SIXTH FIVE-YEAR REVIEW REPORT FOR
TELEDYNE WAH CHANG SUPERFUND SITE
LINN COUNTY, OREGON

Prepared by

U.S. Environmental Protection Agency
Region 10
Seattle, Washington

CALVIN TERADA
Digitally signed by CALVIN TERADA
Date: 2022.12.19 07:32:39 -08'00'

Calvin J. Terada, Director
Superfund and Emergency Management Division

December 19, 2022

Date

This page intentionally left blank

Table of Contents

List of Tables

List of Figures

LIST OF ABBREVIATIONS & ACRONYMS

µg/L	Micrograms per liter
µrem	Micro-roentgen
ASA	Acid Sump Area
ATI	Allegheny Technologies Incorporated Millersburg Operations
AWQC	Ambient Water Quality Criteria
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of Concern
CoGen	Co-Generation
CVOC	Chlorinated Volatile Organic Compound
DCA	Dichloroethane
DCE	Dichloroethene
DCGL	Derived Concentration Guideline Level
DNAPL	Dense Non-aqueous Phase Liquid
EFSC	Energy Facility Siting Council
EISB	Enhanced In Situ Bioaugmentation
EPA	U.S. Environmental Protection Agency
ESD	Explanation of Significant Difference
FFS	Focused Feasibility Study
FCCA	Former Crucible Cleaning Area
FMA	Feed Makeup Area
FS	Feasibility Study
FYR	Five-Year Review
GETS	Groundwater Extraction and Treatment System
HI	Hazard Index
IC	Institutional Control
LRSP	Lower River Solids Pond
MCL	Maximum Contaminant Level
MCLG	Maximum Contaminant Level Goal
MIBK	Methyl Isobutyl Ketone
NPL	National Priorities List
OAR	Oregon Administrative Rule
ODEQ	Oregon Department of Environmental Quality
OHA	Oregon Health Authority
OU	Operable Unit
O&M	Operations and Maintenance
PCB	Polychlorinated Biphenyl
PCE	Tetrachloroethene
pCi	Picocuries
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objective
RCE	Restoration Completeness Evaluation
RfR	Ready for Reuse
RI	Remedial Investigation
ROD	Record of Decision
SEA	South Extraction Area
SMCL	Secondary Maximum Contaminant Limit
SVOC	Semi-Volatile Organic Compound
TCA	Trichloroethane

TCE	Trichloroethene
TWC	Teledyne Wah Chang Superfund Site
UU/UE	Unlimited Use and Unrestricted Exposure
VC	Vinyl Chloride
VOC	Volatile Organic Compound

I. INTRODUCTION

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

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

This is the sixth FYR for the Teledyne Wah Chang (TWC) Superfund Site (Site). The Site was purchased by Allegheny Technologies Incorporated Millersburg Operations (ATI) in 1999, and ATI is currently responsible for fulfilling the obligations of the 1997 Consent Decree for remediation. The triggering action date for this statutory review is the completion date of the last FYR, December 19, 2017. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

This Site consists of three operable units (OUs), all of which are addressed in this FYR:

- Operable Unit 1 (OU1); Sludge Ponds (EPA 1989)
- Operable Unit 2 (OU2); Groundwater and Sediment (EPA 1994)
- Operable Unit 3 (OU3); Surface and Subsurface Soil (EPA 1995)

The Teledyne Wah Chang Superfund Site FYR was led by Chan Pongkhamsing, Remedial Project Manager, EPA Region 10. Other EPA Region 10 participants included Don Clabaugh, Hydrogeologist/Environmental Engineer; Kathleen Peshek, Environmental Engineer; Julie Congdon, Community Involvement Coordinator; and Stephanie Mairs, Assistant Regional Counsel. Margaret L. Oscilia, P.E., also participated on behalf of Oregon Department of Environmental Quality (ODEQ). The responsible party, ATI, was notified of the initiation of the FYR. The review began on January 31, 2022.

Site Background

TWC is an operating zirconium and other non-ferrous metals manufacturing plant located in Millersburg, approximately 2 miles north of downtown Albany and approximately 20 miles due south of Salem, Oregon in a sparsely populated area. The Site is expected to remain an active operating facility for the foreseeable future. Current site use is industrial, and the Site is located within an area in Millersburg that is zoned for heavy industry. Approximately 85 percent of the property is occupied by 180 buildings situated on 110 acres of land that are paved, gravel-covered, or vegetated. The Site is within the Willamette River Valley along the east bank of the river (Figure 1). Portions of the property are located within the Willamette River's 100- and 500-year flood plains. Riparian areas along the Site's western boundary are densely vegetated. In addition, the Site is bounded to the east by Old Salem Road and Interstate 5. Several Solid Waste Management Units (SWMUs) are located on the TWC property. These SWMUs are regulated under the Resource Conservation and Recovery Act, and regulatory oversight is conducted by the State of Oregon. These SWMUs are not currently impacting the Site groundwater and are not discussed in this FYR.

