chromium, copper, cyanide, tin, and zinc. There is one building on the site and part of this building is in a state of disrepair. To the west of the building were formerly a number of old plating vats and several 55-gallon drums associated with Blue Ridge Plating operations, and other miscellaneous debris that were removed and disposed of as part of the soil cleanup completed in 2006 and 2007.

From 1974 to 1985, electroplating wastes were collected in drums stored in the basement of the building. Plating sludges were filtered out of the wastes and the resulting wastewater was directed to a 70,000 gallon in-ground concrete lagoon formerly located immediately south of the building. Plating sludges were shipped offsite for disposal, and the wastewater was either sprayed on the ground or reused as process water. Between 1985 and 1990, the wastewater was discharged to the local municipal sewer system. In 1990, the municipality suspended access to the sewer system because Blue Ridge Plating was not meeting pretreatment requirements. Blue Ridge Plating claimed the facility discontinued discharging wastewater to the sewer system and was using a "closed loop" treatment system; however, the Federal Bureau of Investigation (FBI) discovered that the facility continued to discharge to the sewer system. In 1991, a federal court found Blue Ridge Plating guilty of discharging heavy metals in excess of legal limits to the sewer system, discharging to a sewer without a permit, and lying to federal investigators.

In 1993, the North Carolina Department of Environment and Natural Resources (NCDENR) served an injunction to Blue Ridge Plating to produce site information and implement a closure plan or further site investigation. As a result, Blue Ridge Plating proposed a groundwater monitoring schedule in 1994, and submitted a closure plan in 1996. In 1997, NCDENR received a complaint that Blue Ridge Plating was disposing of plating wastes by dumping them outside the back door and through the cracks in the floor. Consequently, NCDENR requested that EPA collect environmental samples at the facility. The EPA sampling effort, conducted in April 1998, found elevated levels of cadmium, chromium, copper, cyanide, nickel, tin, and zinc in samples collected from inside and outside the Blue Ridge Plating building. Because of these sampling results, the facility was placed in the Comprehensive Environmental Response, Compensation, and Liability Information System (CERCLIS) in October 1998. The 70,000-gallon lagoon was closed under EPA's Resource Conservation and Recovery Act (RCRA) in 2000.

1.3 Previous Investigations

NCDENR conducted a Preliminary Assessment / Site Inspection (PA/SI) in July 1999, which documented a release of cadmium, chromium, copper, and nickel to soils at the site. An Expanded Site Investigation (ESI) was conducted in September 2000. This investigation confirmed the presence of elevated levels of arsenic, cadmium, chromium, copper, cyanide, lead, manganese, mercury, nickel, selenium, silver, and zinc in the site soils. A Remedial Investigation / Feasibility Study (RI/FS) was conducted between 2002 and 2004, and the site was placed on the National Priority List (NPL) in September 2004. A Record of Decision (ROD) for the site was issued in October 2004.

The 2004 ROD called for excavation of contaminated soil/sediment and off-site disposal at a RCRA Subtitle D landfill, along with backfilling, re-grading, and re-seeding the disturbed areas. The soil cleanup phase was conducted between December 2006 and June 2007. A total of 13,105 tons (8,737 cubic yards) of soil was removed and 6,105 tons (4,070 cubic yards) of soil was backfilled and graded. A former pond, which had silted in over the years on the adjacent downgradient property, was excavated to remove the contaminated sediment that had accumulated in the pond basin. At the request of the property owner, this excavation was not backfilled with clean fill since the property owner planned on repairing the earthen dike/dam and reforming the pond. In February 2008, the breach in the earthen dike/dam was repaired, an overflow pipe was installed, and the pond has since refilled.

For the groundwater cleanup phase, the ROD selected MNA as the remedy. However, injecting a reagent(s) in the underlying aquifer to oxidize, reduce, or immobilize the contaminants in place along with long-term monitoring was included as a contingent remedy for groundwater. The decision to implement the contingency was to be made after monitoring the changes in contaminant concentrations in the groundwater for five years after the soil remediation phase was completed.

The groundwater monitoring program was implemented at the site in September 2007, and is currently conducted on an annual schedule. To date, there has not been a consistent trend indicating that the groundwater contamination is attenuating to below ROD cleanup levels.

EPA and NCDENR completed a Five Year Review for the site in September 2012. The Five Year Review concluded that the current remedy at Blue Ridge Plating is protective of human health and the environment, and that collection of additional groundwater data is needed to determine if MNA is an effective groundwater remedy. The review recommended issuing an Explanation of Significant Difference (ESD) to allow more time for collection of groundwater data for evaluation of MNA. Other recommendations of the Five Year Review were to implement perpetual land use restrictions, to install additional downgradient monitoring wells to complete the groundwater plume delineation, and to issue an ESD revising groundwater cleanup goals for 1,1-dichloroethane and cyanide to meet current North Carolina groundwater standards.

EPA completed a removal action at the site in December 2014 and January 2015 to remove and properly dispose of hazardous substances, including acids, cyanide, and heavy metals such as hexavalent chromium, that were stored in deteriorating containers inside the former process building. The removal action was the result of a joint EPA and NCDENR inspection conducted in April 2013, and a follow-up inspection by the City of Asheville in October 2013, which identified leaking and unlabeled containers of hazardous waste. The removal action also included demolition of the former process building, which was deemed unsafe and condemned by the City of Asheville in December 2013.

2.0 FIELD ACTIVITIES

Field activities summarized in this DER include completing an annual groundwater sampling event in June 2016. The following subsections describe the field tasks completed.

2.1 Water Level Measurements

On June 21, 2016, water level elevation measurements were collected from 27 of the 28 monitoring wells at the Blue Ridge Plating Site and from three offsite wells owned and maintained by Duke Energy. Well MW19D was destroyed between the August 2014 and July 2015 sampling events by construction activities and data can no longer be collected from this well. Water levels were measured from the top of casing of each monitoring well to the nearest 0.01-foot using an electronic water level indicator. Locations of the monitoring wells at the site are shown on Figure 2-1. The measured groundwater elevations, in addition to well construction information for each of the monitoring wells, are presented in Table 2-1.

2.2 Groundwater Sampling

Groundwater samples were collected from 27 of the 28 monitoring wells at the site. Monitoring well MW19D was not sampled since the well has apparently been destroyed by construction activities. Figure 2-1 shows the locations of the monitoring wells. Prior to sampling, each well was purged by pumping a minimum of three well volumes or until field parameters (pH, turbidity, specific conductance, oxidation reduction potential [ORP], dissolved oxygen, and temperature) stabilized to within 10% of the prior reading, in accordance with EPA Region 4 field sampling protocols. The groundwater samples were collected using either peristaltic pumps or submersible pumps with Teflon tubing. The approved Sampling and Analysis Plan (SAP) for the Blue Ridge Plating Sampling and Analytical Support provides details of sampling protocols used, field quality assurance/quality control (QA/QC), and data validation/evaluation.

All groundwater samples were submitted for laboratory analysis of Target Compound List (TCL) volatile organic compounds (VOCs), TCL semivolatile organic compounds (SVOCs), target analyte list (TAL) metals, and cyanide. All analyses were performed by the EPA Region 4 laboratory except cyanide which was submitted to and analyzed by Chemtech Consulting Group laboratory in Mountainside, NJ. Sampling events prior to 2015 also included the MNA parameters of ferrous iron, sulfate, sulfide, chloride, alkalinity, total organic carbon, nitrate, methane, ethane, ethene, and *Dehalococcoides* bacteria; however, these parameters were discontinued after the 2014 sampling event based on the recommendations of the EPA Region 4 Technical Services Section.

2.3 Sampling Quality Control

In accordance with the approved SAP, field quality control samples, such as field duplicates, trip blanks, rinsate blanks and temperature blanks, were collected and evaluated as a method to assess the sample handling procedures. During sampling activities, instruments used for field measurements were routinely calibrated and recorded to ensure the accuracy of readings.

3.0 RESULTS

The following subsections present the results of the June 2016 sampling event.

3.1 Groundwater Elevations and Gradient

Groundwater elevations measured on June 21, 2016 (listed in Table 2-1) were used to create groundwater elevation contour maps for the shallow and deep zones of the saprolite aquifer. Figures 3-1 and 3-2 show the groundwater elevation contours for the shallow and deep zones, respectively. Groundwater flow direction in June 2016 was to the west-southwest in both zones. Horizontal groundwater gradients in the shallow and deep zones were approximately 0.033 and 0.029, respectively. Vertical gradients, as evaluated by comparing groundwater elevations at paired shallow and deep well locations, were downward from the shallow zone to the deep zone at seven of the ten nested well pairs (at all except the MW01, MW09, and MW12 pairs). Groundwater flow directions, horizontal gradients, and vertical gradients observed in June 2016 were consistent with those observed during previous sampling events.

3.2 Groundwater Analytical Results

The following summary of analytical results is organized by monitoring well and discusses results of the 2016 annual sampling event for each monitoring well. Table 3-1 summarizes results for constituents that have been detected at concentrations above the 2004 ROD and the 2008 ESD groundwater cleanup levels, plus current EPA Maximum Contaminant Levels (MCLs) and North Carolina's groundwater standards, between 2007 and 2016. Groundwater results are presented in Table 3-1 from all sampling events conducted since the soil remediation activities were completed, and include samples collected in September 2007, January 2008, June 2008, January 2009, January 2010, January/February 2011, February 2012, March 2013, August 2014, July 2015, and June 2016. Table 3-2 provides the final readings of field water quality parameters measured during the January 2010, January/February 2011, February 2012, March 2013, August 2014, July 2015, and June 2016 sampling events. A complete set of the analytical data reports from the June 2016 sampling event is presented in Appendix A.

The following contaminants were detected above ROD cleanup goals in the June 2016 sampling event: 1,1-dichloroethene, chloroform, tetrachloroethene, trichloroethene, cadmium, iron, and manganese. In addition, other contaminants that were detected in June 2016 above either current EPA MCLs or North Carolina groundwater standards were: 1,4-dioxane, 1,1,2-

trichloroethane, 1,1-dichloroethane, 1,2-dichloroethane, carbazole, chromium, cobalt, and vanadium (in offsite well AMA-3A only).

MW01D had three ROD cleanup goal exceedances, which were 1,1-dichloroethene (9.1 µg/L), tetrachloroethene (18 µg/L), and iron (5,900 µg/L). Additionally, 1,4-dioxane (5.4 µg/L) and manganese (140 µg/L) exceeded North Carolina groundwater standards. Most concentrations in MW01D increased slightly in June 2016 as compared to July 2015, with 1,1-dichloroethene and iron increasing above cleanup goals. However, VOC concentrations in this well have remained relatively stable since 2007.

MW01S had only one ROD cleanup goal exceedance, which was manganese at a concentration of 440 µg/L. Carbazole (3.5 µg/L), cadmium (2.8 µg/L), cobalt (6.2 µg/L), and iron (2,800 µg/L) also exceeded North Carolina groundwater standards. Contaminant concentrations in this well have generally shown a decreasing trend over the last seven sampling events, with concentrations of chloroform, naphthalene, pentachlorophenol, and cadmium dropping to below ROD cleanup goals.

MW03S had two exceedances of ROD cleanup goals, which were cadmium at 6.3 µg/L and manganese at 730 µg/L. Additionally, the concentration of iron (1,400 µg/L) exceeded North Carolina groundwater standards. Metals concentrations have historically fluctuated in this well, but VOCs and SVOCs have not been detected above ROD cleanup goals.

MW04S had ROD cleanup goal exceedances for iron (10,000 µg/L) and manganese (2,900 µg/L), consistent with previous sampling events. VOCs and SVOCs have not historically been detected in this well above ROD cleanup goals.

MW05S had exceedances of ROD cleanup goals for cadmium (6.3 µg/L) and manganese (1,500 µg/L). Additionally, cobalt (18 µg/L) exceeded North Carolina groundwater standards. Metals concentrations remained stable as compared to the July 2015 sampling event as has been the case historically.

MW06D had one ROD cleanup goal exceedance, which was tetrachloroethene at 11 µg/L. Additionally, 1,4-dioxane (4.4 µg/L) exceeded the North Carolina groundwater standard. Contaminant concentrations in MW06D have historically remained relatively stable.

MW06S had ROD cleanup goal exceedances for 1,1-dichloroethene (120 µg/L), chloroform (0.63 µg/L), tetrachloroethene (150 µg/L), and trichloroethene (26 µg/L). In addition, the following constituents also exceeded North Carolina groundwater standards: 1,1,2-trichloroethane (2.7 µg/L), 1,1-dichloroethane (61 µg/L), 1,2-dichloroethane (0.56 µg/L), 1,4-dioxane (41 µg/L), chromium (45 µg/L), and cobalt (10 µg/L). The VOCs 1,1-dichloroethene, chloroform, tetrachloroethene, and trichloroethene have historically fluctuated in this well, while other constituents have displayed a general decreasing trend. Concentrations of 1,1,1-trichloroethane, arsenic, cadmium, cyanide, iron, and manganese formerly exceeded ROD cleanup goals in MW06S, but have decreased to below the cleanup goals.

MW07S equaled or exceeded ROD cleanup goal for chloroform (estimated at 0.19 µg/L), tetrachloroethene (1 µg/L), trichloroethene (13 µg/L), cadmium (19 µg/L) and manganese (2,200 µg/L). Cobalt (28 µg/L) was also detected at a concentration exceeding the North Carolina groundwater standard. June 2016 was the first sampling event since 2009 in which VOCs were detected in MW07S above ROD cleanup goals. Cadmium concentrations have historically fluctuated with a general decreasing trend.

MW08S had ROD cleanup goal exceedances for 1,1-dichloroethene (23 µg/L), tetrachloroethene (21 µg/L), and trichloroethene (4.8 µg/L). The concentration of 1,1-dichloroethane (9.7 µg/L) also exceeded the North Carolina groundwater standard. Most contaminants in this well remained stable or decreased marginally as compared to the July 2015 sampling event but have historically displayed a general trend of decreasing concentrations since 2007.

MW09D had one exceedance of ROD cleanup goals, which was tetrachloroethene at a concentration of 1.5 µg/L. June 2016 was the second consecutive sampling event in which tetrachloroethene was detected above the ROD cleanup goal in this upgradient well, although very low concentrations of several VOCs have historically been detected. No other detections exceeded the ROD cleanup goals, EPA MCLs, or North Carolina groundwater standards.

MW09S, which is also an upgradient well, also had a detection of tetrachloroethene at a concentration of 1.0 µg/L, exceeding the ROD cleanup goal. Tetrachloroethene has occasionally exceeded the ROD cleanup goal in this well during some previous sampling events, with concentrations of up to 1.6 µg/L. No other detections exceeded the ROD cleanup goals, EPA MCLs, or North Carolina groundwater standards.

MW10S had ROD cleanup goal exceedances for 1,1-dichloroethene (29 µg/L) and tetrachloroethene (69 µg/L). In addition, the concentrations of 1,1-dichloroethane (6.7 µg/L), chromium (19 µg/L), cobalt (9.8 µg/L), and manganese (190 µg/L) exceeded North Carolina groundwater standards. Despite the increases in VOC concentrations in this well as compared to the 2015 sampling event, historical concentrations in this well have displayed a strong decreasing trend, with 1,1,-trichloroethane, chloroform, trichloroethene, and manganese decreasing to below ROD cleanup goals.

MW11S had ROD cleanup goal exceedances for 1,1-dichloroethene (79 µg/L), chloroform (1.7 µg/L), tetrachloroethene (83 µg/L), and trichloroethene (21 µg/L). Constituents that also exceeded North Carolina groundwater standards were 1,1,2-trichloroethane (0.8 µg/L) 1,1-dichloroethane (46 µg/L), and manganese (120 µg/L). No clear overall trend can be determined in the contaminant levels. Some contaminants have a decreasing trend (1,1,1-trichloroethane), some have an increasing trend (chloroform), while others have been relatively stable (1,1-dichloroethane, 1,1-dichloroethene, tetrachloroethene, and trichloroethene).

MW12D had ROD cleanup goal exceedances for chloroform (estimated at 0.21 µg/L), tetrachloroethene (15 µg/L) and trichloroethene (4 µg/L). Additionally, 1,4-dioxane (4 µg/L) exceeded the North Carolina groundwater standard. Most metals in this well have shown a decreasing trend in concentrations; however, concentrations of VOCs have remained relatively stable or increased slightly.

MW12S had ROD cleanup goal exceedances for tetrachloroethene (4.9 µg/L), trichloroethene (25 µg/L), cadmium (26 µg/L) and manganese (1,800 µg/L). Additionally, 1,1-dichloroethane (9.8 µg/L) and cobalt (47 µg/L) exceeded North Carolina groundwater standards. June 2016 was the first time since 2011 that trichloroethene, and the first time since 2010 that tetrachloroethene, has been detected above its ROD cleanup goal. The concentrations of tetrachloroethene and trichloroethene detected in June 2016 were historical highs for this well. Chloroform previously exceeded the ROD cleanup goal, but concentrations have decreased to below the cleanup goal. Concentrations of metals have historically fluctuated with no discernable trend.

MW13D had four ROD cleanup goal exceedances, which were 1,1-dichloroethene (13 µg/L), chloroform (estimated 0.29 µg/L), tetrachloroethene (19 µg/L), and trichloroethene (6.9 µg/L). Additionally, 1,4-dioxane (5.1 µg/L) and iron (370 µg/L) exceeded North Carolina groundwater standards. Concentrations of 1,1-dichloroethene, tetrachloroethene, and trichloroethene have generally increased over time while chloroform has remained relatively stable.

MW13S had no ROD cleanup goal exceedances; however, the concentration of manganese (150 µg/L) exceeded the North Carolina groundwater standard.

MW14D had one ROD cleanup goal exceedance, which was tetrachloroethene at 1.2 µg/L. Tetrachloroethene has been consistently detected in this well since September 2007 at relatively low concentrations ranging from 0.99 to 7.1 µg/L. Concentrations in MW14D have remained relatively stable over time.

MW14S had no constituents exceeding the ROD cleanup goals, EPA MCLs or North Carolina groundwater standards. There have been no exceedances of cleanup goals in this well since September 2007.

MW15D had one ROD cleanup goal exceedance, which was tetrachloroethene at 6.7 µg/L. This concentration was the highest level of tetrachloroethene detected in MW15D since sampling began in January 2010. Additionally, manganese (110 µg/L) exceeded the North Carolina groundwater standards. Concentrations of tetrachloroethene in MW15D have shown an increasing trend over time.

MW15S had ROD cleanup goal exceedances of 1,1-dichloroethene (12 µg/L) and tetrachloroethene (2.7 µg/L). Additionally, the concentration of manganese (110 µg/L) exceeded the North Carolina groundwater standard. After observing historically high VOC concentrations in this well during the July 2015 sampling event, VOCs decreased in June 2016, returning to levels more consistent with historical data.

MW16D had ROD cleanup goal exceedances of 1,1-dichloroethene (40 µg/L), chloroform (3.2 µg/L), tetrachloroethene (7.4 µg/L), trichloroethene (64 µg/L), and manganese (790 µg/L). Concentrations of 1,1-dichloroethane (12 µg/L) and 1,4-dioxane (4.4 µg/L) also exceeded North Carolina groundwater standards. Most concentrations in this well have remained generally stable since sampling began in February 2012.

MW16S had one ROD cleanup goal exceedance, which was manganese at 440 µg/L. Cadmium (3.6 µg/L), cobalt (29 µg/L), and iron (1,100 µg/L) also exceeded North Carolina groundwater standards. Historically, no VOCs have been detected above ROD cleanup goals in this well.

MW17D had only one ROD cleanup goal exceedance, which was tetrachloroethene at 3.4 µg/L. Additionally, iron (320 µg/L) exceeded the North Carolina groundwater standard. The June 2016 concentration of tetrachloroethene was slightly higher than during the 2014 and 2015 sampling events, and was the highest detected since sampling of this well began in March 2013.

MW17S had two ROD cleanup goal exceedances, chloroform at an estimated 0.19 µg/L and tetrachloroethene at 1.8 µg/L. Manganese (85 µg/L) also exceeded the North Carolina groundwater standard. Most constituents in this well have decreased since its initial sampling in March 2013, with 1,1-dichloroethene and trichloroethene decreasing to below ROD cleanup goals.

MW18D had no exceedances of ROD cleanup goals. Iron (2,700 µg/L) and manganese (74 µg/L) exceeded North Carolina groundwater standards.

MW19D was destroyed sometime between the August 2014 and the July 2015 sampling events, and therefore no current data is available from this well.

MW20D had ROD cleanup goal exceedances of 1,1-dichloroethene (9.7 µg/L), chloroform (0.92 µg/L), tetrachloroethene (4 µg/L), and trichloroethene (11 µg/L). Most VOC concentrations in this well have displayed an increasing trend, while manganese concentrations have decreased to below the ROD cleanup goal.

AMW-3A, AMW-3B, and MW-10 are three clustered wells located northwest of the Blue Ridge Plating site near the southern end of Lake Julian (see Figure 2-1), that are owned and maintained by Duke Energy. These wells have been sampled annually with the permission of Duke Energy since November 2014 to support characterization of the Blue Ridge Plating site. MW-10 is completed across the water table in the upper part of the saprolite aquifer, AMW-3A is completed to the top of bedrock at the base of the saprolite aquifer, and AMW-3B is completed in the bedrock aquifer. The only exceedances of ROD cleanup goals in these wells in June 2016 were the chloroform concentrations in AMW-3A (estimated 0.44 µg/L) and AMW-3B (estimated 0.32 µg/L). Additionally, chromium (59 µg/L) and vanadium (6.2 µg/L) exceeded North Carolina groundwater standards in AMW-3A, and manganese (190 µg/L) exceeded the North Carolina groundwater standard in MW-10.

3.3 Statistical Analysis of Trends

The Mann-Kendall statistical test was used to identify statistically significant trends in the groundwater contaminant concentrations generated from the sampling events that have occurred from September 2007 through June 2016. The Mann-Kendall test is a nonparametric test that can help identify changes in contaminant concentrations over time, for a minimum of four samples. This test cannot verify the rate at which concentrations are changing.

The Mann-Kendall statistical calculations were performed using the GSI Mann-Kendall Toolkit (GSI Environmental, 2012). This spreadsheet-based software follows the Mann-Kendall methodology developed by GSI Environmental, Inc. for the Air Force Civil Engineering Center (AFCEC) in its Monitoring and Remediation Optimization System (MAROS) software. This software relies on three statistical metrics, as follows:

- The Mann-Kendall Statistic, or S Statistic, indicates whether the concentration trend versus time is generally decreasing (negative S value) or increasing (positive S value).
- The Confidence Factor, or CF, which modifies the S Statistic calculation to indicate the degree of confidence in the trend result. Also, if the CF is low, it is used to apply a preliminary "No Trend" classification pending consideration of the Coefficient of Variation.
- The Coefficient of Variation, or COV, is used to distinguish between a "No Trend" result and a "Stable" result for datasets with no significant increasing or decreasing trend (e.g., a low CF).