TWC's manufacturing process involves several physical, chemical, and electrochemical steps that concentrate zircon, hafnium, vanadium, niobium, titanium, and radioactive byproducts such as uranium and thorium. Current and historic waste management programs include process wastewater treatment, lime solid storage, solid waste management, hazardous waste management, and radioactive waste management.

The Site is comprised of the following locations:

- Main Plant – The central area of the manufacturing process for zirconium and non-ferrous metal production is shown in Figure 2. Site areas linked to the manufacturing process are described as follows:
    - Extraction Area – The Extraction Area is a 40-acre portion of the Site located south of Truax Creek. Zircon sand is processed into hafnium and zirconium. The Extraction Area includes the Feed Makeup Area (FMA) and the South Extraction Area (SEA).
    - Fabrication Area – The Fabrication Area is a 50-acre area located north of Truax Creek. Zirconium is consolidated into ingots and then welded together and melted into ingots. The ingots are then fabricated into numerous shapes and forms such as forgings, plate, sheet, foil, tubing, rod, and wire. The Fabrication Area includes the Acid Sump Area (ASA), Ammonium Sulfate Storage, Material Recycle, Dump Master, and former Crucible Cleaning Areas.
- Solids Area – The Solids Area, shown in Figure 3, is a 20-acre area located west of the Fabrication Area. Subareas include the Lower River Solids Pond (LRSP), Schmidt Lake, Chlorinated Residue Pile, and the Magnesium Resource Recovery Area. This area received solids from the wastewater treatment system.
- Farm Ponds Parcels – The Farm Ponds Parcels, shown in Figure 4, is an approximately 115-acre parcel located 0.75 mile north of the Main Plant. This area formerly included four, 2.5-acre storage ponds that received the plant's wastewater treatment lime solids.
- Soil Amendment Area – The Soil Amendment Area, also shown on Figure 4, is a 40-acre parcel currently owned by the City of Millersburg that is located north of the Farm Ponds Parcels. This area received a one-time application of lime solids in 1976 from the LRSP in an ODEQ-permitted action. The land is currently leased for agricultural purposes.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Teledyne Wah Chang		
EPA ID: ORD050955848		
Region: 10	**State:** OR	**City/County:** Millersburg/Linn
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the Site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Chan Pongkhamsing		
Author affiliation: EPA Region 10		
Review period: 12/20/2021-12/19/2022		
Date of Site inspection: 10/3/2022		
Type of review: Statutory		
Review number: 6		
Triggering action date: 12/19/2017		
Due date *(five years after triggering action date)*: 12/19/2022		

II. RESPONSE ACTION SUMMARY

In response to releases or a substantial threat of a release of a hazardous substance at or from the Site, EPA placed TWC on the National Priorities List (NPL) in October 1983, and TWC commenced a Remedial Investigation (RI)/Feasibility Study (FS) for the Site in 1987 under Consent Order (Docket No. 1086-02-19-106). A Site chronology is provided in Appendix A.

Operable Unit 1 – Sludge Ponds

Basis for Taking Action

The basis for EPA action at OU1 was prompted by EPA's concerns that hazardous materials from the unlined sludge ponds (LRSP and Schmidt Lake) were a likely source of groundwater contamination; were located in the Willamette River flood plain; and contained radioactive materials. Source material included zircon sands with elevated amounts of thorium and uranium, and an underground storage tank containing liquid petroleum product. Exposure pathways of concern included direct contact and migration of contaminated groundwater into the Willamette River.

Response Actions

The Record of Decision (ROD) for OU1 was signed by EPA on December 28, 1989 (EPA 1989). The ROD for OU1 required implementing an interim action concurrent with an ongoing RI/FS. Cleanup levels were not established in the ROD, since this expedited response action to remove sludge was carried out in advance of the RI/FS.

The remedial action objectives (RAOs) for OU1 were to effectively reduce risk to human health and the environment and to ensure that contaminants were not transported to groundwater, surface water, and/or air. The remedy selected in the ROD for OU1 consisted of an interim action to remove sludge as a source material, and included the following activities:

- Excavation and removal of approximately 110,000 cubic yards of sludges from the ponds.
- Partial solidification of the sludge using Portland cement.
- Construction of a monocell at Finley Buttes Landfill, an off-site, permitted solid waste facility.
- Transportation of the solidified sludge to Finley Buttes Landfill and disposal in the monocell.
- Long-term operation and maintenance of the off-site monocell.