The S Statistic is calculated by comparing the data sequentially. For a given number of sampling events (n), the contaminant concentration from Event 1 is compared to the concentration from Events 2 through n, the concentration from Event 2 is compared to the concentrations from Events 3 through n, and the concentration from Event 3 is compared to the concentrations from Events 4 through n, and so on. If the contaminant concentration increases between two events, then a value of +1 is given. A value of -1 is given if the contaminant concentration decreases between two events and a value of 0 is given if the concentration does not change. The values representing the changes between the concentration from Event 1 and the other events are summed, then the changes between Event 2 and other events, and so on. The sums are added together to get one value, which is the S Statistic. A value of S greater than zero indicates an increasing trend, while a value of S less than zero indicates a decreasing trend, subject to further modification based on the CF and the COV. The S statistic indicates the direction of the trend (increasing or decreasing), while the strength of the trend is characterized by the CF, as described below. Furthermore, if the degree of confidence regarding an increasing or decreasing trend is insufficient (due to either variability in concentrations versus time or little change in concentrations versus time), the S Statistic result is re-classified as "No Trend."

The CF is the measure of confidence for rejecting the null hypothesis of "no trend" versus time. The null hypothesis states that the dataset shows no distinct linear trend over time. The Mann-Kendall method tests the null hypothesis against the alternative hypothesis, which is that the data do show a trend over the specified time period. The probability (p) of accepting the null hypothesis is determined from the Mann-Kendall table of probabilities, which are based on the number of sample events (n, for $4 \leq n \leq 40$) and the absolute value of S. Specifically, p is the probability of obtaining a value of S equal to or greater than the calculated value for n events when no trend is present. The null hypothesis is rejected when $p < 0.1$.

The CF is defined as (1 - p)%. When CF > 95% ($p < 0.05$), the data demonstrate a strong trend, either "Increasing" or "Decreasing" trends. When the CF falls between 90 and 95% ($0.1 > p > 0.05$), the null hypothesis is rejected and a trend is indicated; however, due to the lower confidence in the trend, the qualifier "Probably" is applied, as in "Probably Increasing" or "Probably Decreasing." If the CF is less than 90% ($p > 0.1$), the null hypothesis is accepted and either a "No Trend" condition or a "Stable" condition is indicated, depending on the COV.

The COV for the dataset is the standard deviation divided by the mean. The COV provides a general indicator of the degree of variability in the concentrations at a particular monitoring location over time. The COV is used to distinguish between a "Stable" plume condition (relatively constant concentration in the well versus time) and a "No Trend" condition (highly variable concentrations versus time) for datasets with no significant increasing or decreasing trend. Depending on the values of the S Statistic and the COV, sampling locations that exhibit a low CF (CF < 90%) are designated as either "Stable" ($S \leq 0$ and COV < 1) or "No Trend" (COV ≥ 1).

The following table summarizes the statistical metrics used by the GSI Mann-Kendall Toolkit to evaluate trend:

S Statistic	Confidence in Trend	Trend
S > 0	CF > 95%	Increasing
S > 0	95% ≥ CF ≥ 90%	Probably Increasing
S > 0	CF < 90%	No Trend
S ≤ 0	CF < 90% and COV ≥ 1	No Trend
S ≤ 0	CF < 90% and COV < 1	Stable
S < 0	95% ≥ CF ≥ 90%	Probably Decreasing
S < 0	CF > 95%	Decreasing

Of the 30 wells sampled in June 2016, 25 wells had enough data sets that qualified for statistical calculations. From these 25 wells, 100 data sets were analyzed to determine trends in concentrations of contaminants of concern over time. The data sets analyzed primarily were limited to those containing constituents exceeding the ROD cleanup goals. The results of the Mann-Kendall statistical analysis are listed in Table 3-3, and the outputs from the *GSI Mann-Kendall Toolkit* are included in Appendix B. Results of the trend evaluation are summarized in the table below:

Contaminant of Concern	Wells with Decreasing or Probably Decreasing Trend	Wells with Increasing or Probably Increasing Trend	Wells with No Trend or Stable Trend
VOCs			
1,1,1-Trichloroethane	MW06S, MW10S, MW11S	None	None
1,1-Dichloroethane	MW06S, MW08S, MW10S, MW18D	MW12D, MW13D	MW01D, MW06D, MW11S, MW12D, MW16D, MW17S, MW20D
1,1-Dichloroethene	MW06S, MW08S, MW10S, MW18D		MW01D, MW06D, MW11S, MW16D, MW17S, MW20D
Chloroform	MW01S, MW05S, MW06S, MW08S, MW12D	MW11S	MW01D, MW12S, MW13D, MW15D, MW16D
Tetrachloroethene	MW08S, MW10S	MW12D, MW13D, MW15D	MW01D, MW06D, MW06S, MW09S, MW11S, MW13S, MW14D, MW15S, MW16D, MW17S, MW17D, MW20D
Trichloroethene	MW08S, MW10S	MW13D	MW06S, MW11S, MW12S, MW12D, MW13S, MW15S, MW16D, MW17S, MW20D
SVOCs			
Naphthalene	None	None	MW01S
Pentachlorophenol	None	None	MW01S
Metals			
Cadmium	MW01S, MW06S, MW07S, MW08S	None	MW03S, MW05S, MW12S

Contaminant of Concern	Wells with Decreasing or Probably Decreasing Trend	Wells with Increasing or Probably Increasing Trend	Wells with No Trend or Stable Trend
Cyanide	MW06S	None	None
Iron	MW07S	MW04S	MW03S, MW05S, MW08S
Manganese	MW01S, MW03S, MW05S, MW06S, MW08S, MW10S, MW12D, MW13D, MW14D, MW15S, MW16S, MW16D, MW17S, MW17D, MW20D	None	MW04S, MW07S, MW12S, MW13S, MW18D

3.4 Quality Assurance Summary

Data quality objectives for the Blue Ridge Plating Site were developed during the preparation of the SAP. Data quality indicators (DQIs) are used to interpret the degree of acceptability or usability of data collected. The principal DQIs are precision, accuracy (or bias), representativeness, comparability, and completeness (PARCC). As discussed in the SAP, an EPA Region 4 contractor provides data validation of analytical results. The data validators review all method procedures, internal spikes, calibrations, matrix spike, matrix spike duplicate, performance evaluation samples among other tasks performed by the laboratories for the sample set. The case narratives included in the data deliverables and the qualifiers placed on the data are reflective of the data validation review. Other data quality review is performed by the sampling contractor including evaluation of precision and completeness, and discussion of the analytical results of field prepared blanks or equipment rinsate blanks. Field and laboratory completeness goals for this project are greater than 90 percent, as established in the SAP.

To determine completeness, the number of usable, valid results for each sample type and analyte were counted and compared to the completeness objectives. The percent completeness was calculated using the following equation:

$$\% \text{ Completeness} = (DO/DP) * 100$$

Where: DO = Data Obtained and usable.

DP = Data Planned to be obtained

The VOC, SVOC, and metals data for the June 2016 sampling event were qualified without any rejected, not analyzed, or not reported data. However, three SVOC samples (MW06D, MW13D, and MW13D duplicate) did arrive at the laboratory in excess of 6 °C and were flagged in the data set for temperature exceedances. The only constituent detected in these three samples was 1,4-dioxane at levels anticipated from trends from previous sampling events. Therefore, the percent completeness is 100% for these data packages and the overall completeness of this field event exceeded the DQI of 90%.

For precision of duplicate samples, the Relative Percent Difference (RPD) goal established in the SAP is less than 35 percent for water sample results and less than 50 percent for sediment or soil sample results. The RPD between a sample (Sample 1) and its duplicate (Sample 2) was calculated using the following formula.

$$\text{Relative Percent Difference} = ((S-D) / [(S+D)/2]) * 100$$

Where: S = First sample value (original value), and

D = Second sample value (duplicate value).

A summary of the RPD calculations is presented in Table 3-4. Three duplicate groundwater samples were collected during this field event. Each sample and its duplicate had enough detection of contaminants to perform the RPD calculations. The average RPDs calculated for the groundwater duplicate pairs on detected constituents were 3.7% for MW06S, 3.3% for MW13D, and 5.4% for MW16D. The precision criterion for the groundwater samples was met as less than 35%.

In addition to the duplicates, other field quality control samples, including trip blanks, rinsate blanks and temperature blanks, were collected and evaluated to assess the data quality. Aqueous trip blanks were collected for monitoring of the ambient conditions during collection of VOCs. For this sampling field event, two aqueous trip blanks was prepared, handled, and analyzed along with the field samples. The trip blanks were ordered and received along with the other bottle ware purchased for this sampling project. No VOCs were detected in the trip blanks.

A rinsate blank was collected and analyzed for VOCs, SVOCs, and metals to check procedural decontamination and/or sample container contamination at the site that may cause sample contamination. Chloroform was detected in the rinsate blank at estimated concentrations 0.12

µg/L. Chloroform is a contaminant of concern at the site; however, chloroform regularly appears as a laboratory contaminant as well. Additionally, the estimated value was below the reporting limit but above the minimum detection limit therefore the accuracy of the value is in doubt. Since no other site COCs were detected in the rinse blank sample it is possible that the chloroform is a laboratory artifact. This result should not affect the overall quality of the data of field samples from monitoring wells.

Samples were packed into coolers with ice and a two-ounce bottle of water was included in each cooler as a temperature indicator. Upon receipt of samples at the laboratory, the sample custodian measured the temperature of the temperature indicators. If the temperature was outside the range of 4 degrees Centigrade plus or minus 2 degrees Centigrade, the sample custodian informed EPA sample management. Data qualifiers may be placed on the data for temperature exceedances. Notifications and qualifiers were placed on three of the June 2016 results (1,4-dioxane results for MW06D, MW13D, and MW13D duplicate) to reflect sample temperature exceedances. Historical data confirmed that the 1,4-dioxane levels were within expected ranges; therefore, the confidence in the data quality for these three samples is high.

In summary, the sample results received for this sampling event are useable and met quality assurance and quality control criteria and objectives. Minor data qualifiers were applied to the data which should be reviewed and may require consideration depending on intended use and decisions to be made.

4.0 CONCLUSIONS AND RECOMMENDATIONS

Versar completed an annual groundwater monitoring event at the Blue Ridge Plating site in June 2016. This was the seventh annual sampling event completed under this task order. The 2016 sampling also included collection of samples from three monitoring wells that are owned and maintained by Duke Energy.

Groundwater analytical results from June 2016 indicated that VOCs (1,1-dichloroethene, chloroform, tetrachloroethene, or trichloroethene) were detected at concentrations above the ROD cleanup goals in 21 of the 30 wells sampled. The highest VOC concentrations were detected in MW06S. No SVOCs were detected in excess of the cleanup goals. The metals cadmium, iron, and manganese were detected above ROD cleanup goals, with exceedances of cadmium in four wells (MW03S, MW05S, MW07S, and MW12S), iron in two wells (MW01D and MW04S), and manganese in eight wells (MW01S, MW03S, MW04S, MW05S, MW07S, MW12S, MW16D, and MW16S).

In addition to the site contaminants with cleanup goals established by the 2004 ROD and 2008 ESD, there were several other constituents detected in site groundwater in June 2016 at concentrations exceeding current EPA MCLs or North Carolina groundwater standards. These constituents are: 1,1,2-trichloroethane, 1,1-dichloroethane, 1,2-dichloroethane, 1,4-dioxane, carbazole, chromium, cobalt, and vanadium.

Based on analysis of groundwater concentration trends at the site using the Mann-Kendall statistical test, chlorinated VOC concentrations generally appear to be exhibiting a decreasing trend in most shallow wells but either an increasing trend, stable trend, or no trend in most deep wells. For metals, the Mann-Kendall test indicated that most wells display decreasing trend, stable trend, or no trend. The only metals data set with an increasing trend was iron in MW04S.

Based on groundwater monitoring data collected from 2007 through 2016, Versar recommends continuing annual groundwater monitoring in accordance with the recommendations of the First Five Year Review.

5.0 REFERENCES

Black & Veatch Special Projects Corporation (Black & Veatch) 2004, *Remedial Investigation Report, Blue Ridge Plating Company Site, Arden, Buncombe County, North Carolina*, August 19, 2004.

Black & Veatch 2009, *Revised Data Evaluation/Cleanup Status Report Based on Groundwater Data Collected between September 2007 and January 2009, Blue Ridge Plating Site, Arden, Buncombe County, North Carolina*, May 2009.

GSI Environmental Inc., 2012, *Software User's Manual GSI Mann-Kendall Toolkit for Constituent Trend Analysis Version 1*, November 2012.

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EPA 2012, *First Five-Year Review Report, Blue Ridge Plating Site, Arden, Buncombe County, North Carolina*, September 26, 2012.

TABLES

Table 2-1
Groundwater Elevation Summary
June 21, 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Well Number	Total Depth (feet bgs)	Screened Interval (feet bgs)	TOC Elevation (feet)	Depth to Water (ft below TOC)	Water Level Elevation (feet)
MW01D	73	63-73	2213.70	11.13	2202.57
MW01S	22	*	2212.87	11.46	2201.41
MW03S	13	2.5-12.5	2204.13	2.98	2201.15
MW04S	15	5.0-15.0	2205.60	3.49	2202.11
MW05S	15	5.0-15.0	2206.11	4.87	2201.24
MW06D	78	68-78	2217.65	19.37	2198.28
MW06S	36	16-26	2216.23	17.77	2198.46
MW07S	15.5	5.5-15.5	2204.34	5.73	2198.61
MW08S	26.5	16.5-26.5	2214.42	18.11	2196.31
MW09D	78	68-78	2222.57	13.74	2208.83
MW09S	27.5	17.5-27.5	2223.09	15.69	2207.40
MW10S	30	20-30	2215.98	17.15	2198.83
MW11S	32.5	22.5-32.5	2218.80	18.40	2200.40
MW12D	60	50-60	2206.19	8.30	2197.89
MW12S	19	*	2207.25	9.43	2197.82
MW13D	89	79-89	2211.58	18.56	2193.02
MW13S	30	20-30	2211.74	18.21	2193.53
MW14D	90	80-90	2220.17	21.32	2198.85
MW14S	40	30-40	2220.09	20.14	2199.95
MW15D	80	70-80	2212.06	21.95	2190.11
MW15S	26	16-26	2212.26	21.64	2190.62
MW16D	63.5	53.5-63.5	2185.99	6.08	2179.91
MW16S	15	5-15	2185.96	4.59	2181.37
MW17D	109.5	99.5-109.5	2212.95	24.82	2188.13
MW17S	34.5	24.5-34.5	2213.01	22.34	2190.67
MW18D	25.5	15.5-25.5	2181.28	4.66	2176.62
MW19D	62.5	52.2-62.5	2189.75	destroyed	-
MW20D	52.75	42.75-52.75	2178.01	4.91	2173.10
MW-10	8	3-8	2171.20	6.26	2164.94
AMW-3A	72	62-72	2173.37	8.46	2164.91
AMW-3B	98	88-98	2173.00	8.56	2164.44

Notes
bgs = below ground surface
TOC = top of casing
* = Data not available

Table 3-1
Groundwater Analytical Data Summary
September 2007 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW01D											MW01S											
					9/27/07	1/29/08	6/13/08	1/30/09	1/5/10	2/3/11	2/10/12	3/26/13	8/12/14	7/15/15	6/20/16	9/27/07	1/28/08	6/13/08	1/29/09	1/5/10	1/31/11	1/31/11*	2/6/12	3/26/13	8/12/14	7/15/15	6/20/16
Volatile Organic Compounds																											
1,1,1-Trichloroethane	200	200	200	µg/L	4.2	4.4		3.5	3.9	3.2	3.4	1.3	2.4	1.9	1.6			3.4									
1,1,2-Trichloroethane	NE	5	0.6	µg/L						0.13 J	0.13 J	0.064 J															
1,1-Dichloroethane	700	NE	6	µg/L	2.9	3.0		3.0	3.6	3.4	4.2	1.7	3.2	2.9	2.5			2.7					0.0080 J				
1,1-Dichloroethene	7	7	7	µg/L	3.2	12		9.8	14	12	15	5.9 J	9.8	6.1 J	9.1			8.2									
1,2-Dichloroethane	NE	5	0.4	µg/L					0.31 J	0.28 J	0.33 J	0.19 J	0.30 J		0.17 J												
Carbon Tetrachloride	NE	5	0.3	µg/L																							
Chloroform	0.19	80	70	µg/L		0.2 J	0.46 J	0.19 J	0.25 J	0.24 J	0.29 J		0.22 J		0.17 J	0.45 J	0.52	0.17 J	0.49 J	0.18 J	0.25 J	0.28 J	0.13		0.17 J		0.09 J
Chloromethane	NE	NE	3	µg/L																							
Tetrachloroethene	0.7	5	0.7	µg/L	23	25		14	25	26	32	11	24	16 J	18			19									
Trichloroethene	2.8	5	3	µg/L	0.62	0.75		0.62	0.88	0.96	1.1	0.44 J	1.1	0.99	0.77			0.56									
Vinyl chloride	NE	2	0.03	µg/L																							
Semivolatile Organic Compounds																											
1,4-Dioxane	NE	NE	3	µg/L						6.7 J	13		7.4 J	7.4	5.4												
2-Methylnaphthalene	14	NE	30	µg/L													0.03 J			6	10	7.9	2.6		1.1 J		
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L							15																
Carbazole	NE	NE	2	µg/L																8.8	9.6	9.1	6.0		11	6.9	3.5
Naphthalene	21	NE	6	µg/L												0.09 J				61	70	51	14		1.3 J		
Pentachlorophenol	0.3	1	0.3	µg/L													1 J	1.4 J		0.54 N	2.1	1.9	2.0				
Metals																											
Antimony	NE	6	1	µg/L																							
Arsenic	10	10	10	µg/L															5.9 J								
Barium	NE	2000	700	µg/L					25	45	16	24	19	17	53					16	11	11	13	14	15	11	22
Cadmium	5	5	2	µg/L				3.0 J								20	9.0	17	19	12	8.0	7.9	3.9	3.8	3.6	3.3	2.8
Chromium	NE	100	10	µg/L						6.8					7.7												6.7
Cobalt	NE	NE	1	µg/L																23	14	14	9.1	7.1	5.5		6.2
Cyanide	154	200	70	µg/L		1.3 J										72	45			20						6.6 J	
Iron	3800	NE	300	µg/L	1600	1100	190	340	2200	4800	540	1900	730	440	5900	37 J											2800
Manganese	300	NE	50	µg/L	51	34	7.6	45	56	110	16	46	19	14	140	1600	820	1400	1800	1400	910	910	490	510	510	400	440
Nickel	100	NE	100	µg/L				1.5 J									6.5 J	12	15 J								
Selenium	NE	50	20	µg/L																							
Vanadium	NE	NE	0.3	µg/L						5.5																	

Notes

Table presents results for constituents that currently or historically exceed ROD cleanup goals, EPA MCLs, or NCAC 2L standards.

[1] Record of Decision Summary of Remedial Alternative Selection, Blue Ridge Plating Site, Arden, Buncombe County, North Carolina.

[2] Regional Screening Levels for Chemical Contaminants at Superfund Sites.

[3] North Carolina Administrative Code Title 15A, North Carolina Department of Environment and Natural Resources Division of Water Quality, Subchapter 2L, Groundwater Quality Standards, 15A NCAC 2L .0202 (Effective April 1, 2013)

	Analytical results exceeding the ROD Cleanup Goals are shaded.
Bold	Analytical results exceeding the EPA MCL are bold.
Red	Analytical results exceeding the NCAC Groundwater Standard are red.

ROD - Record of Decision

EPA - United States Environmental Protection Agency

MCL - Maximum Contaminant Level

NCAC - North Carolina Administrative Code

µg/L - micrograms per liter

Blank - no data available; or results are non-detect

NE - not established

* - denotes duplicate sample

Qualifier Definitions

J - The identification of the analyte is acceptable; the reported value is an estimate.

N - There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification.

NA-4 - Not analyzed or reported due to interferences.

T-1 - Sample received in cooler with temperature blank > 6 degrees C

Table 3-1
Groundwater Analytical Data Summary
September 2007 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW03S												MW04S										
					9/27/07	1/28/08	6/12/08	1/29/09	1/5/10	1/5/10*	1/31/11	2/6/12	3/25/13	8/12/14	7/15/15	6/19/16	9/29/07	1/28/08	6/13/08	1/29/09	1/5/10	2/3/11	2/7/12	3/25/13	8/12/14	7/15/15	6/19/16
Volatile Organic Compounds																											
1,1,1-Trichloroethane	200	200	200	µg/L																							
1,1,2-Trichloroethane	NE	5	0.6	µg/L																							
1,1-Dichloroethane	700	NE	6	µg/L		0.08 J						0.025									0.16 J		0.091				
1,1-Dichloroethene	7	7	7	µg/L																						0.25 J	0.10 J
1,2-Dichloroethane	NE	5	0.4	µg/L																							
Carbon Tetrachloride	NE	5	0.3	µg/L																							
Chloroform	0.19	80	70	µg/L								0.047															
Chloromethane	NE	NE	3	µg/L																							
Tetrachloroethene	0.7	5	0.7	µg/L		0.15 J		0.19 J																			
Trichloroethene	2.8	5	3	µg/L	0.50	0.60	0.75	0.53	0.16 J	0.14 J																	
Vinyl chloride	NE	2	0.03	µg/L																							
Semivolatile Organic Compounds																											
1,4-Dioxane	NE	NE	3	µg/L											1.2 J												
2-Methylnaphthalene	14	NE	30	µg/L	0.10																						
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L																							
Carbazole	NE	NE	2	µg/L																							
Naphthalene	21	NE	6	µg/L	0.09 J												0.08 J										
Pentachlorophenol	0.3	1	0.3	µg/L					0.042 J																		
Metals																											
Antimony	NE	6	1	µg/L																							
Arsenic	10	10	10	µg/L													**24 J**										
Barium	NE	2000	700	µg/L					49	50	31	55	50	78	62	58					54	43	39	43	36	32	34
Cadmium	5	5	2	µg/L		**7.9**	4.8	**18**	**7.8**	**8.2**	**5.2**	2.7	3.0	1.1	**6.1**	**6.3**											
Chromium	NE	100	10	µg/L					16	17	18	35	15	12	9.5	6.3											
Cobalt	NE	NE	1	µg/L																							
Cyanide	154	200	70	µg/L	59	42									16		55	40									
Iron	3800	NE	300	µg/L	12000	190	3000	2600	580	570	330	140	570	1400	400	1400	2300	570	2800	110	8800	11000	7800	6200	18000	10000	10000
Manganese	300	NE	50	µg/L	7800	870	1400	2000	840	840	390	31	84	820	320	730	3400	1800	3400	3400	2400	2000	2000	2400	2700	2400	2900
Nickel	100	NE	100	µg/L				19 J	10	11																	
Selenium	NE	50	20	µg/L																							
Vanadium	NE	NE	0.3	µg/L																							

Notes

Table presents results for constituents that currently or historically exceed ROD cleanup goals, EPA MCLs, or NCAC 2L standards.

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Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

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					9/27/07	1/29/08	6/13/08	1/29/09	1/5/10	2/1/11	2/7/12	3/25/13	7/15/15	6/20/16	9/26/07	1/31/08	6/13/08	1/27/09	1/7/10	2/3/11	2/10/12	3/28/13	8/13/14	7/16/15	6/21/16
Volatile Organic Compounds																									
1,1,1-Trichloroethane	200	200	200	µg/L				0.27 J							1.9 J	2.2	2.0	2.8	2.8	2.1	2.1	1.8	1.8	1.2	1.1
1,1,2-Trichloroethane	NE	5	0.6	µg/L															0.16 J						
1,1-Dichloroethane	700	NE	6	µg/L							0.042				1.4	1.4	1.6	2.1	2.3	2.2	2.4	2.2	2.1	1.6	1.6
1,1-Dichloroethene	7	7	7	µg/L		0.08 J		0.25 J							0.39 J	5.1	5.2	**7.5**	**7.6**	**7.6**	**8.5**	**8.1 J**	6.3	5.1 J	6.0
1,2-Dichloroethane	NE	5	0.4	µg/L															0.21 J	0.18 J	0.17 J				0.11 J
Carbon Tetrachloride	NE	5	0.3	µg/L																		0.34 J			
Chloroform	0.19	80	70	µg/L	0.71	0.52	0.40 J	0.27 J	0.17 J	0.18 J	0.19			0.08 J	0.10 J	0.11 J		0.16 J	0.16 J	0.15 J	0.21		0.14 J	0.22 J	0.15 J
Chloromethane	NE	NE	3	µg/L															0.96						
Tetrachloroethene	0.7	5	0.7	µg/L		0.07 J		0.21 J					0.22 J		**12**	**13**	**11**	**16**	**18**	**18**	**19**	**14**	**14**	**9.1 J**	**11**
Trichloroethene	2.8	5	3	µg/L		0.10 J		0.13 J							0.36 J	0.38 J	0.30 J	0.60	0.60	0.63	0.72	0.54	0.82	0.58	0.50
Vinyl chloride	NE	2	0.03	µg/L																					
Semivolatile Organic Compounds																									
1,4-Dioxane	NE	NE	3	µg/L																4.8 J	8.2 J		5.6 J	4.0	4.4 T-1
2-Methylnaphthalene	14	NE	30	µg/L	0.45	0.15	0.17																		
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L						**11**															
Carbazole	NE	NE	2	µg/L																					
Naphthalene	21	NE	6	µg/L	1.8	1.8	0.76								0.08 J										
Pentachlorophenol	0.3	1	0.3	µg/L												0.15 J									
Metals																									
Antimony	NE	6	1	µg/L																					
Arsenic	10	10	10	µg/L				4.5 J				2.8													
Barium	NE	2000	700	µg/L					36	33	34	33	23	28					15	19	16	14	16	16	15
Cadmium	5	5	2	µg/L	**14**		**9.5**	**12**	**24**	**8.6**	**8.4**	**9.3**	**5.1**	**6.3**											
Chromium	NE	100	10	µg/L					5.1		5.1														
Cobalt	NE	NE	1	µg/L					28	25	19	23	14	18											
Cyanide	154	200	70	µg/L	77	59	24		24	22	18	19	13			1.6 J									
Iron	3800	NE	300	µg/L	450			26 J	230	100	460		350	260	180	210		92 J	300	700	460		200	320	130
Manganese	300	NE	50	µg/L	4100	1800	3900	2800	4000	3100	2500	3200	1500	1500		8.4 J	21	8.4 J	9.9	15	14		9.6	9.0	
Nickel	100	NE	100	µg/L				5.3 J	12																
Selenium	NE	50	20	µg/L								8.2													
Vanadium	NE	NE	0.3	µg/L																					

Notes

Table presents results for constituents that currently or historically exceed ROD cleanup goals, EPA MCLs, or NCAC 2L standards.

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MCL - Maximum Contaminant Level

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µg/L - micrograms per liter

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T-1 - Sample received in cooler with temperature blank > 6 degrees C

Table 3-1
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September 2007 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW06S															
					9/26/07	1/30/08	6/11/08	1/28/09	1/7/10	2/2/11	2/9/12	2/9/12*	3/28/13	3/28/13*	8/13/14	8/13/14*	7/13/15	7/13/15*	6/19/16	6/19/16*
Volatile Organic Compounds																				
1,1,1-Trichloroethane	200	200	200	µg/L	370	310	400	240	160	120	120	110	140	140	65	75	140	110	92	87
1,1,2-Trichloroethane	NE	5	0.6	µg/L					1.3	0.82 J	1.2 J	1.0 J	1.5	2.3	0.77	0.94	2.6	2.2	2.7	2.6
1,1-Dichloroethane	700	NE	6	µg/L	95	92	100	76	40	27	24	21	39	45	15	19	56	36	61	60
1,1-Dichloroethene	7	7	7	µg/L	300 J	220	320	180	140	110	110	98	150 J	160	67	79	150 J	110 J	120	110
1,2-Dichloroethane	NE	5	0.4	µg/L					0.28 J								0.74	0.54	0.56	0.57
Carbon Tetrachloride	NE	5	0.3	µg/L																
Chloroform	0.19	80	70	µg/L	1.1	0.86	1.1	0.76 J	0.32 J	0.26 J	0.33	0.35			0.16 J	0.23 J	0.54	0.47 J	0.63	0.59
Chloromethane	NE	NE	3	µg/L					9.3											
Tetrachloroethene	0.7	5	0.7	µg/L	87	84 J	92	54	37	35	52	45	64	78	54	65	140 J	100 J	150	140
Trichloroethene	2.8	5	3	µg/L	21	19 J	31	31	8.8	9.0	4.5	4.3	6.9	10	6.3	7.6	30	16	26	26
Vinyl chloride	NE	2	0.03	µg/L																
Semivolatile Organic Compounds																				
1,4-Dioxane	NE	NE	3	µg/L						8.4 J	29	33			7.4 J	10	24	26	41	42
2-Methylnaphthalene	14	NE	30	µg/L																
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L																
Carbazole	NE	NE	2	µg/L																
Naphthalene	21	NE	6	µg/L	0.19															
Pentachlorophenol	0.3	1	0.3	µg/L			0.27 J													
Metals																				
Antimony	NE	6	1	µg/L																
Arsenic	10	10	10	µg/L				56					14	14						
Barium	NE	2000	700	µg/L					9.8	18	28	28	33	33	20	20	25	27	23	23
Cadmium	5	5	2	µg/L	46	21	48	45	17	7.0	4.3	3.3	1.6	1.5						
Chromium	NE	100	10	µg/L					110	130	190	180	220	230	60	59	55	56	45	42
Cobalt	NE	NE	1	µg/L					76	40	28	28	30	30	9.2	9.2	11	11	10	9.9
Cyanide	154	200	70	µg/L	260	250	280 J	250	230	120	NA-4	NA-4	110	110	36	28	41	37	31	36
Iron	3800	NE	300	µg/L	160	160	140	61 J	160									110	120	
Manganese	300	NE	50	µg/L	1200	670	2000	2300	1000	570	200	170	180	190	13	14	39	42	40	40
Nickel	100	NE	100	µg/L		9.5 J	25	26 J	12											
Selenium	NE	50	20	µg/L					24	18	15	15	40	38	6.2	6.4	8.0	8.0	8.2 J	8.0 J
Vanadium	NE	NE	0.3	µg/L																

Notes

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September 2007 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW07S										
					9/26/07	1/29/08	6/12/08	1/29/09	1/5/10	2/1/11	2/7/12	3/26/13	8/13/14	7/16/15	6/20/16
Volatile Organic Compounds															
1,1,1-Trichloroethane	200	200	200	µg/L	0.14 J										0.30 J
1,1,2-Trichloroethane	NE	5	0.6	µg/L											
1,1-Dichloroethane	700	NE	6	µg/L	0.48 J			0.16 J	0.12 J		0.063				0.80
1,1-Dichloroethene	7	7	7	µg/L	0.82 J	0.05 J		0.36 J					0.080 J	0.22 J	0.84
1,2-Dichloroethane	NE	5	0.4	µg/L											
Carbon Tetrachloride	NE	5	0.3	µg/L											
Chloroform	0.19	80	70	µg/L	1.6	0.23 J	0.4 J	1.4	0.13 J		0.095		0.090 J		0.19 J
Chloromethane	NE	NE	3	µg/L											
Tetrachloroethene	0.7	5	0.7	µg/L	0.24 J	0.09 J		0.31 J	0.12 J				0.23 J	0.29 J	1.0
Trichloroethene	2.8	5	3	µg/L	19	1.9	0.95	11 J	0.29 J	0.14 J	0.45 J	0.21 J	1.7	1.8	13
Vinyl chloride	NE	2	0.03	µg/L											
Semivolatile Organic Compounds															
1,4-Dioxane	NE	NE	3	µg/L											
2-Methylnaphthalene	14	NE	30	µg/L	0.05 J	0.12									
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L											
Carbazole	NE	NE	2	µg/L											
Naphthalene	21	NE	6	µg/L	0.17	1.4	0.64	4.4							
Pentachlorophenol	0.3	1	0.3	µg/L					0.16 J						
Metals															
Antimony	NE	6	1	µg/L											
Arsenic	10	10	10	µg/L											
Barium	NE	2000	700	µg/L					63	28	36	65	31	27	54
Cadmium	5	5	2	µg/L	53	37	42	44	38	15	18	37	14	12	19
Chromium	NE	100	10	µg/L						10	5.9				
Cobalt	NE	NE	1	µg/L									23	14	28
Cyanide	154	200	70	µg/L	35	55	25 J	16	28			28	17	20	31
Iron	3800	NE	300	µg/L	4200	650	1500	1600	340	700	510	410		490	
Manganese	300	NE	50	µg/L	9600	2700	2100	930	420	140	230	380	1800	1400	2200
Nickel	100	NE	100	µg/L	73	29 J	46	47	47	23	26	42	18	14	20
Selenium	NE	50	20	µg/L								2.6			
Vanadium	NE	NE	0.3	µg/L											

Analyte	MW08S										
	9/26/07	1/30/08	6/12/08	1/28/09	1/6/10	2/2/11	2/9/12	3/27/13	8/13/14	7/16/15	6/21/16
Volatile Organic Compounds											
1,1,1-Trichloroethane	170	150	63	100	12	87	30	19	18	27	16
1,1,2-Trichloroethane					0.14 J	1.3	0.29 J	0.27 J	0.24 J		0.42 J
1,1-Dichloroethane	62	55	23	48	7.4	23	10	7.4	4.9	10	9.7
1,1-Dichloroethene	190 J	140	73	110	17	80	14	27 J	19	27 J	23
1,2-Dichloroethane						0.36 J					0.13 J
Carbon Tetrachloride											
Chloroform	0.79	0.63	0.24 J	0.64		0.32 J	0.17				0.10 J
Chloromethane					0.93						
Tetrachloroethene	65	61	20	41	4.6	26	13	9.2	12	22 J	21
Trichloroethene	34	33	18	50	11	15	7.8	5.8	2.6	5.2	4.8
Vinyl chloride											
Semivolatile Organic Compounds											
1,4-Dioxane						22	5.5 J		2.6 J	3.3	1.9 J
2-Methylnaphthalene											
Bis(2-ethylhexyl) phthalate											
Carbazole											
Naphthalene	0.11										
Pentachlorophenol											
Metals											
Antimony											
Arsenic								1.3			
Barium					25	76	37	34	14	17	12
Cadmium	65	26	21	51	4.5	16	2	6.8	2.1	3.4	0.78
Chromium										6.7	6.5
Cobalt					5.6	22	8.0	9.3			
Cyanide	33	64	48	37	19	51	NA-4	25	15	26	
Iron	110	170	5100	95 J	220	430	450	450	130		
Manganese	1000	430	400	900	99	330	59	180	51	95	21
Nickel	40	15 J	14	31 J							
Selenium					2.6	5.8	3.7	5.6	2.9	5.4	2.0
Vanadium											

Notes

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Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW09D											MW09S										
					9/28/07	1/28/08	6/11/08	1/27/09	1/7/10	2/2/11	2/7/12	3/27/13	8/12/14	7/14/15	6/19/16	9/28/07	1/28/08	6/10/08	1/27/09	1/4/10	2/1/11	2/7/12	3/27/13	8/11/14	7/13/15	6/19/16
Volatile Organic Compounds																										
1,1,1-Trichloroethane	200	200	200	µg/L		0.08 J									0.10 J		0.23 J		0.29 J		0.28 J					0.10 J
1,1,2-Trichloroethane	NE	5	0.6	µg/L																						
1,1-Dichloroethane	700	NE	6	µg/L		0.09 J			0.11 J	0.12 J	0.14											0.0054 J				
1,1-Dichloroethene	7	7	7	µg/L		0.12 J		0.28 J	0.21 J	0.24 J			0.27 J	0.39 J	0.30 J		0.42 J	0.31 J	0.61	0.22 J	0.64			0.29 J	0.55 J	0.45 J
1,2-Dichloroethane	NE	5	0.4	µg/L																						
Carbon Tetrachloride	NE	5	0.3	µg/L																						
Chloroform	0.19	80	70	µg/L							0.047						0.07 J		0.15 J			0.010 J				0.10 J
Chloromethane	NE	NE	3	µg/L					0.82																	
Tetrachloroethene	0.7	5	0.7	µg/L		0.18 J		0.37 J	0.37 J	0.36 J	0.23 J	0.45 J	0.64	1.0 J	1.5	0.64	1.4	1.1	1.5	0.55	1.6		0.90	0.99	1.0 J	1.0
Trichloroethene	2.8	5	3	µg/L									0.31 J													
Vinyl chloride	NE	2	0.03	µg/L																						
Semivolatile Organic Compounds																										
1,4-Dioxane	NE	NE	3	µg/L																						
2-Methylnaphthalene	14	NE	30	µg/L	0.03 J		0.12																			
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L																						
Carbazole	NE	NE	2	µg/L																						
Naphthalene	21	NE	6	µg/L	0.20		0.21									0.08 J										
Pentachlorophenol	0.3	1	0.3	µg/L																0.089 J						
Metals																										
Antimony	NE	6	1	µg/L																						
Arsenic	10	10	10	µg/L																						
Barium	NE	2000	700	µg/L					17	28	15	15	16	18	14					20	16	14	15	14	16	16
Cadmium	5	5	2	µg/L																						
Chromium	NE	100	10	µg/L					50	60																
Cobalt	NE	NE	1	µg/L																						
Cyanide	154	200	70	µg/L	36	10																				
Iron	3800	NE	300	µg/L	1200	340	230	39 J	660	2300							100	360	600	1300	220	200	300		270	220
Manganese	300	NE	50	µg/L	300	98	160	70	82	120	12	10	13	11		12 J	7 J	14	19	28	11	9.6	11	7.3	13	9.4
Nickel	100	NE	100	µg/L	92	17 J	15		25	33																
Selenium	NE	50	20	µg/L																						
Vanadium	NE	NE	0.3	µg/L																						

Notes

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					9/26/07	1/30/08	6/11/08	1/28/09	1/6/10	2/2/11	2/7/12	3/27/13	8/14/14	7/15/15	6/20/16	9/26/07	6/11/08	1/27/09	1/6/10	2/2/11	2/10/12	3/26/13	8/11/14	7/13/15	6/20/16
Volatile Organic Compounds																										
1,1,1-Trichloroethane	200	200	200	µg/L	**2800**	**3000**	**2100**	**1700**	**270**	91	70	42	16	15	39	**260 J**	**440**	**370**	**400**	**240**	**240**	130	110	96	46
1,1,2-Trichloroethane	NE	5	0.6	µg/L					2	0.40 J	0.27 J								2.0 J	1.6 J		1.8	1.2	1.4	0.80
1,1-Dichloroethane	700	NE	6	µg/L	110	120	94	82	13	3.3	3.5	3.2	0.91	1.2	6.7	45	75 J	59	74	58	68	52	71	63	46
1,1-Dichloroethene	7	7	7	µg/L	**1400 J**	**1500**	**1300**	**910**	**190**	**56**	**47**	**31 J**	**12**	**12 J**	**29**	**190 J**	**310**	**210**	**250**	**180**	**190**	**110**	**120**	**110 J**	**79**
1,2-Dichloroethane	NE	5	0.4	µg/L					0.68 J										0.80 J			0.68 J	0.54	0.57	0.32 J
Carbon Tetrachloride	NE	5	0.3	µg/L																					
Chloroform	0.19	80	70	µg/L	2.5 J	1.8	2.4				0.12				0.11 J	0.80 J	1.4	1.2 J	1.4 J	0.95 J	1.7	1.8	1.9	1.8	1.7
Chloromethane	NE	NE	3	µg/L					7.7										3.8						
Tetrachloroethene	0.7	5	0.7	µg/L	**570**	**660**	**430**	**320**	**55**	**30**	**28**	**20**	**14**	**15 J**	**69**	**95**	**160**	**120**	**160**	**140**	**160**	**100**	**130**	**100 J**	**83**
Trichloroethene	2.8	5	3	µg/L	**57**	**66**	**60**	**43**	**7.1**	1.8	1.6	1.3	0.46 J	0.56	2.7	**25**	**37 J**	**31**	**33**	**28**	**32**	**35**	**38**	**33**	**21**
Vinyl chloride	NE	2	0.03	µg/L																					
Semivolatile Organic Compounds																										
1,4-Dioxane	NE	NE	3	µg/L																2.5 J	3.4 J		1.3 J	1.5 J	1.2 J
2-Methylnaphthalene	14	NE	30	µg/L		0.05 J																			
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L																					
Carbazole	NE	NE	2	µg/L																					
Naphthalene	21	NE	6	µg/L	0.12	0.47	0.18									0.12									
Pentachlorophenol	0.3	1	0.3	µg/L					0.24																
Metals																										
Antimony	NE	6	1	µg/L																					
Arsenic	10	10	10	µg/L																		1.5			
Barium	NE	2000	700	µg/L					12	11	11	12	9.0	8.4	9.7			0.28 J	120	110	130	120	110	85	77
Cadmium	5	5	2	µg/L			4.2	**5.6**	3.5		1.6	1.6	1.3	1.0	0.78				0.62		0.66	0.61	0.69	0.58	
Chromium	NE	100	10	µg/L								5.0	17	22	19										
Cobalt	NE	NE	1	µg/L					62	28	20	15	12	10	9.8						5.0				
Cyanide	154	200	70	µg/L	37	82	57	53	68					7.2 J											
Iron	3800	NE	300	µg/L	290	84 J								110				110	130		110		1100		
Manganese	300	NE	50	µg/L	1200	720	1400	1800	1200	520	370	320	280	220	190	180	190	150	190	190	190	180	190	140	120
Nickel	100	NE	100	µg/L		12 J	21	24 J	17								23	15 J	19	22	19	21	17	14	11
Selenium	NE	50	20	µg/L					12	4.9	3.5	4.1										3.6			
Vanadium	NE	NE	0.3	µg/L																					

Notes

Table presents results for constituents that currently or historically exceed ROD cleanup goals, EPA MCLs, or NCAC 2L standards.

[1] Record of Decision Summary of Remedial Alternative Selection, Blue Ridge Plating Site, Arden, Buncombe County, North Carolina.

[2] Regional Screening Levels for Chemical Contaminants at Superfund Sites.