Status of Implementation

On February 14, 1991, EPA issued a Unilateral Order to TWC for design and implementation of the selected remedy for the Sludge Ponds. Based on this order, excavated sludge was transported to the monocell at Finley Buttes Landfill in Boardman, Oregon. On June 30, 1993, EPA issued a Certification of Completion for the Sludge Ponds OU1 Remedial Action (RA) to TWC (EPA 1993). Operations and Maintenance (O&M) and monitoring are the responsibility of the disposal facility, Finley Buttes Landfill, and does not require EPA oversight.

Operable Unit 2 – Groundwater and Sediments

Basis for Taking Action

OU2 addresses contamination in groundwater and sediment at the Site. The need for remedial action was based on direct contact risks to industrial workers, and use of groundwater by future workers at the main plant and potential future residents of the Farm Ponds Area. Contaminated groundwater beneath the Site discharges to adjacent properties and adjacent surface water bodies including the Willamette River. Contaminated fill material may potentially enter Truax Creek through slope erosion and surface water bodies adjacent to or flowing through the Site to the local ecosystem. Polychlorinated Biphenyls (PCBs) in the sediments of Truax Creek pose the greatest risk to fish and mammals. Agricultural exposures were considered for the Soil Amendment Area and adjoining land to the northeast and northwest of the Farm Ponds Area (EPA 1994).

The remedial actions identified in the ROD for OU2 were selected to deal with sources of groundwater and sediment contamination that were caused by past operational practices. Groundwater beneath the Site is contaminated with metals, volatile organic compounds (VOCs), PCBs, and radionuclides. Groundwater beneath some areas of the Site is very acidic (pH = 1) due to releases of caustics, acids, and sulfates. Sediments are contaminated with PCBs.

Response Actions

EPA selected the Final Remedial Action for OU2 in a June 10, 1994 ROD (EPA 1994). The ROD for OU2 identified contaminants of concern (COCs) and cleanup levels for groundwater as shown in Table 1. The ROD for OU2 identified total PCBs as the COC for sediments at the Site, with a cleanup level established at 1 mg/kg.

Table 1: COCs and Groundwater Cleanup Levels from Table 10-1 of the ROD

COCs	Chemical Classification	Cleanup Level (µg/L)	Basis
Benzene	VOC	5	MCL
1,2-Dichloroethane (DCA)	VOC	5	MCL
1,1-Dichloroethene (DCE)	VOC	7	MCL
Methyl isobutyl ketone (MIBK)	VOC	5,000	HI=1
1,1,2,2-Tetrachloroethane	VOC	0.175	10-6
Tetrachloroethene (PCE)	VOC	5	MCL
1,1,1-Trichloroethane (TCA)	VOC	200	MCL
1,1,2-Trichloroethane (1,1,2-TCA)	VOC	3	Non-zero MCLG
Trichloroethene (TCE)	VOC	5	MCL
Vinyl Chloride (VC)	VOC	2	MCL
Hexachlorobenzene	SVOC	1	MCL
Bis(2-ethylhexyl)phthalate	SVOC	0.2	MCL
Total PCBs	SVOC	0.5	MCL
Beryllium	Metal	4	MCL
Copper	Metal	1,000	SMCL
Manganese	Metal	50	SMCL
Uranium	Metal	30	MCL
Radium-226	Radionuclide	5	MCL
Radium-228	Radionuclide	5	MCL
Ammonium	Inorganic	250,000	OAR 333-61-030
Arsenic	Inorganic	50	MCL
Fluoride	Inorganic	2,000	OAR 333-61-030
Nitrate	Inorganic	10,000	MCL

Notes:
µg/L = micrograms per liter
COCs = Contaminants of Concern
MCL = Maximum Contaminant Limit
MCLG = Maximum Contaminant Limit Goal
HI = Hazard Index
OAR = Oregon Administrative Rule
SMCL = Secondary Maximum Contaminant Limit
SVOC = Semivolatile organic compound
VOC = Volatile organic compound

The following RAOs were established in the ROD (EPA 1994) for groundwater, sediment, and surface water in OU2.

Groundwater:

- Prevent people from drinking groundwater containing contaminant levels above federal or state drinking water standards.
- Prevent contaminated groundwater above federal or state drinking water standards from leaving the TWC property boundary.
- Reduce the concentrations of TWC-related organic, inorganic, or radionuclide compounds in groundwater to concentrations below federal or state drinking water standards or other risk-based levels.
- Prevent groundwater containing TWC-related organic, inorganic, or radionuclide compounds above federal or state standards from discharging into nearby surface water.