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ROD - Record of Decision
EPA - United States Environmental Protection Agency
MCL - Maximum Contaminant Level
NCAC - North Carolina Administrative Code
µg/L - micrograms per liter
Blank - no data available; or results are non-detect
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Table 3-1
Groundwater Analytical Data Summary
September 2007 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW12D							MW12S										
					1/5/10	2/1/11	2/10/12	3/28/13	8/14/14	7/16/15	6/19/16	9/27/07	1/29/08	6/12/08	1/28/09	1/5/10	1/31/11	2/10/12	3/28/13	8/13/14	7/16/15	6/19/16
Volatile Organic Compounds																						
1,1,1-Trichloroethane	200	200	200	µg/L	1.3	1.5 J	0.89	0.99	0.69	1.2	1.2		0.21 J	0.67	0.60	0.23 J	0.18 J	0.14 J				1.1
1,1,2-Trichloroethane	NE	5	0.6	µg/L																		
1,1-Dichloroethane	700	NE	6	µg/L	1.7	1.6	2.0	2.2	2.0	2.6	2.9	0.34 J	0.17 J	1.2	1.1	0.51	0.30 J	0.42	0.35 J		0.30 J	9.8
1,1-Dichloroethene	7	7	7	µg/L	4.9	5.1	5.2	4.4	2.6	5.9 J	6.6	0.69 J	0.22 J	1.8	1.7	0.69	0.30 J				0.32 J	4.2
1,2-Dichloroethane	NE	5	0.4	µg/L							0.19 J											
Carbon Tetrachloride	NE	5	0.3	µg/L																		
Chloroform	0.19	80	70	µg/L	0.60	0.25 J	0.30		0.16 J		0.21 J		0.16 J	0.67	1.0	0.67	0.27 J	0.19				0.18 J
Chloromethane	NE	NE	3	µg/L																		
Tetrachloroethene	0.7	5	0.7	µg/L	6.7	9.0	8.2	8.2	7.0	10 J	15		0.21 J		0.84	0.38 J	0.22 J	0.19 J	0.27 J		0.35 J	4.9
Trichloroethene	2.8	5	3	µg/L	5.9	2.7	3.7	4.8	3.0	3.7	4.0	3.2	2.0	13	16	7.2	2.8	0.85	1.7	0.14 J	0.92	25
Vinyl chloride	NE	2	0.03	µg/L																		
Semivolatile Organic Compounds																						
1,4-Dioxane	NE	NE	3	µg/L		2.1 J	3.6 J		4.4 J	4.4	4.0											
2-Methylnaphthalene	14	NE	30	µg/L											8.1 J	1.6						
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L																		
Carbazole	NE	NE	2	µg/L																		
Naphthalene	21	NE	6	µg/L								0.20	0.57	1.5	1.4 J	2.7 J						
Pentachlorophenol	0.3	1	0.3	µg/L	0.077 J	0.16 J																
Metals																						
Antimony	NE	6	1	µg/L			4.5															
Arsenic	10	10	10	µg/L											8.1 J	1.6						
Barium	NE	2000	700	µg/L	73	210	460	290	340	430	580					68	45	29	26	13	27	52
Cadmium	5	5	2	µg/L	3.4							32	5.9	40	82	63	21	8.1	10	4.7	15	26
Chromium	NE	100	10	µg/L	170	24	13	11	14	8.2												
Cobalt	NE	NE	1	µg/L	14	5.8										55	31	19	16	10	22	47
Cyanide	154	200	70	µg/L		21						70	65	52 J	60	63	110	NA-4	71	23	25	29
Iron	3800	NE	300	µg/L	1100	840			270			52 J			260							
Manganese	300	NE	50	µg/L	1300	300	7.8		81			1100	170	1100	2300	1800	760	400	430	270	830	1800
Nickel	100	NE	100	µg/L	93	12								18	33 J	32	11				16	26
Selenium	NE	50	20	µg/L												4.8			4.2			5.8 J
Vanadium	NE	NE	0.3	µg/L		55	27	17	16	12												

Notes

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September 2007 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW13D														MW13S										
					9/25/07	1/30/08	6/12/08	1/28/09	1/7/10	2/3/11	2/9/12	3/28/13	8/13/14	8/13/14*	7/14/15	7/14/15*	6/21/16	6/21/16*	9/25/07	1/30/08	6/12/08	1/28/09	1/7/10	2/3/11	2/9/12	3/28/13	8/13/14	7/14/15	6/21/16
Volatile Organic Compounds																													
1,1,1-Trichloroethane	200	200	200	µg/L	0.22 J	1.4	1.5	1.3	0.33 J	1.7	1.7	1.6	1.8	1.8	1.2	1.4	2.9	3.0		2.0	1.2	1.6	0.19 J	0.61		0.94	0.21 J	0.47 J	0.15 J
1,1,2-Trichloroethane	NE	5	0.6	µg/L													0.17 J	0.15 J											
1,1-Dichloroethane	700	NE	6	µg/L	0.15 J	0.98	1.2	1.2	0.23 J	1.7	1.8	2.0	2.5	2.5	2.1	2.3	4.7	4.7		1.4	0.6	0.32 J		0.77	0.39	2.8	0.31 J	0.65	0.28 J
1,1-Dichloroethene	7	7	7	µg/L	0.56 J	3.8	4.7	3.5	0.62	5.2	4.8	4.3	**8.4**	**8.6**	6.2 J	**7.3 J**	**13**	**13**		3.7	1.8	1.0	0.20 J	1.4		3.8	0.49 J	1.1 J	0.46 J
1,2-Dichloroethane	NE	5	0.4	µg/L													0.22 J	0.23 J											
Carbon Tetrachloride	NE	5	0.3	µg/L								0.30 J																	
Chloroform	0.19	80	70	µg/L	0.51	0.21 J		0.19 J		0.18 J	0.25		0.24 J	0.25 J	0.25 J	0.22 J	0.29 J	0.28 J	0.22 J	0.10 J					0.062				
Chloromethane	NE	NE	3	µg/L					0.30 J														0.51						
Tetrachloroethene	0.7	5	0.7	µg/L	1.2	4.2	3.9	4.5	2.0	**8.4**	**11**	**10**	**15**	**15**	**13 J**	**12 J**	**19**	**20**		0.87		0.65	0.14 J	0.47 J		1.3	0.16 J	0.50 J	0.19 J
Trichloroethene	2.8	5	3	µg/L	0.09 J	2.4	3.4	2.6		3.6	2.7	2.3	4.3	4.3	3.5	3.6	**6.9**	**6.8**		4.9	1.8	0.69		2.4	0.26 J	**11**	0.69	1.7	0.42 J
Vinyl chloride	NE	2	0.03	µg/L																									
Semivolatile Organic Compounds																													
1,4-Dioxane	NE	NE	3	µg/L						2.8 J	3.5 J		4.5 J	3.5 J	5.1	4.6	5.1 T-1	4.8 T-1											
2-Methylnaphthalene	14	NE	30	µg/L			0.19																						
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L																									
Carbazole	NE	NE	2	µg/L																									
Naphthalene	21	NE	6	µg/L	0.13		0.31												0.11										
Pentachlorophenol	0.3	1	0.3	µg/L																			0.14 J						
Metals																													
Antimony	NE	6	1	µg/L																									
Arsenic	10	10	10	µg/L																						1.6			
Barium	NE	2000	700	µg/L					16	24	22	24	23	22	21	22	29	29					27	53	73	130	110	64	45
Cadmium	5	5	2	µg/L																						**9.4**		0.54	
Chromium	NE	100	10	µg/L					7.6	9.6	19	46	5.0																
Cobalt	NE	NE	1	µg/L																						9.9	9.5	6.5	
Cyanide	154	200	70	µg/L		22														22									
Iron	3800	NE	300	µg/L	1700	440	210	48 J	170	780	710	990	110	100	230	280	370	390	53 J										
Manganese	300	NE	50	µg/L	300	280	260	250	62	110	91	78	50	48	40	41	56	56	110	150	170	100	28	94	130	370	360	200	150
Nickel	100	NE	100	µg/L								25																	
Selenium	NE	50	20	µg/L																						4.7		3.1	3.0
Vanadium	NE	NE	0.3	µg/L																									

Notes

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Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW14D										
					9/26/07	1/31/08	6/11/08	1/30/09	1/6/10	2/2/11	2/9/12	3/25/13	8/11/14	7/13/15	6/20/16
Volatile Organic Compounds															
1,1,1-Trichloroethane	200	200	200	µg/L	0.97	0.23 J	0.36 J	0.24 J	1.8	0.23 J	0.22 J		0.15 J		
1,1,2-Trichloroethane	NE	5	0.6	µg/L											
1,1-Dichloroethane	700	NE	6	µg/L	0.86	0.16 J	0.5 U	0.18 J	1.9	0.22 J	0.25		0.20 J		0.13 J
1,1-Dichloroethene	7	7	7	µg/L	0.85 J	0.57	0.53	0.60	4.2	0.79	0.66		0.71	0.56 J	0.44 J
1,2-Dichloroethane	NE	5	0.4	µg/L											
Carbon Tetrachloride	NE	5	0.3	µg/L											
Chloroform	0.19	80	70	µg/L	4.4				0.20 J		0.059				
Chloromethane	NE	NE	3	µg/L					0.51						
Tetrachloroethene	0.7	5	0.7	µg/L	2.4	1.5	1.7	1.5	7.1	1.8	1.9	0.99	2.0	1.6 J	1.2
Trichloroethene	2.8	5	3	µg/L	2.1				5.4						
Vinyl chloride	NE	2	0.03	µg/L											
Semivolatile Organic Compounds															
1,4-Dioxane	NE	NE	3	µg/L											
2-Methylnaphthalene	14	NE	30	µg/L											
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L											
Carbazole	NE	NE	2	µg/L											
Naphthalene	21	NE	6	µg/L	0.13										
Pentachlorophenol	0.3	1	0.3	µg/L					0.15 J						
Metals															
Antimony	NE	6	1	µg/L											
Arsenic	10	10	10	µg/L											
Barium	NE	2000	700	µg/L					22	16	15	16	17	23	18
Cadmium	5	5	2	µg/L											
Chromium	NE	100	10	µg/L					19						
Cobalt	NE	NE	1	µg/L											
Cyanide	154	200	70	µg/L		11									
Iron	3800	NE	300	µg/L	3200	220	390	1600	810	190	130		400	340	230
Manganese	300	NE	50	µg/L	320	130	270	130	180	28	18	13	13	17	14
Nickel	100	NE	100	µg/L	270										
Selenium	NE	50	20	µg/L											
Vanadium	NE	NE	0.3	µg/L											

Analyte	MW14S										
	9/26/07	1/31/08	6/11/08	1/27/09	1/6/10	2/2/11	2/7/12	3/25/13	8/11/14	7/13/15	6/20/16
Volatile Organic Compounds											
1,1,1-Trichloroethane	1.1			0.14 J	0.24 J		0.15 J				
1,1,2-Trichloroethane											
1,1-Dichloroethane	0.76						0.019				
1,1-Dichloroethene	2.4 J				0.26 J						
1,2-Dichloroethane											
Carbon Tetrachloride											
Chloroform	0.39 J	0.18 J					0.071				
Chloromethane					0.47 J						
Tetrachloroethene	0.52				0.12 J						
Trichloroethene	1.7				0.17 J						
Vinyl chloride											
Semivolatile Organic Compounds											
1,4-Dioxane											
2-Methylnaphthalene											
Bis(2-ethylhexyl) phthalate											
Carbazole											
Naphthalene	0.14										
Pentachlorophenol					0.21 N						
Metals											
Antimony											
Arsenic											
Barium					48	29	31	30	32	32	36
Cadmium											
Chromium											
Cobalt											
Cyanide	6.8 J	3.3 J									
Iron	54 J										
Manganese	740	23	37	32	93	26	26	28	28	27	31
Nickel				2.2 J							
Selenium											
Vanadium											

Notes

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Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW15D											MW15S						
					1/6/10	1/6/10*	2/2/11	2/2/11*	2/9/12	2/9/12*	3/27/13	3/27/13*	8/13/14	7/14/15	6/20/16	1/6/10	2/2/11	2/8/12	3/27/13	8/13/14	7/14/15	6/20/16
Volatile Organic Compounds																						
1,1,1-Trichloroethane	200	200	200	µg/L	7.7	7.4	1.1	1.1	0.95	1.0	1.6	1.6	1.7	1.1	1.0	0.31 J	50	9.4	4.1	12	100	4.9
1,1,2-Trichloroethane	NE	5	0.6	µg/L	0.41 J	0.41 J											2.9	0.43 J	0.27 J	0.79	6.7	0.37 J
1,1-Dichloroethane	700	NE	6	µg/L	2.0	2.1	0.75	0.72	0.99	1.0	1.2	1.2	1.2	1.1	1.1		9.6	2.0	1.0	2.6	22	1.1
1,1-Dichloroethene	7	7	7	µg/L	21	20	3.3	3.4	1.0	3.0	5.8 J	5.8 J	6.0	4.7 J	4.7	0.64	88	18	10 J	27	190 J	12
1,2-Dichloroethane	NE	5	0.4	µg/L	0.21 J	0.21 J											1.2	0.21 J		0.29 J	2.3	0.10 J
Carbon Tetrachloride	NE	5	0.3	µg/L							0.64	0.67										
Chloroform	0.19	80	70	µg/L	0.59	0.60	0.14 J		0.16	0.17			0.13 J		0.09 J			0.075			0.52	
Chloromethane	NE	NE	3	µg/L	0.35 J	0.36 J										0.36 J						
Tetrachloroethene	0.7	5	0.7	µg/L	3.6	3.6	2.5	2.6	3.6	3.6	4.3	4.5	5.0	5.8 J	6.7		14	2.6	1.4	4.7	40 J	2.7
Trichloroethene	2.8	5	3	µg/L	1.8	1.7	1.5	1.6	1.8	2	1.8	1.9	1.4	1.1	0.72		7.2	1.3	0.48 J	1.4	10	0.51
Vinyl chloride	NE	2	0.03	µg/L																		
Semivolatile Organic Compounds																						
1,4-Dioxane	NE	NE	3	µg/L					1.9 J	1.9 J			2.5 J	2.4	2.1		40	6.9 J		5.7 J	22	
2-Methylnaphthalene	14	NE	30	µg/L																		
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L																		
Carbazole	NE	NE	2	µg/L																		
Naphthalene	21	NE	6	µg/L																		
Pentachlorophenol	0.3	1	0.3	µg/L		0.045 J																
Metals																						
Antimony	NE	6	1	µg/L																		
Arsenic	10	10	10	µg/L															2.7			
Barium	NE	2000	700	µg/L	27	31	17	18	17	16	18	18	17	19	19	580	620	1200	860	940	690	560
Cadmium	5	5	2	µg/L																		
Chromium	NE	100	10	µg/L																		
Cobalt	NE	NE	1	µg/L												8.9	9.0	9.2	5.6	6.5	6.8	
Cyanide	154	200	70	µg/L																		
Iron	3800	NE	300	µg/L	190	970	170	190								190						
Manganese	300	NE	50	µg/L	190	230	170	180	73	72	39	31	15	73	110	450	190	220	170	150	140	110
Nickel	100	NE	100	µg/L													12	10			10	
Selenium	NE	50	20	µg/L															5.0			
Vanadium	NE	NE	0.3	µg/L																		

Notes

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Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW16D								MW16S					MW17D				MW17S			
					2/10/12	3/26/13	8/12/14	8/12/14*	7/14/15	7/14/15*	6/21/16	6/21/16*	2/10/12	3/26/13	8/12/14	7/14/15	6/21/16	3/26/13	8/14/14	7/15/15	6/19/16	3/26/13	8/14/14	7/15/15	6/19/16
Volatile Organic Compounds																									
1,1,1-Trichloroethane	200	200	200	μg/L	7.4	2.7	5.3	5.4	4.4	4.4	4.8	5.0							0.21 J	0.25 J	0.23 J	51	1.9	6.5	2.0
1,1,2-Trichloroethane	NE	5	0.6	μg/L			0.15 J	0.090 J			0.18 J	0.19 J										0.85 J			
1,1-Dichloroethane	700	NE	6	μg/L	11	4.1	9.8	9.8	9.1	9.1	11	12	0.015						0.29 J	0.33 J	0.39 J	8.1	0.32 J	1.3	0.48 J
1,1-Dichloroethene	7	7	7	μg/L	**37**	**14 J**	**36**	**36**	**29 J**	**28 J**	**38**	**40**							1.1	1.2 J	0.90	**94 J**	3.9	**16 J**	5.8
1,2-Dichloroethane	NE	5	0.4	μg/L			0.16 J	0.15 J		0.28 J	0.19 J	0.20 J										0.24 J			
Carbon Tetrachloride	NE	5	0.3	μg/L																					
Chloroform	0.19	80	70	μg/L	4.0	1.5	3.2	3.2	2.9	2.9	3.1	3.2	0.0082 J						0.16 J		0.12 J		0.50		0.19 J
Chloromethane	NE	NE	3	μg/L																					
Tetrachloroethene	0.7	5	0.7	μg/L	**6.1**	2.5	**5.7**	**5.5**	**5.2 J**	4.9 J	**7.3**	**7.4**						0.79	2.9	2.4 J	3.4	**26**	1.1	3.8 J	1.8
Trichloroethene	2.8	5	3	μg/L	**61**	**42 J**	**60**	**60**	**58**	**55**	**62**	**64**		0.25 J							0.22 J	**5.5**	0.27 J	1.1	0.40 J
Vinyl chloride	NE	2	0.03	μg/L																					
Semivolatile Organic Compounds																									
1,4-Dioxane	NE	NE	3	μg/L	7.7 J		3.5 J	3.2 J	3.5	3.5	3.0	4.4													
2-Methylnaphthalene	14	NE	30	μg/L																					
Bis(2-ethylhexyl) phthalate	NE	6	3	μg/L																					
Carbazole	NE	NE	2	μg/L																					
Naphthalene	21	NE	6	μg/L																					
Pentachlorophenol	0.3	1	0.3	μg/L																					
Metals																									
Antimony	NE	6	1	μg/L																					
Arsenic	10	10	10	μg/L																		2.2			
Barium	NE	2000	700	μg/L	85	89	110	110	110	110	120	110	86	54	55	49	57	20	25	19	20	220	180	210	190
Cadmium	5	5	2	μg/L									2.4	2.7	2.6	2.7	3.6								
Chromium	NE	100	10	μg/L																					
Cobalt	NE	NE	1	μg/L									53	34	28	28	29					10	8.8	5.6	
Cyanide	154	200	70	μg/L																					
Iron	3800	NE	300	μg/L	510	130			200	200		110	520	340	1300	860	1100	890	260		320				
Manganese	300	NE	50	μg/L	6000	2900	2000	2000	1500	1500	780	790	1000	600	510	490	440	560	98	47	25	220	150	120	85
Nickel	100	NE	100	μg/L									32	23	19	21	20								
Selenium	NE	50	20	μg/L																		5.0			
Vanadium	NE	NE	0.3	μg/L																					

Notes

Table presents results for constituents that currently or historically exceed ROD cleanup goals, EPA MCLs, or NCAC 2L standards.

[1] Record of Decision Summary of Remedial Alternative Selection, Blue Ridge Plating Site, Arden, Buncombe County, North Carolina.

[2] Regional Screening Levels for Chemical Contaminants at Superfund Sites.

[3] North Carolina Administrative Code Title 15A, North Carolina Department of Environment and Natural Resources Division of Water Quality, Subchapter 2L, Groundwater Quality Standards, 15A NCAC 2L .0202 (Effective April 1, 2013)

	Analytical results exceeding the ROD Cleanup Goals are shaded.
Bold	Analytical results exceeding the EPA MCL are bold.
Red	Analytical results exceeding the NCAC Groundwater Standard are red.

ROD - Record of Decision

EPA - United States Environmental Protection Agency

MCL - Maximum Contaminant Level

NCAC - North Carolina Administrative Code

μg/L - micrograms per liter

Blank - no data available; or results are non-detect

NE - not established

* - denotes duplicate sample

Qualifier Definitions

J - The identification of the analyte is acceptable; the reported value is an estimate.

N - There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification.

NA-4 - Not analyzed or reported due to interferences.

T-1 - Sample received in cooler with temperature blank > 6 degrees C

Table 3-1
Groundwater Analytical Data Summary
September 2007 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	ROD Cleanup Goal[1]	EPA MCL[2]	NCAC 2L Standard[3]	Units	MW18D				MW19D			MW20D					Duke Energy Wells: AMW-3A			AMW-3B			MW-10		
					3/27/13	8/12/14	7/16/15	6/21/16	3/27/13	8/12/14		3/27/13	3/27/13*	8/12/14	7/16/15	6/21/16	11/4/14	7/15/15	6/21/16	11/4/14	7/15/15	6/21/16	11/4/14	7/15/15	6/21/16
Volatile Organic Compounds																									
1,1,1-Trichloroethane	200	200	200	µg/L					2.0	1.9	Well Destroyed	1.4	1.4	2.0	1.3	1.4									
1,1,2-Trichloroethane	NE	5	0.6	µg/L																					
1,1-Dichloroethane	700	NE	6	µg/L	2.5	1.4	0.83	0.59	1.8	2.0		1.9	1.8	3.2	2.3	3.0									
1,1-Dichloroethene	7	7	7	µg/L	4.9 J	2.8	1.8 J	1.1	7.2 J	7.9		5.8	5.6	9.8	7.3 J	9.7									
1,2-Dichloroethane	NE	5	0.4	µg/L												0.12 J									
Carbon Tetrachloride	NE	5	0.3	µg/L					0.28 J																
Chloroform	0.19	80	70	µg/L						0.72				0.95	0.74	0.92	0.17 J	0.23 J	0.44 J	0.23 J	0.33 J	0.32 J	0.22 J	0.24 J	0.12 J
Chloromethane	NE	NE	3	µg/L																					
Tetrachloroethene	0.7	5	0.7	µg/L					3.7	4.4		2.7	2.5	4.2	2.9 J	4.0									
Trichloroethene	2.8	5	3	µg/L	0.73	0.55	0.44 J	0.26 J	5.0	7.0		6.4	6.2	12	8.6	11	0.19 J								
Vinyl chloride	NE	2	0.03	µg/L	0.50	0.25 J																			
Semivolatile Organic Compounds																									
1,4-Dioxane	NE	NE	3	µg/L						2.6 J	Well Destroyed			2.2 J	2.4	2.2									
2-Methylnaphthalene	14	NE	30	µg/L																					
Bis(2-ethylhexyl) phthalate	NE	6	3	µg/L																					
Carbazole	NE	NE	2	µg/L																					
Naphthalene	21	NE	6	µg/L																					
Pentachlorophenol	0.3	1	0.3	µg/L																					
Metals																									
Antimony	NE	6	1	µg/L							Well Destroyed														
Arsenic	10	10	10	µg/L																					
Barium	NE	2000	700	µg/L	71	79	82	88	14	16		21	20	20	21	20		33	12		5.6	6.0		46	45
Cadmium	5	5	2	µg/L																					
Chromium	NE	100	10	µg/L															59						
Cobalt	NE	NE	1	µg/L																					
Cyanide	154	200	70	µg/L																					
Iron	3800	NE	300	µg/L	2500	840	1800	2700		150		300	290		170						120			200	290
Manganese	300	NE	50	µg/L	110	68	74	74	77	17		340	330	13	7.8						28	7.3		220	190
Nickel	100	NE	100	µg/L																					
Selenium	NE	50	20	µg/L																					
Vanadium	NE	NE	0.3	µg/L														11	6.2						

Notes

Table presents results for constituents that currently or historically exceed ROD cleanup goals, EPA MCLs, or NCAC 2L standards.

[1] Record of Decision Summary of Remedial Alternative Selection, Blue Ridge Plating Site, Arden, Buncombe County, North Carolina.

[2] Regional Screening Levels for Chemical Contaminants at Superfund Sites.

[3] North Carolina Administrative Code Title 15A, North Carolina Department of Environment and Natural Resources Division of Water Quality, Subchapter 2L, Groundwater Quality Standards, 15A NCAC 2L .0202 (Effective April 1, 2013)

	Analytical results exceeding the ROD Cleanup Goals are shaded.
Bold	Analytical results exceeding the EPA MCL are bold.
Red	Analytical results exceeding the NCAC Groundwater Standard are red.

ROD - Record of Decision

EPA - United States Environmental Protection Agency

MCL - Maximum Contaminant Level

NCAC - North Carolina Administrative Code

µg/L - micrograms per liter

Blank - no data available; or results are non-detect

NE - not established

* - denotes duplicate sample

Qualifier Definitions

J - The identification of the analyte is acceptable; the reported value is an estimate.

N - There is presumptive evidence that the analyte is present; the analyte is reported as a tentative identification.

NA-4 - Not analyzed or reported due to interferences.

T-1 - Sample received in cooler with temperature blank > 6 degrees C

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW01D							MW01S						
		1/5/10	2/3/11	2/10/12	3/26/13	8/12/14	7/15/15	6/20/16	1/5/10	1/31/11	2/6/12	3/26/13	8/12/14	7/15/15	6/20/16
Temperature	°C	14.5	15.6	15.4	13.5	16.7	16.4	16.2	12.9	14.7	15.2	13.5	16.7	17.1	19.0
Specific Conductivity	µS/cm	36	41	32	41	37	39	31	1755	1160	1184	1092	944	720	610
Dissolved Oxygen	mg/L	1.62	5.42	4.32	6.90	4.64	5.97	6.05		1.42	0.39	0.52	2.98	0.33	0.49
pH	Unitless	5.41	5.42	5.36	5.56	5.18	4.93	5.53	5.48	5.95	6.02	6.05	5.94	5.63	6.03
ORP	mV	223	290	301	151	139	143	168	44	234	131	131	-37	44	102
Turbidity	NTU	17.3	41.4	9.9	41.6	13.7	7.6	166	1.4	0.87	0.96	2.1	2.9	2.1	2.6

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW03S							MW04S						
		1/5/10	1/31/11	2/6/12	3/25/13	8/12/14	7/15/15	6/19/16	1/5/10	2/3/11	2/7/12	3/25/13	8/12/14	7/15/15	6/19/16
Temperature	°C	9.1	10.9	11.8	10.5	20.9	20.1	16.8	12.4	11.1	14.0	12.0	20.6	18.2	16.6
Specific Conductivity	µS/cm	587	435	487	524	521	398	366	509	527	453	428	380	339	338
Dissolved Oxygen	mg/L	1.53	1.44	2.63	2.92	1.25	0.21	0.53	0.91	1.35	0.55	0.44	1.31	0.15	0.33
pH	Unitless	6.09	5.75	5.97	6.41	6.44	6.14	6.36	6.07	6.27	6.21	6.28	6.41	6.11	6.34
ORP	mV		192	10	120	-434	46	52	32	-25	-42	19	-341	-36	-66
Turbidity	NTU	5.3	9.9	3.7	9.3	1.2	9.1	2.4	6.0	5.0	10.4	4.9	10.2	9.0	6.0

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW05S						MW06D						
		1/5/10	2/1/11	2/7/12	3/25/13	7/15/15	6/20/16	1/7/10	2/3/11	2/10/12	3/28/13	8/13/14	7/16/15	6/21/16
Temperature	°C	12.1	12.9	14.3	12.6	17.7	15.4	15.1	15.8	15.4	13.9	18.6	16.1	16.2
Specific Conductivity	µS/cm	764	889	722	719	527	526	24	33	26	33	32	36	32
Dissolved Oxygen	mg/L	0.95	0.75	0.27	0.31	0.26	0.32	13.65	5.75	4.35	7.20	3.75	6.21	6.85
pH	Unitless	5.62	5.60	5.68	5.62	5.58	5.64	5.15	5.14	5.05	5.16	5.15	4.01	4.87
ORP	mV	205	272	132	171	98	193	155	289	278	168	-147	112	149
Turbidity	NTU	5.1	2.4	9.7	2.4	7.6	7.0	9.2	9.5	9.7	6.1	5.1	8.3	6.1

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
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Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW06S							MW07S						
		1/7/10	2/2/11	2/9/12	3/28/13	8/13/14	7/13/15	6/19/16	1/5/10	2/1/11	2/7/12	3/26/13	8/13/14	7/16/15	6/20/16
Temperature	°C	15.7	15.5	15.9	14.8	17.2	18.3	16.4	10.9	10.6	12.3	9.1	17.4	17.5	17.6
Specific Conductivity	µS/cm	1925	2078	1497	1739	743	992	933	351	209	279	593	753	621	849
Dissolved Oxygen	mg/L	1.01	4.54	3.86	3.83	1.70	2.33	0.90	5.92	6.12	4.86	5.66	3.84	3.52	4.19
pH	Unitless	5.59	5.81	6.04	5.99	6.30	6.66	5.85	5.75	5.74	5.73	5.66	5.55	5.45	5.71
ORP	mV	275	260	129	195	-256	139	130	176	250	174	211	130	161	150
Turbidity	NTU	7.6	4.0	2.0	0.80	5.4	9.8	9.0	3.0	10.5	10.0	5.4	1.0	4.0	1.2

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
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Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW08S							MW09D						
		1/6/10	2/2/11	2/9/12	3/27/13	8/13/14	7/16/15	6/21/16	1/7/10	2/2/11	2/7/12	3/27/13	8/12/14	7/14/15	6/19/16
Temperature	°C	13.9	15.4	14.7	14.5	16.0	16.2	16.9	16.5	19.0	16.5	15.2	16.8	18.8	16.3
Specific Conductivity	µS/cm	340	963	532	400	296	391	260	30	37	31	37	38	36	36
Dissolved Oxygen	mg/L	1.04	4.61	4.95	5.94	6.28	3.40	4.44	13.53	4.66	4.24	5.31	6.25	5.22	5.65
pH	Unitless	5.30	5.13	5.48	5.45	5.19	5.01	5.72	5.67	5.65	5.46	5.62	4.96	5.40	3.73
ORP	mV	239	291	248	169	44	155	71	150	218	132	118	144	225	256
Turbidity	NTU	4.7	6.0	9.1	15.6	6.0	4.9	4.3	12.7	5.3	3.6	3.7	5.4	1.3	4.5

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
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Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW09S							MW10S						
		1/4/10	2/1/11	2/7/12	3/17/13	8/11/14	7/13/15	6/19/16	1/6/10	2/2/11	2/7/12	3/27/13	8/14/14	7/15/15	6/20/16
Temperature	°C	10.9	15.7	16.0	15.2	17.6	17.2	16.9	15.0	16.0	16.2	14.9	16.6	16.6	16.3
Specific Conductivity	µS/cm	24	19	18	17	24	26	25	838	575	396	348	218	211	223
Dissolved Oxygen	mg/L	6.45	5.83	5.44	6.09	5.31	8.26	7.02	0.61	3.44	3.68	2.17	1.69	1.82	1.48
pH	Unitless	4.80	4.72	4.79	5.08	4.34	4.41	4.31	4.82	5.06	5.11	5.10	5.11	5.05	5.02
ORP	mV		400	161	216	85	277	197	274	322	230	164	-358	30	185
Turbidity	NTU	18.9	6.2	8.6	8.2	3.3	9.1	8.2	0.00	1.3	1.2	2.6	4.2	3.3	1.0

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
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Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW11S							MW12D						
		1/6/10	2/2/11	2/10/12	3/26/11	8/11/14	7/13/15	6/20/16	1/5/10	2/1/11	2/10/12	3/28/13	8/14/14	7/15/15	6/19/16
Temperature	°C	15.2	14.8	14.7	15.1	16.9	17.0	16.4	12.2	18.7	12.9	16.0	18.3	16.0	17.4
Specific Conductivity	µS/cm	159	184	169	187	170	145	110	339	4848	3219	4904	6132	5389	4801
Dissolved Oxygen	mg/L	1.47	5.46	3.41	3.99	2.07	3.03	1.43	0.21	1.52	7.31	4.09	2.00	4.04	2.60
pH	Unitless	4.45	4.53	4.60	4.52	4.32	5.14	4.44	6.20	12.52	11.98	11.99	12.33	8.10	12.59
ORP	mV	287	402	289	195	53	245	170	-57	-120	-86	-61	-415	-64	99
Turbidity	NTU	3.1	1.3	5.6	0.00	7.9	1.4	1.6	20.1	6.0	6.9	9.8	9.2	7.0	7.3

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW12S							MW13D						
		1/5/10	1/31/11	2/10/12	3/28/13	8/13/14	7/16/15	6/19/16	1/7/10	2/3/11	2/9/12	3/27/13	8/13/14	7/14/15	6/21/16
Temperature	°C	12.9	14.5	13.0	11.6	16.8	16.2	15.2	14.3	14.9	14.6	15.3	16.2	16.0	17.1
Specific Conductivity	µS/cm	776	802	717	440	341	438	669	44	44	35	41	58	49	70
Dissolved Oxygen	mg/L	0.12	0.63	0.24	0.33	1.15	0.21	0.51		5.74	6.10	5.71	5.29	4.99	5.79
pH	Unitless	5.69	5.77	5.95	5.80	6.10	5.58	5.66	5.38	5.47	5.71	5.52	4.86	5.90	5.39
ORP	mV	212	226	132	189	-84	181	192	84	266	144	197	96	99	94
Turbidity	NTU	0.51	0.05	5.9	1.7	2.0	2.9	0.8	3.7	8.9	16.1	9.9	5.4	8.9	9.9

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW13S							MW14D						
		1/7/10	2/3/11	2/9/12	3/28/13	8/13/14	7/14/14	6/21/16	1/6/10	2/2/11	2/9/12	3/25/13	8/11/14	7/13/15	6/20/16
Temperature	°C	11.3	13.5	15.2	15.2	15.9	15.0	16.4	15.5	15.9	15.9	15.2	21.8	16.7	19.3
Specific Conductivity	µS/cm	231	333	368	573	573	406	345	35	48	38	37	46	46	51
Dissolved Oxygen	mg/L	1.77	1.12	0.77	0.48	1.30	0.77	0.54	16.81	6.68	7.04	7.54	5.01	7.06	4.97
pH	Unitless	5.03	5.03	4.93	4.72	4.36	5.32	4.86	5.71	5.76	6.01	5.80	5.83	5.55	6.21
ORP	mV	233	229	220	136	50	109	98	124	237	130	245	118	191	170
Turbidity	NTU	0.40	0.31	0.89	2.5	0.56	0.69	1.1	2.3	2.3	6.8	2.3	9.5	5.5	5.4

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW14S							MW15D						
		1/6/10	2/2/11	2/7/12	3/25/13	8/11/14	7/13/15	6/20/16	1/6/10	2/2/11	2/9/12	3/27/13	8/13/14	7/14/15	6/20/16
Temperature	°C	14.4	14.7	15.2	12.6	17.5	17.1	19.7	14.8	15.3	14.9	14.2	15.8	15.7	15.8
Specific Conductivity	µS/cm	33	39	30	28	37	35	39	111	33	25	28	32	30	34
Dissolved Oxygen	mg/L	1.04	3.87	4.05	5.91	5.17	4.47	3.86		5.43	5.92	4.68	5.24	6.21	5.77
pH	Unitless	4.67	4.87	4.69	4.77	4.54	4.76	4.91	5.39	5.20	5.61	5.45	4.62	5.17	5.16
ORP	mV	279	209	142	311	75	148	210	89	301	194	121	75	132	201
Turbidity	NTU	0.22	0.08	0.52	0.01	0.93	0.02	1.0	7.2	2.6	2.3	1.5	0.19	1.3	3.2

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW15S							MW16D				
		1/6/10	2/2/11	2/8/12	3/27/13	8/13/14	7/14/15	6/20/16	2/10/12	3/26/13	8/12/14	7/14/15	6/21/16
Temperature	°C	13.9	13.8	13.6	13.6	16.5	15.6	15.7	14.6	14.4	17.9	15.7	15.7
Specific Conductivity	µS/cm	51	92	73	60	71	142	81	151	111	152	157	187
Dissolved Oxygen	mg/L	9.14	3.84	5.58	3.62	5.79	2.93	4.34	1.88	1.57	1.04	0.75	0.82
pH	Unitless	4.60	4.06	4.39	4.55	3.77	4.57	4.21	5.81	5.54	5.27	5.93	5.69
ORP	mV	230	288	316	268	94	222	229	177	118	-5.4	53	214
Turbidity	NTU	0.54	0.93	0.46	4.3	1.6	3.5	0.8	10.8	4.5	4.8	8.9	3.9

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW16S					MW17D				MW17S			
		2/10/12	3/26/13	8/12/14	7/14/15	6/21/16	3/26/13	8/14/14	7/15/15	6/19/16	3/26/13	8/14/14	7/15/15	6/19/16
Temperature	°C	12.2	9.2	19.7	19.2	19.8	14.3	15.8	16.3	15.9	11.8	16.6	16.8	16.7
Specific Conductivity	µS/cm	219	134	178	164	202	54	46	49	44	123	133	223	178
Dissolved Oxygen	mg/L	0.54	0.71	0.32	0.29	0.55	2.59	6.38	5.42	6.87	4.19	5.92	4.44	4.59
pH	Unitless	5.06	4.78	4.41	4.96	4.73	6.16	5.78	6.30	6.08	4.51	4.33	4.80	4.49
ORP	mV	187	222	19	112	306	122	187	150	187	259	281	204	341
Turbidity	NTU	8.9	2.9	5.9	5.8	3.5	5.3	5.2	0.8	12.6	0.43	4.6	0.9	3.2

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	MW18D				MW19D			MW20D			
		3/27/13	8/12/14	7/16/15	6/21/16	3/27/13	8/12/14		3/27/13	8/12/14	7/16/15	6/21/16
Temperature	°C	14.7	16.5	16.5	16.0	14.3	17.6	Well destroyed	13.7	16.4	15.1	16.5
Specific Conductivity	µS/cm	166	95	166	169	65	71		96	83	86	86
Dissolved Oxygen	mg/L	0.41	0.44	2.64	0.37	3.57	3.78		2.86	3.37	4.04	2.99
pH	Unitless	5.25	4.78	5.31	5.31	5.94	5.43		5.85	5.29	1.32	5.99
ORP	mV	1.7	8.8	134	180	47	2.6		35	23	102	150
Turbidity	NTU	0.20	4.5	7.9	13.7	0.71	2.9		5.2	2.2	3.2	14.7

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-2
Field Parameters
January 2010 - June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	Units	Duke Energy Wells								
		AMW-3A			AMW-3B			MW-10		
		11/4/14	7/15/15	6/21/16	11/4/14	7/15/15	6/21/16	11/4/14	7/15/15	6/21/16
Temperature	°C	15.9	15.2	15.8	14.8	15.1	14.9	15.8	17.7	16.9
Specific Conductivity	µS/cm	845	1860	949	91	88	72	73	75	72
Dissolved Oxygen	mg/L	1.33	5.70	5.55	3.37	4.67	5.34	0.85	0.47	0.43
pH	Unitless	11.60	11.60	11.65	6.32	6.68	6.48	5.00	5.57	5.01
ORP	mV	-49	101	92	36	151	115	112	151	125
Turbidity	NTU	4.1	1.4	0.4	12.8	8.9	0.4	1.8	1.6	0.7

Notes
°C = degrees Centigrade
µS/cm = microsiemens per centimeter
mV = millivolts
NTU = Nephelometric Turbidity Units
mg/L = milligrams per liter
mL = milliliter
Blank - no data
* = beyond readable limit of instrument
Final stabilized readings are reported.

Table 3-3
Summary of Mann-Kendall Statistical Calculations
September 2007 - July 2015
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Well Number	Constituent	No. of Samples	No. of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	Concentration Trend
MW01D	1,1-Dichloroethane	11	10	0.38	1	50.0%	No Trend
MW01D	1,1-Dichloroethene	11	10	0.52	3	56.0%	No Trend
MW01D	Chloroform	11	8	0.31	-9	72.9%	Stable
MW01D	Tetrachloroethene	11	10	0.45	2	53.0%	No Trend
MW01S	Cadmium	11	11	0.72	-47	>99.9%	Decreasing
MW01S	Manganese	11	11	0.56	-35	99.7%	Decreasing
MW01S	Chloroform	11	9	0.56	-23	95.7%	Decreasing
MW01S	Naphthalene	11	6	1.88	9	72.9%	No Trend
MW01S	Pentachlorophenol	11	6	1.16	1	50.0%	No Trend
MW03S	Cadmium	11	10	0.81	-3	56.0%	Stable
MW03S	Iron	11	11	1.67	-12	79.9%	No Trend
MW03S	Manganese	11	11	1.5	-25	97.0%	Decreasing
MW04S	Iron	11	11	0.76	28	98.4%	Increasing
MW04S	Manganese	11	11	0.23	-2	53.0%	Stable
MW05S	Cadmium	10	9	0.6	-15	89.2%	Stable
MW05S	Chloroform	10	8	0.63	-26	98.9%	Decreasing
MW05S	Iron	10	8	0.85	8	72.9%	No Trend
MW05S	Manganese	10	10	0.35	-20	95.5%	Decreasing
MW06D	1,1-Dichloroethane	11	11	0.2	11	77.7%	No Trend
MW06D	1,1-Dichloroethene	11	11	0.37	15	85.9%	No Trend
MW06D	Tetrachloroethene	11	11	0.23	-2	53.0%	Stable
MW06S	1,1,1-Trichloroethane	11	11	0.59	-37	99.8%	Decreasing
MW06S	1,1-Dichloroethane	11	11	0.52	-25	97.0%	Decreasing
MW06S	1,1-Dichloroethene	11	11	0.46	-29	98.7%	Decreasing
MW06S	Cadmium	11	8	1.15	-46	>99.9%	Decreasing
MW06S	Chloroform	11	10	0.59	-26	97.5%	Decreasing
MW06S	Cyanide	10	10	0.64	-37	>99.9%	Decreasing
MW06S	Manganese	11	11	1.07	-39	99.9%	Decreasing
MW06S	Tetrachloroethene	11	11	0.49	9	72.9%	No Trend
MW06S	Trichloroethene	11	11	0.6	-10	75.3%	Stable
MW07S	Cadmium	11	11	0.48	-32	99.4%	Decreasing
MW07S	Iron	11	9	1.25	-25	99.6%	Decreasing
MW07S	Manganese	11	11	1.34	-13	82.1%	No Trend
MW08S	1,1-Dichloroethane	11	11	0.91	-34	99.6%	Decreasing
MW08S	1,1-Dichloroethene	11	11	0.91	-28	98.4%	Decreasing
MW08S	Cadmium	11	11	1.2	-39	99.9%	Decreasing
MW08S	Chloroform	11	7	0.69	-27	98.0%	Decreasing
MW08S	Iron	11	9	2.25	-9	72.9%	No Trend
MW08S	Manganese	11	11	1.05	-41	100.0%	Decreasing
MW08S	Tetrachloroethene	11	11	0.73	-21	94.0%	Probably Decreasing
MW08S	Trichloroethene	11	11	0.91	-43	>99.9%	Decreasing
MW09S	Tetrachloroethene	11	10	0.41	0	45.1%	Stable
MW10S	1,1,1-Trichloroethane	11	11	1.32	-49	>99.9%	Decreasing
MW10S	1,1-Dichloroethane	11	11	1.25	-39	99.9%	Decreasing
MW10S	1,1-Dichloroethene	11	11	1.27	-48	>99.9%	Decreasing
MW10S	Manganese	11	11	0.75	-42	>99.9%	Decreasing
MW10S	Tetrachloroethene	11	11	1.23	-39	99.9%	Decreasing
MW10S	Trichloroethene	11	11	1.27	-39	99.9%	Decreasing
MW11S	1,1,1-Trichloroethane	10	10	0.59	-36	>99.9%	Decreasing
MW11S	1,1-Dichloroethane	10	10	0.18	-7	70.0%	Stable
MW11S	1,1-Dichloroethene	10	10	0.36	-13	89.0%	Stable
MW11S	Chloroform	10	10	0.26	26	98.9%	Increasing
MW11S	Tetrachloroethene	10	10	0.24	-13	85.4%	Stable
MW11S	Trichloroethene	10	10	0.17	4	60.3%	No Trend
MW12D	1,1-Dichloroethane	7	7	0.22	16	99.0%	Increasing
MW12D	Chloroform	7	5	0.5	-12	94.9%	Probably Decreasing
MW12D	Manganese	7	5	1.96	-10	95.2%	Probably Decreasing

Table 3-3
Summary of Mann-Kendall Statistical Calculations
September 2007 - July 2015
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Well Number	Constituent	No. of Samples	No. of Detections	Coefficient of Variation	Mann-Kendall Statistic	Confidence in Trend	Concentration Trend
MW12D	Tetrachloroethene	7	7	0.31	10	90.7%	Probably Increasing
MW12D	Trichloroethene	7	7	0.27	0	37.9%	Stable
MW12S	Cadmium	11	11	0.9	-11	77.7%	Stable
MW12S	Chloroform	11	7	0.73	-14	84.0%	Stable
MW12S	Manganese	11	11	0.71	-3	56.0%	Stable
MW12S	Trichloroethene	11	11	1.21	-13	82.1%	No Trend
MW13D	1,1-Dichloroethane	11	11	0.73	46	>99.9%	Increasing
MW13D	Chloroform	11	7	0.34	8	70.3%	Stable
MW13D	Manganese	11	11	0.73	-45	>99.9%	Decreasing
MW13D	Tetrachloroethene	11	11	0.7	43	>99.9%	Increasing
MW13D	Trichloroethene	11	11	0.68	23	95.7%	Increasing
MW13S	Manganese	11	11	0.63	14	84.0%	No Trend
MW13S	Tetrachloroethene	11	7	0.79	-6	64.8%	Stable
MW13S	Trichloroethene	11	9	1.46	1	50.0%	No Trend
MW14D	Manganese	11	11	1.09	-39	99.9%	Decreasing
MW14D	Tetrachloroethene	11	11	0.78	-10	75.3%	Stable
MW15D	Chloroform	7	5	0.74	-8	84.5%	Stable
MW15D	Tetrachloroethene	7	7	0.32	18	99.7%	Increasing
MW15S	Manganese	7	7	0.56	-19	99.9%	Decreasing
MW15S	Tetrachloroethene	7	6	1.52	7	80.9%	No Trend
MW15S	Trichloroethene	7	6	1.3	5	71.9%	No Trend
MW16D	1,1-Dichloroethane	5	5	0.33	2	59.2%	No Trend
MW16D	1,1-Dichloroethene	5	5	0.33	2	59.2%	Stable
MW16D	Chloroform	5	5	0.31	-1	50.0%	Stable
MW16D	Manganese	5	5	0.83	-9	97.5%	Decreasing
MW16D	Tetrachloroethene	5	5	0.34	-2	59.2%	No Trend
MW16D	Trichloroethene	5	5	0.15	2	59.2%	No Trend
MW16S	Manganese	5	5	0.37	-10	99.2%	Decreasing
MW17S	1,1-Dichloroethane	4	4	1.46	-2	62.5%	No Trend
MW17S	1,1-Dichloroethene	4	4	1.44	-2	62.5%	No Trend
MW17S	Tetrachloroethene	4	4	1.46	-2	62.5%	No Trend
MW17S	Trichloroethene	4	4	1.37	-2	62.5%	No Trend
MW17S	Manganese	4	4	0.4	-6	95.8%	Decreasing
MW17D	Manganese	4	4	1.39	-6	95.8%	Decreasing
MW17D	Tetrachloroethene	4	4	1.33	-2	62.5%	No Trend
MW18D	1,1-Dichloroethane	4	4	0.64	-6	95.8%	Decreasing
MW18D	1,1-Dichloroethene	4	4	0.62	-6	95.8%	Decreasing
MW18D	Manganese	4	4	0.24	-1	50.0%	Stable
MW20D	1,1-Dichloroethane	4	4	0.23	2	62.5%	No Trend
MW20D	1,1-Dichloroethene	4	4	0.24	2	62.5%	No Trend
MW20D	Manganese	4	4	1.83	-6	95.8%	Decreasing
MW20D	Tetrachloroethene	4	4	0.22	2	62.5%	No Trend
MW20D	Trichloroethene	4	4	0.26	2	62.5%	No Trend