Sediments:

- Prevent TWC-related contaminants from moving into sediments, and from sediments into surface water.
- Prevent sediments containing TWC-related contaminants from leaving the Site.
- Prevent aquatic organisms from contacting contaminated sediments.
- Reduce concentrations of TWC-related compounds in sediments where necessary, to protect aquatic organisms.

Surface Water:

- Ensure that non-permitted discharges to surface water from the TWC facility do not exceed federal or state water quality standards. [*Note: Per 1996 Scope of Work for RD/RA (EPA 1996a) no groundwater discharge to surface water will occur that causes exceedances of the Ambient Water Quality Criteria (AWQC) for aquatic organisms].*

The selected RAs for OU2, identified in the ROD, consisted of the actions listed below with modifications defined in three Explanation of Significant Differences (ESDs) issued on October 8, 1996 (EPA 1996b): June 19, 2009 (EPA 2009); and April 25, 2013 (EPA 2013).

Groundwater Remedial Actions:

- Extraction and treatment of contaminated groundwater.
    - EPA dropped the requirement for groundwater extraction at and outside the plant boundaries on the northern and western perimeters contingent on placing deed restrictions on an adjacent property on the western perimeter to preclude groundwater use for drinking water (EPA 1996b).
    - EPA selected a secondary treatment technology consisting of Enhanced In Situ Bioaugmentation (EISB) in the ASA to meet RAOs (EPA 2009).
    - EPA approved implementation of buffering solution injection in the FMA to enhance remediation (EPA 2013).
- Preventing off-site migration of contaminated groundwater (off the Main Plant or beyond the current boundary of the groundwater contaminant plume at the Farm Ponds Area) by using EISB and pump and treatment of groundwater.
- Treatment or removal of subsurface source material near the FMA building at the Main Plant.

Sediment Remedial Actions:

- Slope erosion protection along the banks of Truax Creek to prevent contaminated fill material from entering the creek.
- Removal of 3,600 cubic yards of contaminated sediments from surface water bodies adjacent to or flowing through the Site.

Sitewide Actions:

- Deed restrictions and institutional controls (ICs) on land and groundwater use for both the Main Plant and the Farm Ponds Area.

- Environmental evaluations of currently uncharacterized potentially contaminated source areas as needed to ensure achievement of groundwater RAOs.

- Long-term on- and off-site groundwater, surface water, and sediment monitoring.

Status of Implementation

Groundwater Remedial Actions – The OU2 ROD specified groundwater pump-and-treat as the remedial alternative for hot-spot areas across the Site (EPA, 1994). In 2000, the groundwater extraction and treatment systems (GETS) began operating with extraction wells FW-1, FW-2, FW-3, FW-4, and FW-5 in the Fabrication Area and extraction wells EW-1, EW-2, EW-3, EW-4, EW-5, and EW-6 in the Extraction Area. Well FW-6 was not incorporated in the GETS, due to insufficient water production. Extraction well FW-7 was brought online in 2001 to prevent offsite migration but was shut down in April 2009 with EPA approval. Extraction wells EW-4, EW-5, and EW-6 were shut down in 2011 with EPA approval. Extraction wells FW-1, FW-2, FW-3, and FW-4 were idled for a shutdown pilot test in June 2020 with EPA approval. Between October 2000 and April 2002, the GETS were brought online in the Fabrication and Extraction Areas to achieve groundwater RAOs and cleanup levels.

Since the GETS began operating, 111,350 to 2.3 million gallons of water a month have been pumped from the aquifer. Over the life span of the GETS, the quantity of COC mass removed by extraction wells in the Fabrication Area has diminished from the baseline quantities, as indicated by the COC concentrations in extracted water. With EPA and ODEQ approval, and as recommended by the Optimization Review, four extraction wells were taken offline in June 2020.

The environmental benefit of extraction wells in the Extraction Area is continuing to be reviewed, as part of the FMA hydraulic test in the 2019 Millersburg Operations Progress Summary (GSI, 2020a). Overall, very little radium is being removed using the system, and a total of only 3.92 x 10^{-8} pounds of radium was removed over the last 3 years. Further evaluation is warranted to develop recommendations for modifications to the remedial approach for the FMA.

Since 2021, the operating extraction wells are EW-2 in the FMA and FW-5 in the Ammonia Sulfate Storage Area. Through the operation of the GETS, ammonium, fluoride, nickel, total dissolved solids, radium-226/228, and Chlorinated Volatile Organic Compounds (CVOCs) have been removed from the aquifer.