Interpretation of trend data:

If Mann-Kendall Statistic is	and Confidence is	then Trend is
>0	>95%	Increasing
>0	between 95% and 90%	Probably Increasing
>0	<90%	No Trend
≤ 0	<90% and COV$\geq$1	No Trend
≤ 0	<90% and COV<1	Stable
<0	between 95% and 90%	Probably Decreasing
<0	>95%	Decreasing

Table 3-4
Groundwater Duplicates Relative Percent Difference (RPD)
June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	MW06S	MW06SX	% RPD
1,1,1-Trichloroethane	92	87	5.6%
1,1,2-Trichloroethane	2.7	2.6	3.8%
1,1-Dichloroethane	61	60	1.7%
1,1-Dichloroethene	120	110	8.7%
1,2-Dichloroethane	0.56	0.57	1.8%
Chloroform	0.63	0.59	6.6%
cis-1,2-Dichloroethene	9.8	10	2.0%
Cyanide	31	36	14.9%
Tetrachloroethene	150	140	6.9%
trans-1,2-Dichloroethene	1.1	1.1	0.0%
Trichloroethene	26	26	0.0%
1,4-Dioxane	41	42	2.4%
Aluminum	680	740	8.5%
Barium	23	23	0.0%
Calcium	710	700	1.4%
Chromium	45	42	6.9%
Cobalt	10	9.9	1.0%
Magnesium	1600	1600	0.0%
Manganese	40	40	0.0%
Potassium	47000	46000	2.2%
Selenium	8.2	8	2.5%
Sodium	140000	140000	0.0%
Yttrium	25	27	7.7%
		Average	**3.7%**

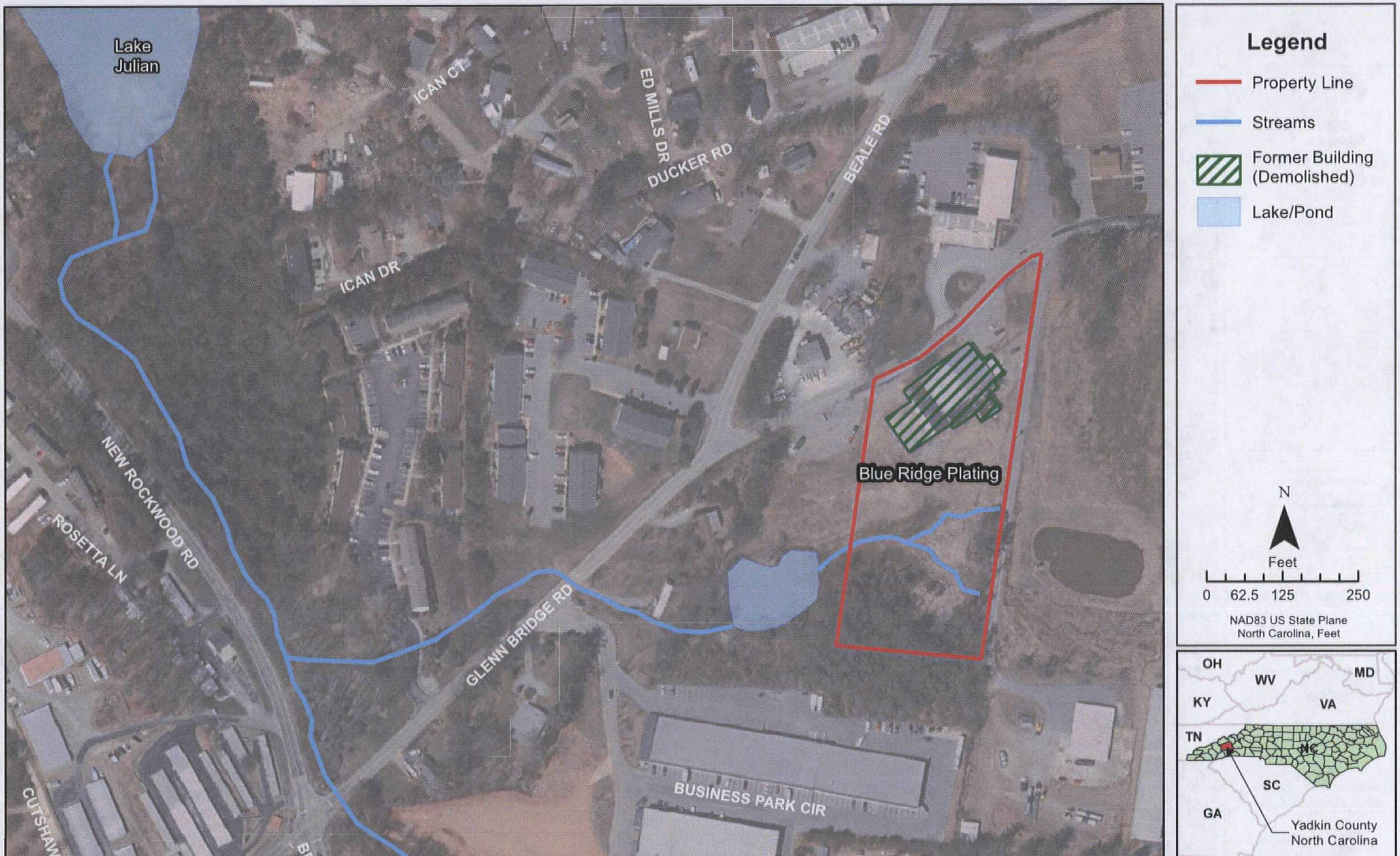
Analyte	MW13D	MW13DX	% RPD
1,1,1-Trichloroethane	2.9	3	3.4%
1,1,2-Trichloroethane	0.17	0.15	12.5%
1,1-Dichloroethane	4.7	4.7	0.0%
1,1-Dichloroethene	13	13	0.0%
1,2-Dichloroethane	0.22	0.23	4.4%
Chloroform	0.29	0.28	3.5%
cis-1,2-Dichloroethene	0.36	0.35	2.8%
Tetrachloroethene	19	20	5.1%
Trichloroethene	6.9	6.8	1.5%
1,4-Dioxane	5.1	4.8	6.1%
Aluminum	270	250	7.7%
Barium	29	29	0.0%
Calcium	4000	4100	2.5%
Iron	370	390	5.3%
Magnesium	1300	1300	0.0%
Manganese	56	56	0.0%
Methyl T-Butyl Ether (MTBE)	0.13	0.14	7.4%
Potassium	1300	1300	0.0%
Sodium	5700	5500	3.6%
Strontium	52	52	0.0%
Titanium	29	30	3.4%
		Average	**3.3%**

Table 3-4
Groundwater Duplicates Relative Percent Difference (RPD)
June 2016
Blue Ridge Plating Site
Arden, Buncombe County, North Carolina

Analyte	MW16D	MW16DX	% RPD
1,1,1-Trichloroethane	4.8	5	4.1%
1,1,2-Trichloroethane	0.18	0.19	5.4%
1,1-Dichloroethane	11	12	8.7%
1,1-Dichloroethene	38	40	5.1%
1,2-Dichloroethane	0.19	0.2	5.1%
1,4-Dichlorobenzene	0.23	0.24	4.3%
cis-1,2-Dichloroethene	1.8	1.8	0.0%
Chloroform	3.1	3.2	3.2%
Tetrachloroethene	7.3	7.4	1.4%
trans-1,2-Dichloroethene	0.19	0.20	5.1%
Trichloroethene	62	64	3.2%
1,4-Dioxane	3.0	4.4	37.8%
Barium	120	110	8.7%
Calcium	14000	15000	6.9%
Magnesium	5100	5100	0.0%
Manganese	780	790	1.3%
Potassium	2600	2600	0.0%
Sodium	8200	8500	3.6%
Strontium	170	170	0.0%
		Average	**5.4%**

Note: Concentrations are in micrograms per liter (µg/L)

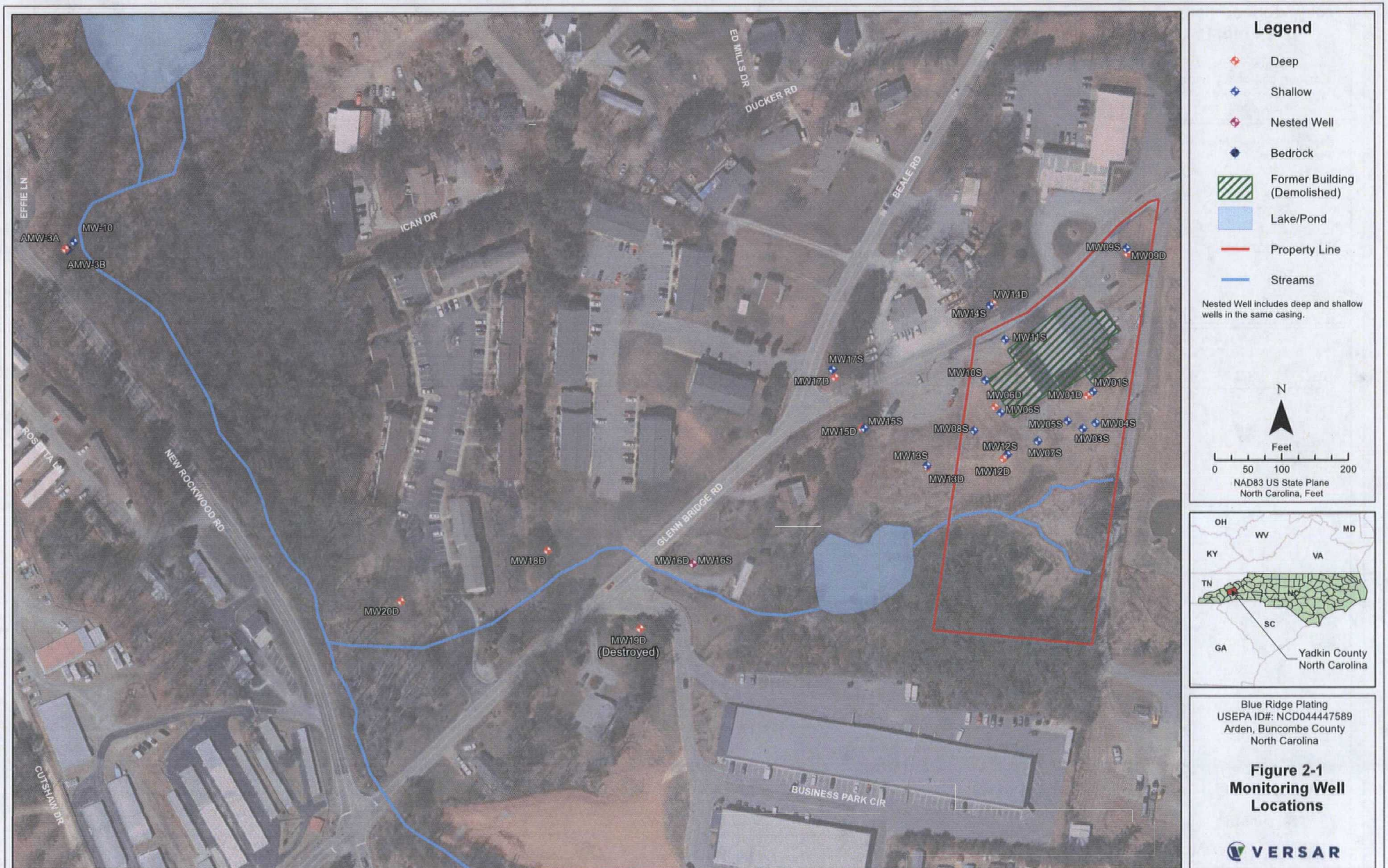
FIGURES



Blue Ridge Plating
USEPA ID#: NCD044447589
Arden, Buncombe County
North Carolina

Figure 1-1
Site Location Map

VERSAR

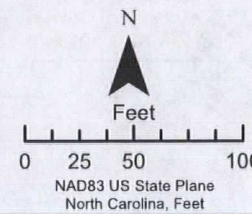


Source: Aerial Source: USGS 2010 Date: 12/16/2015 User: hcoats Name: Fig 2-1 MW locations

Legend

- Shallow Well
- Groundwater Elevation Contour (in feet)
- Property Line
- Streams
- Former Building (Demolished)
- Lake/Pond

Note: Groundwater elevations measured on June 2016

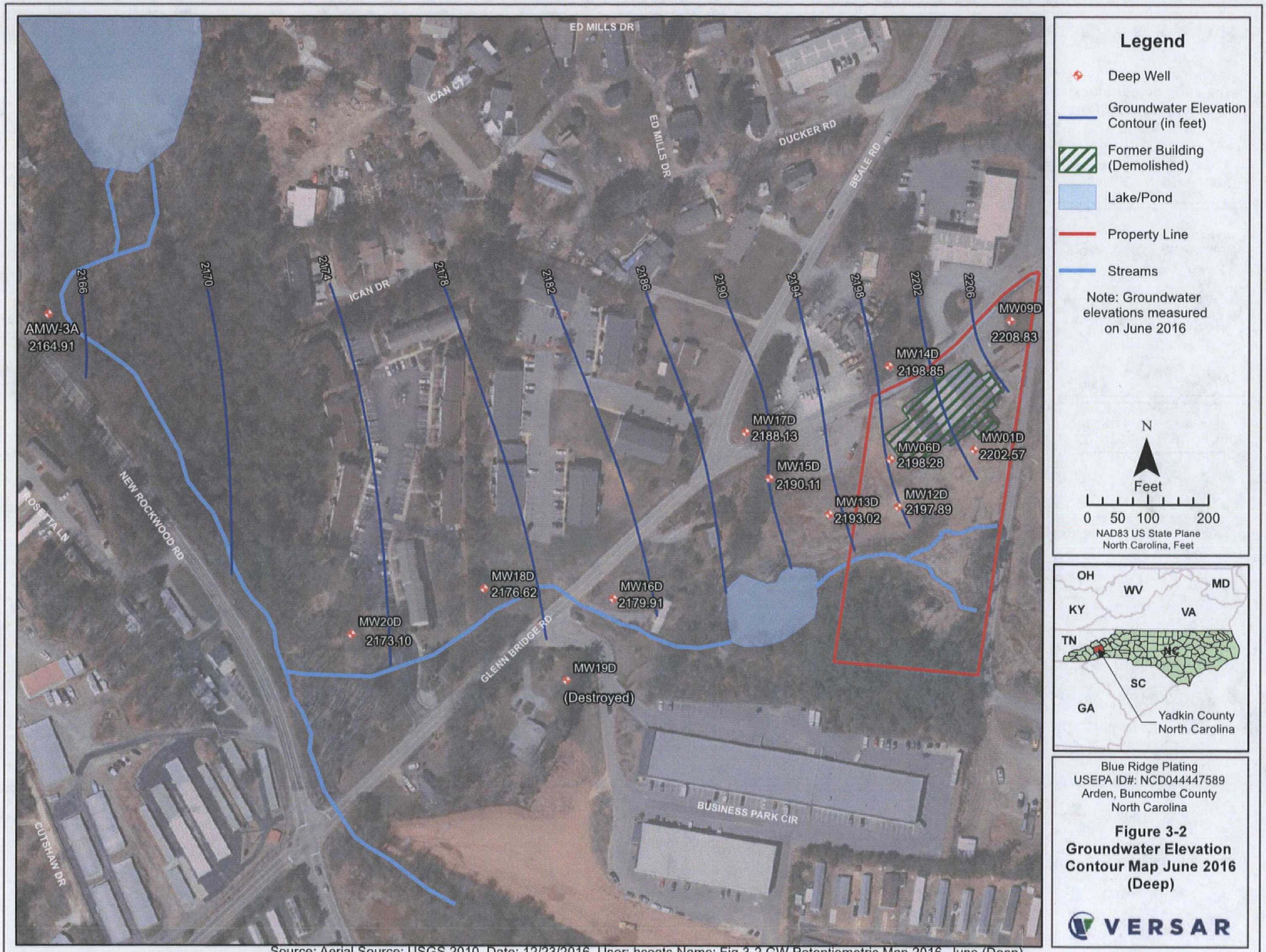


Blue Ridge Plating
USEPA ID#: NCD044447589
Arden, Buncombe County
North Carolina

Figure 3-1
Groundwater Elevation Contour Map June 2016 (Shallow)

VERSAR

Source: Aerial Source: USGS 2010 Date: 12/23/2016 User: hcoats Name: Fig 3-1 GW Potentiometric Map 2016 June (Shallow)+



Blue Ridge Plating
USEPA ID#: NCD044447589
Arden, Buncombe County
North Carolina

Figure 3-2
Groundwater Elevation Contour Map June 2016 (Deep)

APPENDIX H
2017 Declaration of Perpetual Land Use Restrictions

Workflow No. 0000403185-0003

Doc ID: 030984120006 Type: CRP
Recorded: 03/17/2017 at 11:50:31 AM
Fee Amt: $26.00 Page 1 of 6
Workflow# 0000403185-0003
Buncombe County, NC
Drew Reisinger Register of Deeds
BK 5529 PG 1739-1744

DECLARATION OF PERPETUAL LAND USE RESTRICTIONS

Return to: Mahney Box #48

For Property Owned By: Carolyn Mitchell Benfield as Trustee of the Bill J. Benfield Family Trust

Former Blue Ridge Plating Site, Buncombe County, North Carolina

The real property which is the subject of this Declaration of Perpetual Land Use Restrictions ("Declaration") is contaminated with hazardous substances, and is an INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE as defined by North Carolina's Inactive Hazardous Sites Response Act of 1987, which consists of Section 130A-310 through Section 130A-310.19 of the North Carolina General Statutes ("N.C.G.S."). The real property which is the subject of this Declaration shall hereinafter referred to as the "Site." This Declaration is part of a Remedial Action Plan for the Site that has been approved by the Secretary of the North Carolina Department of Environmental Quality (or its successor in function), or his/her delegate, as authorized by N.C.G.S. Section 130A-310.3(f). The North Carolina Department of Environmental Quality shall hereinafter be referred to as "DEQ."

Carolyn Mitchell Benfield as trustee of the Bill J. Benfield Family Trust is the owner in fee simple of the Site, which is located at 171 Glenn Bridge Rd. in the County of Buncombe, Biltmore Township, State of North Carolina, and is the real property legally described in Deed Book 3070, Pages 198-200 in the Office of the Register of Deeds for Buncombe County. The Site is also shown on a Notice of Inactive Hazardous Substance or Waste Disposal Site that is concurrently being recorded with this Declaration at Map Book 172 Page 152 in the Office of the Register of Deeds for Buncombe County.

For the purpose of protecting public health and the environment, Carolyn Benfield as Trustee of the Bill J. Benfield Family Trust, hereby declares that all of the Site shall be held, sold and conveyed subject to the following perpetual land use restrictions, which shall run with the land; shall be binding on all parties having any right, title or interest in the Site or any part thereof, their heirs, successors and assigns; and shall, as provided in N.C.G.S. Section 130A-310.3(f), be enforceable without regard to lack of privity of estate or contract, lack of benefit to particular land, or lack of any property interest in particular land. These restrictions shall continue in perpetuity and cannot be amended or canceled unless and until the Buncombe County Register of Deeds receives and records the written concurrence of the Secretary of DEQ (or its successor in function), or his/her delegate. If any provision of this Declaration is found to be unenforceable in any respect, the validity, legality, and enforceability of the remaining provisions shall not in any way be affected or impaired.

PERPETUAL LAND USE RESTRICTIONS

1. The Site shall be used exclusively for commercial or industrial purposes, but shall not be used for child care centers, schools, parks, recreational areas, or athletic fields without prior approval from the DEQ or its successor in function.

2. Notification to DEQ or its successor in function is required before making any soil modification more than five (5) feet below the existing grade.

3. Site development or redevelopment for commercial or industrial purposes is allowed subject to the limitation in paragraph 2 of this Declaration.

4. Any surface or underground water shall not be used as a source of potable or irrigation water, or for any other purpose. The installation of groundwater wells or other devices for access to groundwater for any purpose other than monitoring groundwater quality is prohibited without prior approval by DEQ or its successor in function.

5. The Site shall not be used for mining, extraction of coal, oil, gas or any other minerals or non-mineral substances.

6. Mowing of vegetation, tree pruning and other landscaping and maintenance activity is allowed at the Site.

7. In January of each year, each person who owns any portion of the Site shall submit a letter containing that owner's notarized signature to the Superfund Section of the Division of Waste Management of DEQ, or its successor in function, confirming that this Declaration is still recorded in the Office of the Buncombe County Register of Deeds and that activities and conditions at the Site remain in compliance with the land use restrictions herein.

8. No person conducting environmental assessment or remediation at the Site, or involved in determining compliance with applicable land use restrictions, at the direction of, or pursuant to a permit or order issued by, DEQ or its successor in function may be denied access to the Site for the purpose of conducting such activities.

9. Each person who owns any portion of the Site shall cause the instrument of any sale, lease, grant, or other transfer of any interest in the Site 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.

10. The owner of any portion of the Site may submit a written request to DEQ or its successor in function for modification of these restrictions, and must at the same time provide written notification to EPA Region 4's Superfund Division that the owner is requesting DEQ to modify the restrictions. DEQ will concur with and grant such request for modification if DEQ determines, based upon a showing by the owner, that the modification is justified.

REPRESENTATIONS AND WARRANTIES

The owner of the Site hereby represents and warrants to the other signatories hereto:

that the owner of the Site is the sole owner of the Site;

that the owner of the Site has the power and authority to enter into this Declaration, to grant the rights and interests herein provided and to carry out all obligations hereunder;

that the owner of the Site has provided to DEQ the names of all other persons that own an interest in or hold an encumbrance on the Site and has notified such persons of the owner's intention to enter into this Declaration;

that this Declaration will not materially violate or contravene or constitute a material default under any other agreement, document or instrument to which the owner of the Site is a party or by which the owner of the Site may be bound or affected.

ENFORCEMENT

The above land use restrictions are an integral part of the remedy for the contamination at the Site. Adherence to the restrictions is necessary to protect public health and the environment. These land use restrictions shall be enforced by any owner, operator, or other party responsible for any part of the Site. The above land use restrictions may also be enforced by DEQ through the remedies provided in N.C.G.S. Chapter 130A, Article 1, Part 2 or by means of a civil action, and may also be enforced by any unit of local government having jurisdiction over any part of the Site. Any attempt to cancel this Declaration without the approval of DEQ or its successor in function shall constitute noncompliance with the Remedial Action Plan approved by DEQ for the Site, and shall be subject to enforcement by DEQ to the full extent of the law. Failure by any party required or authorized to enforce any of the above restrictions shall in no event be deemed a waiver of the right to do so thereafter as to the same violation or as to one occurring prior or subsequent thereto.

FUTURE SALES, LEASES, CONVEYANCES AND TRANSFERS

When any portion of the Site is sold, leased, conveyed or transferred, pursuant to N.C.G.S. Section 130A-310.8(e) the deed or other instrument of transfer shall contain in the description section, in no smaller type than that used in the body of the deed or instrument, a statement that the real property being sold, leased, conveyed, or transferred has been used as a hazardous substance or waste disposal site and a reference by book and page to the recordation of this Declaration.

OWNER SIGNATURE

IN WITNESS WHEREOF, I execute these presents on this 8 day of February 2017.

Signatory's name typed or printed: Carolyn M. Benfield

Signature: Carolyn M. Benfield
Title: Trustee of the Bill J. Benfield Family Trust

STATE OF NORTH CAROLINA
COUNTY OF BUNCOMBE

I, Jeremi Comolli, a Notary Public, do hereby certify that Carolyn M. Benfield personally appeared before me this day, produced proper identification in the form of Drivers License, and signed this Declaration.

WITNESS my hand and official seal this 8 day of Feb, 2017.

Notary Public

My Commission expires: 10-25-2020

[SEAL]

JEREMI COMOLLI
NOTARY PUBLIC
BUNCOMBE COUNTY
STATE OF NORTH CAROLINA
MY COMMISSION EXPIRES 10-25-2020

APPROVAL AND CERTIFICATION OF THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENTAL QUALITY

The foregoing Declaration of Perpetual Land Use Restrictions is hereby approved and certified.

By: Jim Bateson

Jim Bateson, L.G., Chief
Superfund Section
Division of Waste Management
North Carolina Department of Environmental Quality

STATE OF NORTH CAROLINA
COUNTY OF WAKE

I, Kelly B Galantis, a Notary Public, do hereby certify that Jim Bateson personally appeared before me this day, produced proper identification in the form of personally known, and signed this Declaration.

WITNESS my hand and official seal this 13 day of March, 2017.

Kelly B Galantis
Notary Public

My Commission expires: 8-27-18

[SEAL]

KELLY B. GALANTIS
Notary Public
Johnston County, NC
My Commission Expires 8-27-18

REGISTER OF DEEDS CERTIFICATION

The foregoing Declaration of Perpetual Land Use Restrictions is certified to be duly recorded at the date and time, and the Book and Page, shown on the first page hereof.

Register of Deeds for Buncombe County

By: ______________________________
(signature)

____
(type or print name and title)

Book 172 Page 150 Page 1 of 1

NORTH CAROLINA
WAKE COUNTY

I, Kelly B. Galantis A NOTARY PUBLIC OF SAID COUNTY AND STATE DO HEREBY CERTIFY THAT Jim Bateson DID PERSONALLY APPEAR AND SIGN BEFORE ME THIS THE 13 DAY OF March 2017

Kelly B. Galantis
NOTARY PUBLIC (signature)

KELLY B. GALANTIS
Notary Public
My Commission Expires 8-27-18
(official seal)

MY COMMISSION EXPIRES 8-27-18

APPROVED FOR RECORDATION PURPOSES OF N.C.G.S. 130A-310.8

Jim Bateson
JIM BATESON, LG
CHIEF, SUPERFUND SECTION
DIVISION OF WASTE MANAGEMENT

NORTH CAROLINA
BUNCOMBE COUNTY

REGISTERED THIS THE 17th DAY OF March 2017
AND RECORDED IN PLAT BOOK 172 PAGE 150
BY: Jane C. Doyle, Deputy

Drew Reisinger 3/17/2017
REGISTER OF DEEDS DATE

Book 172 Page 150

I, KEVIN A. HOLLAR, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL GPS (OR GNSS) SURVEY PERFORMED UNDER MY SUPERVISION AND THE FOLLOWING INFORMATION WAS USED TO PERFORM THIS SURVEY:

CLASS OF SURVEY: SECOND ORDER CLASS II

POSITIONAL ACCURACY: 1:20,000

TYPE OF GPS OR GNSS FIELD PROCEDURE: JAVAD OPOS RAPID STATIC

DATE(S) OF SURVEY: 03/02/2017

DATUM/EPOCH: N.A.D. 83/2010

PUBLISHED/FIXED CONTROL: HAYW, MARI, NCMA, NCSP, NCSW

GEOID MODEL: GEOID12B

UNITS: U.S. SURVEY FEET

COMBINED FACTOR: 0.99977760

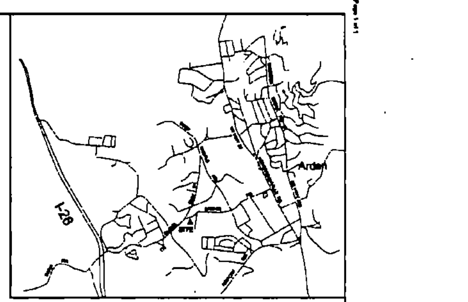
HORIZONTAL MEASUREMENTS ARE REFERENCED TO NAD83(NSRS 2007)

VERTICAL POSITIONS ARE REFERENCED TO N.A.V.D. 88 GEOID USING (GEOID12B)

CERTIFICATE OF SURVEY

I, KEVIN A. HOLLAR, CERTIFY THAT THIS PLAT OF SURVEY IS OF ANOTHER CATEGORY, SUCH AS THE RECOMBINATION OF EXISTING PARCELS, A COURT ORDERED SURVEY, OR OTHER EXCEPTION TO THE DEFINITION OF SUBDIVISION.

3/3/17 Kevin A. Hollar
DATE KEVIN A. HOLLAR PLS-4239



VICINITY MAP NTS

OWNER ACKNOWLEDGEMENT

CAROLYN MITCHELL BENFIELD AS TRUSTEE OF THE BILL J. BENFIELD FAMILY TRUST

BY: Carolyn Mitchell Benfield
CAROLYN MITCHELL BENFIELD
TITLE: TRUSTEE OF THE BILL J. BENFIELD FAMILY TRUST

NORTH CAROLINA
BUNCOMBE COUNTY

I, Lesley J. Robson A NOTARY PUBLIC OF SAID COUNTY AND STATE, CERTIFY THAT CAROLYN MITCHELL BENFIELD PERSONALLY CAME BEFORE ME THIS DAY AND ACKNOWLEDGED THAT SHE IS TRUSTEE OF THE BILL J. BENFIELD FAMILY TRUST, AND THAT SHE SIGNED THE FOREGOING INSTRUMENT.

WITNESS MY HAND AND OFFICIAL SEAL THIS 9th DAY OF March, 2017.

Lesley J. Robson
NOTARY PUBLIC
MY COMMISSION EXPIRES 1/31/22

SURVEY NOTES

SUBJECT PROPERTY LIES IN FLOOD HAZARD ZONE "X" AS REFERENCED ON F.E.M.A. PANEL PANEL ID# 3700964400J, EFFECTIVE 1/6/2010

THE LOCATIONS OF MONITORING WELLS AND SOIL CONTAMINATION AREAS DEPICTED ON THE FACE OF THIS PLAT HAVE NOT BEEN FIELD VERIFIED.

LOCATIONS OF MONITORING WELLS AND SOIL CONTAMINATIONS WERE PROVIDED BY:

ALPHA ENVIRONMENTAL
P.O. BOX 2165
ASHEVILLE NC 28802
828-298-2040

THIS SURVEY WAS PREPARED WITHOUT A TITLE REPORT WHICH MAY REVEAL ADDITIONAL RIGHT-OF-WAYS, EASEMENTS, OR OTHER RESTRICTIONS NOT SHOWN ON THIS SURVEY

ALL BEARINGS AND DISTANCES ARE GROUND MEASUREMENTS UNLESS OTHERWISE NOTED

ADJOINING PROPERTY INFORMATION IS TAKEN FROM COUNTY TAX RECORDS CURRENT AT TIME OF THIS SURVEY.

SUBJECT PROPERTY IS ZONED: CI

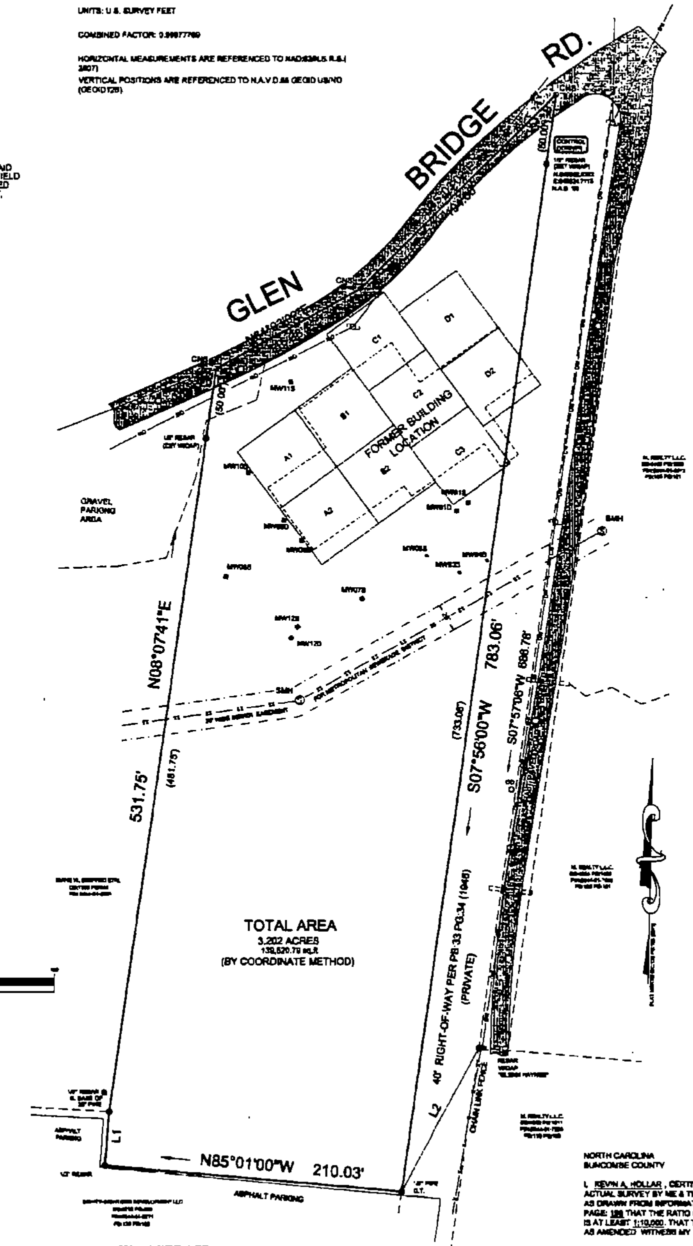
"COMMERCIAL INDUSTRIAL"

SETBACKS

FRONT: 33'

SIDE: 0'

REAR: 10'



GENERAL NOTES

1

Soil Sample ID	Contaminant above clean up levels
A2 (BRP-SF-A2)	Cadmium
B1 (BRP-SF-B1)	Cadmium
B2 (BRP-SF-B2)	Cadmium
C1 (BRP-SF-C1)	Cadmium
C2 (BRP-SF-C2)	Cadmium
C3 (BRP-SF-C3)	Cadmium
D2 (BRP-SF-D2)	Cadmium

2

Well ID	Contaminant above clean up levels
MW01S	Pentachlorophenol, Manganese
MW01D	1,1-Dichloroethene, Chloroform, Tetrachloroethene
MW04D	Manganese
MW05S	Cadmium, Manganese
MW06S	1,1-Dichloroethane, 1,1-Dichloroethene, Tetrachloroethene, Trichloroethene
MW06D	Tetrachloroethene
MW07S	Cadmium
MW08S	1,1-Dichloroethane, 1,1-Dichloroethene, Tetrachloroethene, Trichloroethene
MW10S	1,1-Dichloroethene, Tetrachloroethene, Manganese
MW11S	1,1,1-Trichloroethane, 1,1-Dichloroethane, 1,1-Dichloroethene, Chloroform, Tetrachloroethene, Trichloroethene
MW12S	Cadmium, Manganese
MW12D	Tetrachloroethene
MW13D	Tetrachloroethene
MW14D	Tetrachloroethene
MW15S	Tetrachloroethene
MW15D	Tetrachloroethene

3 DETECTED CONTAMINANTS ABOVE CLEAN UP GOALS:

CADMIUM (SOIL)
1,1,1-TRICHLOROETHANE
1,1-DICHLOROETHANE
1,1-DICHLOROETHENE
CHLOROFORM
TETRACHLOROETHENE
TRICHLOROETHENE
PENTACHLOROPHENOL
CADMIUM
MANGANESE

4 THE AREAS AND TYPE OF CONTAMINATION DEPICTED UPON THE MAP ARE APPROXIMATIONS DERIVED FROM THE BEST AVAILABLE INFORMATION AT THE TIME OF THE FILING OF THIS PLAT.

5 A DECLARATION OF PERPETUAL LAND USE RESTRICTIONS, LIMITING THE USES OF THIS PROPERTY, IS BEING RECORDED CONCURRENTLY WITH THIS NOTICE

6 UPON NORTH CAROLINA SUPERFUND SECTION APPROVAL AND RECORDATION IN ACCORDANCE WITH N.C.G.S. 130A-310.8 (a), THIS NOTICE SUPERSEDES ANY PREVIOUSLY RECORDED NOTICE(S) OF INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE FOR THIS PROPERTY.

7 UPON NORTH CAROLINA SUPERFUND SECTION APPROVAL AND RECORDATION IN ACCORDANCE WITH N.C.G.S. 130A-310.8 (b), THIS NOTICE SUPERSEDES ANY PREVIOUSLY RECORDED NOTICE(S) OF INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE FOR THIS PROPERTY.

8 THIS PROPERTY HAS BEEN USED AS A HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE. A NOTICE OF INACTIVE HAZARDOUS SUBSTANCE OR WASTE DISPOSAL SITE IS RECORDED IN THE BUNCOMBE COUNTY REGISTER OF DEEDS OFFICE AT PLAT BOOK ____ PAGE ____. QUESTIONS CONCERNING THIS MATTER MAY BE DIRECTED TO THE NORTH CAROLINA DIVISION OF WASTE MANAGEMENT, SUPERFUND SECTION, INACTIVE HAZARDOUS SITES BRANCH, 1646 MAIL SERVICE CENTER, RALEIGH, NC 27699-1646.

LINES TABLE		
#	BEARING	LENGTH
1	N04°16'36"E	37.13'
2	S28°17'03"W	114.45'

NORTH CAROLINA
BUNCOMBE COUNTY

I, KEVIN A. HOLLAR, CERTIFY THAT THIS MAP WAS DRAWN UNDER MY SUPERVISION FROM AN ACTUAL SURVEY BY ME & THAT THE BOUNDARIES NOT SURVEYED ARE CLEARLY INDICATED AS DRAWN FROM INFORMATION FOUND IN DEED DESCRIPTION RECORDED IN BOOK 3070 PAGE: 198 THAT THE RATIO OF PRECISION AS CALCULATED BY LATITUDES AND DEPARTURES IS AT LEAST 1:10,000. THAT THIS MAP WAS PREPARED IN ACCORDANCE WITH GS 47-30(f)(11)(c) AS AMENDED WITNESS MY HAND AND SEAL THIS THE 3rd DAY OF MARCH, 2017

PROJECT DESIGNATION:
NOTICE OF INACTIVE HAZARDOUS SUBSTANCE OR WASTE
DISPOSAL SITE:

SITE INFORMATION:
A PORTION OF THE SITE;
FORMER BLUE RIDGE PLATING SITE
171 GLEN BRIDGE ROAD
CITY OF ASHEVILLE BUNCOMBE COUNTY NC
PIN:9644-01-4987 DB:3070 PG:198

CURRENT OWNER:
CAROLYN MITCHELL BENFIELD AS TRUSTEE OF THE BILL J. BENFIELD FAMILY TRUST

MAP SCALE: 1"=40'

NO.	REVISION/ISSUE	DATE

SURVEYOR:
KEVIN A. HOLLAR PLS-4239
502 WINDSWEPT DRIVE
ASHEVILLE NC 28801
pls4239@gmail.com (828) 989-0163

NORTH CAROLINA
BUNCOMBE COUNTY

I, Mike Mahoney REVIEW OFFICER FOR BUNCOMBE COUNTY, CERTIFY THAT THE MAP OR PLAT TO WHICH THIS CERTIFICATION IS AFFIXED, MEETS ALL STATUTORY REQUIREMENTS FOR RECORDING.

3/14/17
REVIEW OFFICER DATE

NORTH CAROLINA PROFESSIONAL SEAL L-4239 LAND SURVEYOR KEVIN A. HOLLAR

Kevin A. Hollar
PROFESSIONAL LAND SURVEYOR L-4239

BK 172 Pg 150

Book: 172 Page: 150 Seq: 1

APPENDIX I
2017 EPA Memorandum
Hydrogeology Review

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4

61 Forsyth Street
Atlanta, Georgia 30303-3104

June 19, 2017

4SD-SSS

MEMORANDUM

SUBJECT: Five Year Review, Blue Ridge Plating Site, Arden, North Carolina

FROM: William N. O'Steen, Physical Scientist
Scientific Support Section, Superfund Division

THROUGH: Glenn Adams, Chief
Scientific Support Section, Superfund Division

TO: Jon Bornholm, Remedial Project Manager
Superfund Restoration and Site Evaluation Branch

This memorandum responds to your request for a review of the **draft Second Five Year Review Report, Blue Ridge Plating Site, Arden, North Carolina**. The document is referred to herein as "the FYR." For your convenience, comments on the FYR are itemized and are referenced to specific sections or pages of the FYR, as applicable. A summary of comment 5 (detailed independent review of groundwater data) is at the end of this memorandum. If you have any questions about this memorandum or need additional technical assistance on this project, please contact me.

1. In the list of acronyms, PCB needs to indicate the correct organic compound.

2. On page 3, text states "Because a municipal water supply is available, the use of groundwater at the Site for potable purposes is minimal." This statement implies there is some use of groundwater in the area for drinking water. If this is a correct interpretation of the wording, a statement needs to be added regarding where such groundwater use is present in relation to the Site and groundwater contamination associated with the Site. If no such local groundwater use is present or if it may be present but the locations of private wells are not known, that information needs to be stated in the FYR.

3. The Table 1 designation of concentrations at the bottom needs corrections. Micrograms per milligram would be correct, although a sort of standard mode of expression is milligrams per kilogram (which is consistent with Record of Decision Table 17).

4. I concur with the recommendation and commentary regarding MNA in the first paragraph answer to Question A (FYR Section V., page 16). See my detailed comment 5 below for my independent review of Site groundwater monitoring data.

5. I have some observations regarding the groundwater monitoring data, the J.M.

Waller/Versar groundwater concentration trend analysis, and the assessment of monitored natural attenuation (MNA) as a potentially viable groundwater remedial alternative. The following tabulation presents some observations regarding the FYR Table 3-3 summary of Mann-Kendall statistical calculations (focus on the stable, no trend, and increasing trend elements of Table 3-3 only) and the monitoring data contained in FYR Table 3-1. Note that in previous comments to you on Site annual data evaluation reports (comment memos from June 2014 and November 2012), some of the earlier monitoring results from the MNA groundwater monitoring program (implemented in September 2007) may be representative of changes in groundwater quality primarily due to the Site soil remedial action and other activities, rather than due to natural attenuation processes. Often, during a soil remedial action involving removal, there can be a short-term, notable increase in groundwater concentrations during or at some period following the remedial action. This condition has been observed at multiple other Superfund sites in EPA Region 4 and appears to be the case for some of the results from the Blue Ridge Plating Site (see Table 1 below). The additional emergency response action that occurred from December 2014 to May 2015 is another potentially confounding factor in interpreting the groundwater monitoring results, although it would only potentially be reflected in the most recent (July 2015 and June 2016) monitoring results.

Table 1. Observations/Comments on FYR Table 3-3 Constituents with No Trend, Stable, or Increasing Concentration Designations

Monitoring Well	Contaminant	Designation	Observation/comment
MW01D	1,1-dichloroethane	No trend	Concentrations << ROD cleanup goal and < NC 2L standard
MW01D	1,1-dichloroethene	No trend	Some possible effects of soil remedial action during the MNA evaluation monitoring period
MW01D	Chloroform	Stable	Concentrations generally slightly above the 0.19 ug/L ROD cleanup goal, but well below NC 2L standard
MW01D	Tetrachloroethene	No trend	Some possible effects of soil remedial action during the MNA evaluation monitoring period
MW01S	Naphthalene	No trend	As many nondetects as detects during the MNA monitoring period; 2010-2012 concentration increases consistent with a delayed reaction to the soil remedial action
MW01S	Pentachlorophenol	No trend	As many nondetects as detects during the MNA monitoring period; MNA evaluation period concentration data consistent with significant influences from the soil remedial action
MW03S	Cadmium	Stable	January 2009 spike in the concentration may be a delayed effect of the soil remedial action
MW03S	Iron	No trend	
MW04S	Iron	Increasing	Possible short-term improvement due to soil remedial action followed by a concentration rebound to approximate pre-remediation condition
MW04S	Manganese	Stable	

Table 1 is continued on the next page

Table 1, continued

Monitoring Well	Contaminant	Designation	Observation/comment
MW05S	Cadmium	Stable	Possible gradual, long-term decrease in concentration not yet confirmable through statistical testing
MW05S	Iron	No trend	Concentrations < ROD Cleanup goal
MW06D	1,1-dichloroethane	No trend	Concentrations << ROD cleanup goal and < NC 2L standard
MW06D	1,1-dichloroethene	No trend	2009-2013 concentration increases possibly consistent with a delayed reaction to the soil remedial action; average MNA evaluation period concentration < MCL and NC 2L standard
MW06D	Tetrachloroethene	Stable	2009-2012 concentration increases possibly consistent with a delayed reaction to the soil remedial action
MW06S	Tetrachloroethene	No trend	2015-2016 concentration increases possibly due to 2014-2015 emergency response action
MW06S	Trichloroethene	Stable	2015-2016 concentration increases possibly due to 2014-2015 emergency response action
MW07S	Manganese	No trend	Possible 2009-2013 short-term improvement due to soil remedial action followed by a concentration rebound to approximate pre-remediation condition; September 2007 concentration spike may be an initial effect of the soil remedial action
MW08S	Iron	No trend	June 2008 concentration spike may be an initial effect of the soil remedial action; all other MNA evaluation monitoring results < ROD cleanup goal
MW09S	Tetrachloroethene	Stable	
MW11S	1,1-dichloroethane	Stable	No obvious effects from soil remedial action. Concentrations are < ROD cleanup goal but > NC 2L standard.
MW11S	1,1-dichloroethene	Stable	Possible gradual, long-term decrease in concentration not yet confirmable through statistical testing
MW11S	Chloroform	Increasing	Concentrations > ROD cleanup goal and << NC 2L standard
MW11S	Tetrachloroethene	Stable	No obvious effects from soil remedial action.
MW11S	Trichloroethene	No trend	No obvious effects from soil remedial action.
MW12D	1,1-dichloroethane	Increasing	Concentrations << ROD cleanup goal and < NC 2L standard
MW12D	Tetrachloroethene	Probably Increasing	No pre-remedial data
MW12D	Trichloroethene	Stable	No pre-remedial data
MW12S	Cadmium	Stable	2008-2010 concentration increases possibly consistent with a delayed reaction to the soil remedial action; 2015-2016 concentration increases possibly due to 2014-2015 emergency response action

MW12S	Chloroform	Stable	Concentrations generally slightly above 0.19 ug/L ROD cleanup goal, but well below NC 2L standard
Table 1 is continued on the next page			

Table 1, continued

Monitoring Well	Contaminant	Designation	Observation/comment
MW12S	Manganese	Stable	2009-2010 concentration increases possibly consistent with a delayed reaction to the soil remedial action; 2015-2016 concentration increases possibly due to 2014-2015 emergency response action
MW12S	Trichloroethene	No trend	2008-2009 concentration increases possibly consistent with a delayed reaction to the soil remedial action; 2015-2016 concentration increases possibly due to 2014-2015 emergency response action
MW-13D	1,1-dichloroethane	Increasing	Concentrations << ROD cleanup goal and < NC 2L standard
MW-13D	Chloroform	Stable	Concentrations generally slightly above 0.19 ug/L ROD cleanup goal, but well below NC 2L standard
MW-13D	Tetrachloroethene	Increasing	
MW-13D	Trichloroethene	Increasing	
MW13S	Manganese	No trend	Concentrations generally < ROD cleanup goal but > NC 2L standard
MW13S	Tetrachloroethene	Stable	Concentrations generally < ROD cleanup goal and NC 2L standard
MW13S	Trichloroethene	No trend	Concentrations generally < ROD cleanup goal and NC 2L standard
MW14D	Tetrachloroethene	Stable	Concentrations generally about 2 to 3*x* above 0.7 ug/L ROD cleanup goal and NC 2L standard
MW15D	Chloroform	Stable	Concentrations generally < ROD cleanup goal and << NC 2L standard
MW15D	Tetrachloroethene	Increasing	
MW15S	Tetrachloroethene	No trend	2015 concentration increase possibly due to 2014-2015 emergency response action
MW15S	Trichloroethene	No trend	2015 concentration increase possibly due to 2014-2015 emergency response action
MW16D	1,1-dichloroethane	No trend	Concentrations << ROD cleanup goal and generally > NC 2L standard
MW16D	1,1-dichloroethene	Stable	Concentrations > ROD cleanup goal and NC 2L standard
MW16D	Chloroform	Stable	Concentrations > ROD cleanup goal and < NC 2L standard
Table 1 is continued on the next page			

Table 1, continued

Monitoring Well	Contaminant	Designation	Observation/comment
MW16D	Tetrachloroethene	No trend	Concentrations > ROD cleanup goal and NC 2L standard
MW16D	Trichloroethene	No trend	Concentrations > ROD cleanup goal and NC 2L standard
MW17S	1,1-dichloroethane	No trend	Possible concentration decrease due to soil remedial action; only four samples
MW17S	1,1-dichloroethene	No trend	Possible concentration decrease due to soil remedial action; only four samples
MW17S	Tetrachloroethene	No trend	Possible concentration decrease due to soil remedial action; only four samples
MW17S	Trichloroethene	No trend	Possible concentration decrease due to soil remedial action; only four samples; three most recent sample concentrations < ROD cleanup goal and NC 2L standard
MW17D	Tetrachloroethene	No trend	Concentrations > ROD cleanup goal and NC 2L standard; only four samples
MW18D	Manganese	Stable	Concentrations < ROD cleanup goal and > NC 2L standard
MW20D	1,1-dichloroethane	No trend	Concentrations << ROD cleanup goal and generally < NC 2L standard; only four samples
MW20D	1,1-dichloroethene	No trend	Possible concentration increase; only four samples
MW20D	Tetrachloroethene	No trend	Possible concentration increase; concentrations > ROD cleanup goal and NC 2L standard; only four samples
MW20D	Trichloroethene	No trend	Possible concentration increase; concentrations > ROD cleanup goal and NC 2L standard; only four samples

Table 1 shows that many of the Site monitoring wells have one or more contaminants that are showing no definable concentration changes in response to the remedial action. A few constituents are apparently increasing at a few of the wells. At some of the wells where concentrations are either stable (or no trend) or increasing, other constituents are decreasing in concentration. Based on Table 1 and the ongoing statistical trend analyses of Site groundwater monitoring data, there is no current basis for concluding that monitored natural attenuation is a viable groundwater remedial action for the Blue Ridge Plating Site.

MW10S is the only well where groundwater concentrations of potential concern are showing only a decreasing trend. A few other wells with long-term records (records that include data preceding the remedial action) are mostly showing decreasing concentrations of constituents of concern. These wells are MW01S, MW06S, MW07S, and MW08S. All wells showing mostly positive indications of concentration decreases are shallow monitoring wells located within about 100 feet of the former plating facility. These are the wells that one would expect to most likely show the effects of the 2006-2007 soil remedial action. Of these four wells plus MW10S, three wells (MW06S, MW08S and MW10S) have historically monitored groundwater with the most significant levels of overall contamination. Some of the key time-concentration trends in samples from these wells are evaluated in this review.

MW6S had pre-remedial concentrations of several chlorinated compounds, plus cadmium, cyanide, and manganese that exceeded ROD cleanup goals. In the post-remediation environment, all of these contaminants appear to be decreasing, with the possible exception of PCE. The inorganic constituents have decreased to less than ROD cleanup goals and are not discussed further. 1,1,1-trichloroethane has also decreased to below its ROD cleanup goal and is not discussed further. Although chloroform remains above its ROD cleanup goal of 0.19 ug/L, it has decreased to less than 1 ug/L and is a relatively inconsequential contaminant in terms of its concentration. The chlorinated compounds that are considered further for this well are 1,1-dichloroethane, 1,1-dichloroethene, PCE, and TCE.

Figure 1 below shows time-concentration plots for the MW6S chlorinated compounds. The four compounds show increasing concentrations late in the monitoring history for MW6S. I interpret these increasing concentrations to the influence of the 2014-2015 emergency response action. This upward concentration pattern may be transient but adds a complicating factor to the assessment of natural attenuation for MW6S. Also, the first few samples from the MNA evaluation period show concentration patterns and decreases that I interpret as reflecting mostly the lingering effects of the 2006-2007 remedial action, not MNA. This early post-remediation influence on the time-concentration data is suggested by the fluctuating concentrations (most notable for 1,1-dichloroethane) and the steep decline in concentrations that are present from the third to fourth or fifth sample events. The fluctuating concentrations are suggestive of a disequilibrium condition. Such a condition is often the result of a change in Site hydrogeologic and chemical conditions associated with soil excavation and removal. Data that may reflect natural attenuation of groundwater contamination monitored by MW6S are likely in the 2010 to 2014 monitoring interval. These data do not show significant attenuation of the chlorinated compound concentrations.

MW8S had pre-remedial concentrations of several chlorinated compounds that exceeded ROD cleanup goals. The remedial action appears to have actually caused brief increases in contaminant concentrations (Figure 2 below). This phenomenon has been observed at other Superfund sites in EPA Region 4 where soil removal has occurred. The rise in concentrations apparently occurs due to increased groundwater recharge through contaminated areas as they are being excavated or otherwise disturbed. The increased recharge is likely accompanied by increased mass transfer of contaminants to the dissolved phase due to disruption of soil structures (e.g. clay lenses) that may have been chemical or hydraulic "traps" for soil contaminants. These disruptions to the Site hydrology and hydrostratigraphy briefly accelerate the mass flux of contaminants into and through the groundwater.

The MW8S inorganic constituent with a "no trend" designation is iron. However, the last eight MW8S samples have had iron below the ROD cleanup goal and the iron data are not discussed further. Other inorganic constituents of potential concern have apparently decreased to less than ROD cleanup goals and are also not discussed further. Although chloroform may remain above its ROD cleanup goal of 0.19 ug/L, the five most recent MW8S samples have had chloroform below its cleanup goal. Chloroform is therefore not considered further. The chlorinated compounds that are considered further for this well are 1,1-dichloroethane, 1,1-dichloroethene, PCE, and TCE.

Figure 2 shows time-concentration plots for the evaluated MW8S chlorinated compounds. As previously noted, the chlorinated compounds show an increase in concentration just after the completion of the remedial action that I interpret to be a response to changing Site conditions during the remedial action. There are some notable concentration fluctuations for the first several samples after the short-term increase in concentrations. This fluctuation period is followed by a relatively flat time-concentration trend from 2013 onward. The fluctuation period is a probable condition where groundwater is in a lingering state of disequilibrium around MW8S until about four to five years after the completion of the remedial action. Only the last four years of MW8S data may represent the natural attenuation component of groundwater quality changes at MW8S. However, the 2014-2015 emergency response action superimposed another disturbance on the Site conditions. This second source area disturbance may be reflected in the slight uptick in concentrations in July 2015 relative to the August 2014 sample. Although the nonparametric Mann-Kendall trend analysis indicates an improvement in MW8S groundwater quality for the MNA evaluation period, the results would be misleading with regard to indicating natural attenuation is effectively reducing contaminant concentrations. The positive aspect to the MW8S data is that the most recent sample results show relatively low concentrations. Therefore, if future monitoring results indicate natural attenuation is a potentially effective remediation process, there is not a tremendously high degree of contamination present around this well.

MW10S had pre-remedial concentrations of several chlorinated compounds and manganese that exceeded ROD cleanup goals. In the post-remediation environment, all of these contaminants appear to be decreasing. Manganese has apparently decreased to less than its 300 ug/L ROD cleanup goal as of August 2014, has continued to decrease in concentration since then, and is therefore not discussed further. 1,1,1-trichloroethane has decreased to below its ROD cleanup goal and is not discussed further. As for MW6S and MW8S, the chlorinated compounds that are considered further for this well are 1,1-dichloroethane, 1,1-dichloroethene, PCE, and TCE.

Figure 3a below shows time-concentration plots for the MW10S chlorinated compounds. The four compounds (particularly 1,1-dichloroethene and PCE) show large concentration declines for the first five monitoring periods following the remedial action. The large concentration decreases are interpreted as being indicative of the effects of the remedial action on groundwater monitored by this well, not a result of natural attenuation. The January 2010 to February 2011 concentration decline may reflect a period of transition from a predominantly remedial action-influenced downward concentration trend to a concentration trend dominated by natural attenuation effects. From the 2011 sample onward to perhaps the July 2015 sample, groundwater concentrations are interpreted as reflecting natural attenuation effects. The 2016 sample may show a delayed response to the 2014-2015 emergency response action, with some increase in concentrations for all four contaminants.

Because there is a three order of magnitude variation in contaminant concentrations shown on Figure 3a, concentration changes are not clear during the period interpreted to represent the period of natural attenuation effects. Figure 3b below shows the MW10S concentrations for just the period from February 2011 until June 2016. Figure 3b shows that during the period interpreted to be representative of mostly or entirely natural attenuation influence on concentrations, concentrations of contaminants were declining. Between the August 2014 and the July 2015 samples, the emergency response action occurred. After that event, chlorinated compound concentrations in MW10S samples began to increase, with the June 2016 sample having clearly higher concentrations of contaminants. Particularly noteworthy is the large increase in the 2016 PCE concentration compared to the 2015 concentration. The June 2016 PCE at MW10S is the highest PCE observed at this well since a sample from 2009. I interpret the 2016 MW10S results to represent a delayed effect of the 2014-2015 emergency response action. The 2015 and 2016 data points introduce a confounding aspect to what appears to be declining MW10S concentration trends that are presumptively attributable to natural attenuation. Further monitoring will be necessary to understand the ability of natural attenuation to attain ROD goals for groundwater monitored by MW10S. For this well, the data from the 2011 to 2014 monitoring period are promising.

6. You should check with the EPA risk assessor as well as the ORC lawyer assigned to this Site regarding FYR-proposed modifications to the groundwater cleanup goals for some of the metals. It is my understanding that state criteria that are not based upon a risk to human health are not applied to Superfund remedial action goals. Also, there may be some question as to whether or not EPA currently considers as ARARs the North Carolina 2L standards. There are a number of constituents identified in FYR Table 9 where the current cleanup goal does not match a NC 2L value. The FYR review recommends the cleanup goals be changed to the NC 2L value. Additions to the list of contaminants with cleanup goals are also recommended in the FYR (see Table 10 and Section VI. Issue 1 on FYR page 18). Also refer to Appendix E, the ARAR review part of the FYR.

7. Ideally, the Appendix B site chronology would include the date when the remedial action was completed.

As noted at the beginning of this memorandum, this closing statement is a summary of the groundwater data review contained in comment 5. The Site groundwater monitoring results from the MNA evaluation period do not support selection of MNA as a groundwater remedial alternative at this time. Results only appear to be promising for MNA from one shallow monitoring well located adjacent to the former facility, in the area of the 2006-2007 soil remedial action. Elsewhere, decreasing contaminant concentrations observed during the MNA evaluation period appear to mostly be reflective of concentration changes in response to the soil remedial action.

The time needed before MNA can be evaluated as a remedial alternative will be variable. For deeper wells or wells further from the source area remedial action, it may be a decade or longer before MNA can be assessed as a remedial alternative.

cc: Glenn Adams, Chief, SSS (electronic copy)

Figure 1. MW06S Time-Concentration Plots (Concentrations in ug/L)

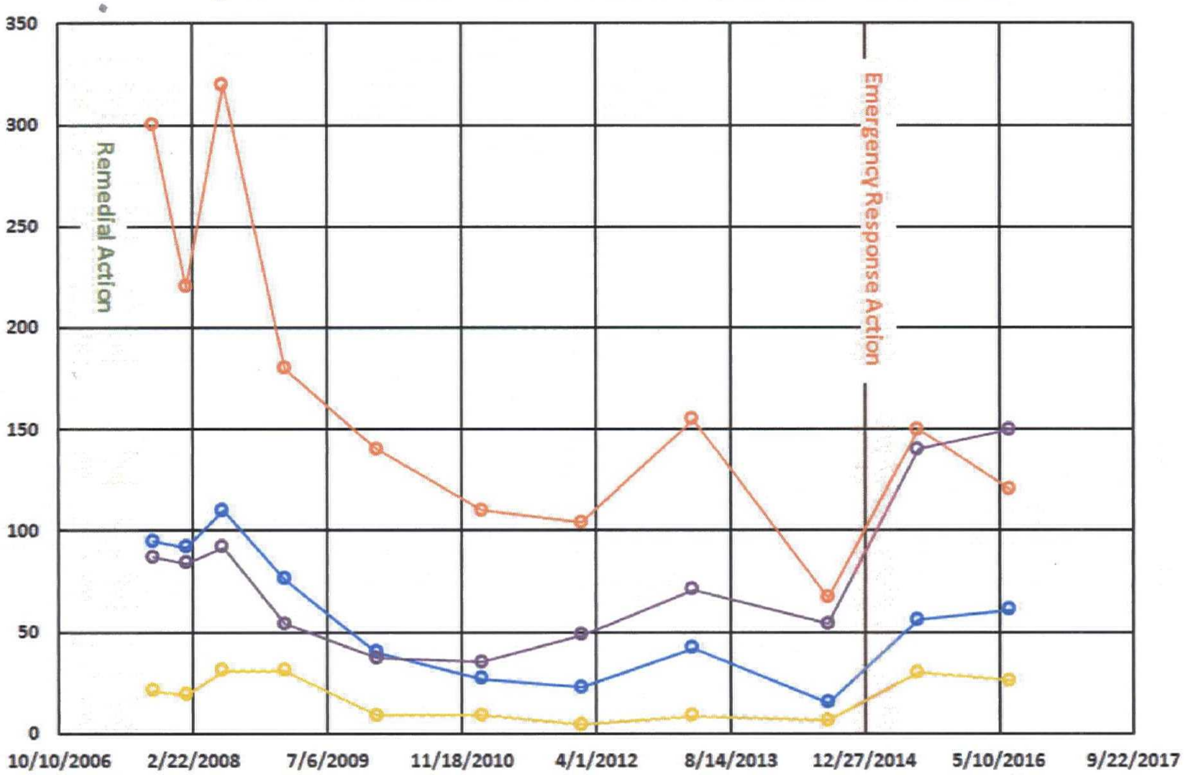


Figure 2. MW08S Time-Concentration Plots (Concentrations in ug/L)

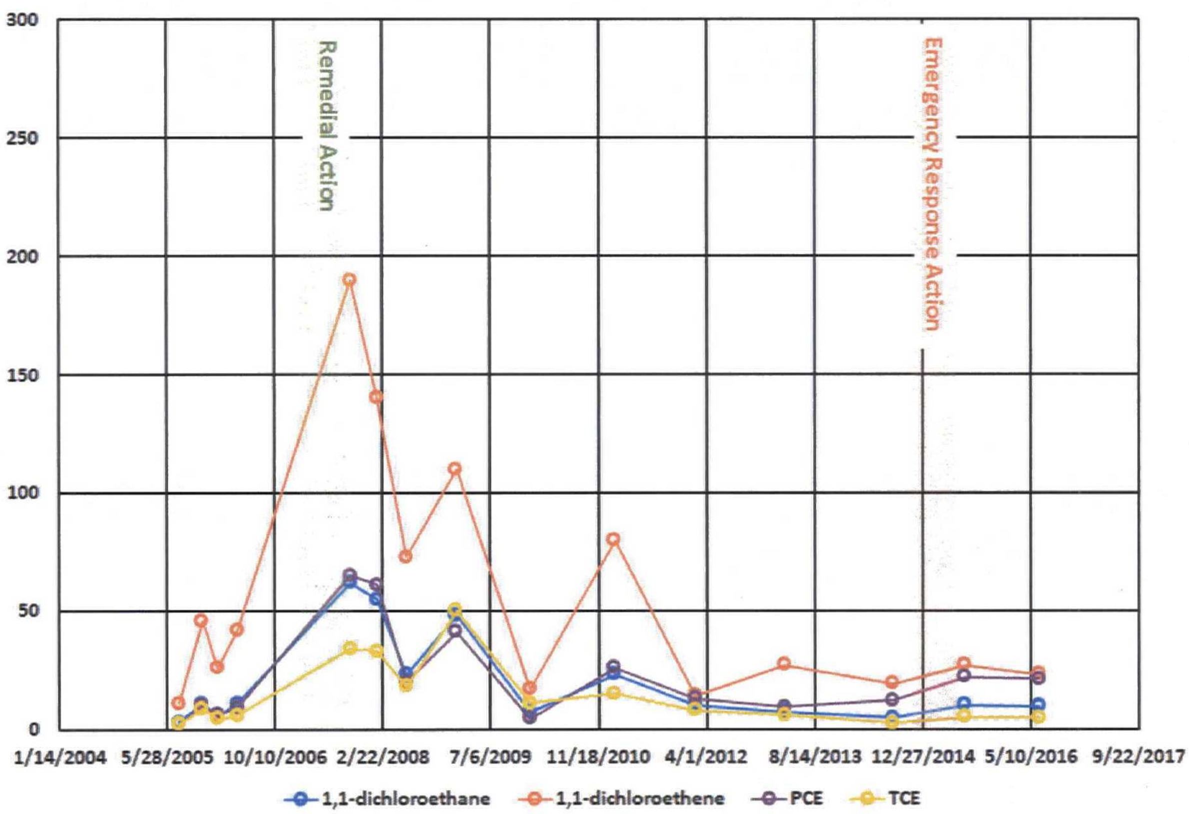


Figure 3a. MW10S Time-Concentration Plots (Concentrations in ug/L)

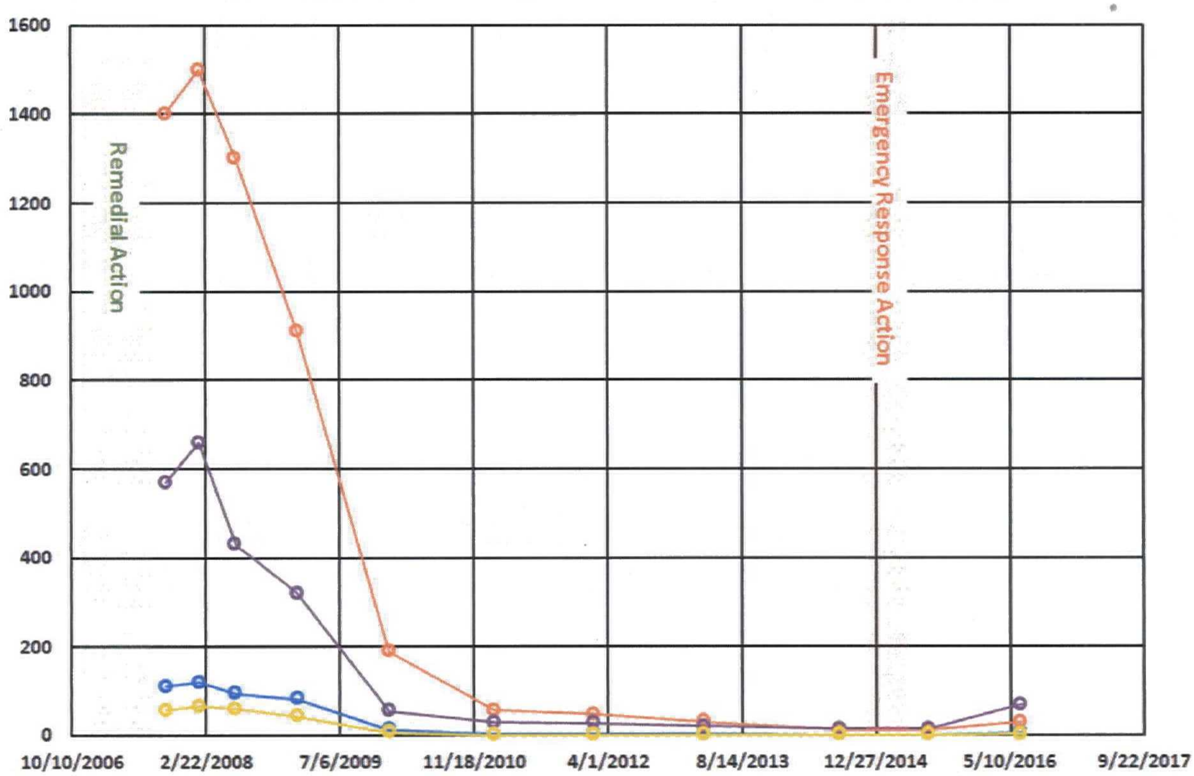


Figure 3b. MW10S Time-Concentration Plots (Concentrations in ug/L)