Extraction at the two operating wells will continue until cleanup levels are achieved at the Main Plant property boundary and for the Farm Ponds Area. Several EPA-approved modifications to the GETS have been completed and are on-going to enhance groundwater extraction and treatment including augmentation by EISB and servicing active extraction wells quarterly in the GETS (EW-2 and FW-5).

In addition to the GETS, multiple remedial activities have been completed in several areas, including:

- **Acid Sump Area:** EISB injections in 2009 and 2022; excavation and in situ chemical oxidation in 2016 (GSI, 2011a, 2017b, 2022c).

- **Feed Makeup Area:** Injections of buffer solutions to mitigate low pH groundwater in 2013 (GSI, 2015e); gamma emitting material excavation in 2020 (GSI, 2021a).

- **Former Crucible Cleaning Area:** EISB injections in 2010 and 2019 (GSI, 2013a, 2021a).

Sitewide Actions

- Deed restrictions and ICs were implemented (See Table 2).
- Environmental Evaluations of Uninvestigated Areas occur whenever TWC discontinues the use of, paves, or otherwise disturbs any pond, plant area, or building on the Site (EPA 1994).
- Long-term monitoring continues and consists of sampling and analyzing groundwater from the Extraction Area, Fabrication Area, Solids Area, and Farm Ponds Area, and surface water from Truax and Murder Creeks (ATI 2022a).

ATI began additional EISB remedial actions at the ASA in 2022 pursuant to the Acid Sump Area Source Treatment Work Plan (GSI, 2022g) approved by EPA. The overall objective of this work is to address the TCA dense non-aqueous phase liquid (DNAPL) present in the area, which provides a continuing source of CVOCs to the dissolved phase groundwater plume. The goal is to target the dendritic DNAPL accumulations and by so doing, reduce overall groundwater concentrations within and downgradient of the ASA.

The project approach consisted of stimulating reductive dechlorination in the ASA by injecting an emulsified oil/zero valent iron substrate and microbes at direct-push injection points, and monitoring CVOC concentrations at DNAPL-area and downgradient monitoring wells before and after injection. The emulsified oil will drive the Linn Gravel to anaerobic conditions and provide a source of organic substrate (i.e., electron donors). The microbes will mediate reductive dechlorination of CVOCs. Augmenting the approach taken during the injection work conducted in 2009, the strategy will be enhanced by the addition of zero valent iron, a strong reducing agent, which will create favorable aquifer conditions for contaminant-degrading bacteria as well as directly reacting with many chlorinated compounds. Work began in July 2022, monitoring well installation and baseline sampling was conducted in September 2022, and injection was conducted in October 2022. Performance monitoring and reporting will occur through 2024.

System Operations/Operation and Maintenance

The active extraction wells in the GETS (EW-2 and FW-5) are serviced quarterly throughout the year, at a minimum. This service includes flushing, cleaning, repairing, and/or replacing (if necessary) the flow meters and pumps.

In additional to the quarterly service, the following occurred to the GETS in 2021:

- Extraction well EW-2 was temporarily down between February 5 through March 26, 2021, due to a small plug in the line.
- The lines at operating extraction wells EW-2 and FW-5 were flushed in April 2021.
- The lines at non-operating extraction wells EW-1, EW-3, FW-1, FW-2, FW-3, and FW-4 were flushed in May 2021 so they remain operational if needed in the future.
- The pump at extraction well EW-2 was replaced in May 2021 due to a faulty check valve.
- Extraction well FW-5 was turned off on July 17, 2021, due to an annual ATI maintenance shutdown and was restarted on August 20, 2021.

Operable Unit 3 – Surface and Subsurface Soil

Basis for Taking Action

OU3 addresses the contamination in surface and subsurface soils. Surface and subsurface soils are contaminated with PCBs and radionuclides as well as other contaminants. The decay products of the radionuclides, gamma radiation and radon, are also present on the Site. Risks from industrial exposure to chemical and radionuclide contamination (excluding gamma radiation and radon) were generally low (EPA 1995). The remedial actions selected in the ROD were based on the industrial use. The remedial action for the Soil Amendment Area was based on industrial and farm worker scenarios.

Response Actions

EPA selected the Final Remedial Action for OU3 in a September 27, 1995 ROD (EPA 1995).

Following the risk assessment, the cleanup levels were established for surface gamma radiation in certain areas on the Main Plant, and for radon on the Main Plant based on industrial use and the Soil Amendment Area based on industrial and farm worker use. The established cleanup levels were a gamma radiation exposure level of 20 microroentgen (µrem)/hour above background. The indoor radon concentration of 4 picocuries (pCi)/liter is the selected action level. Action is required where measured levels, or appropriate modeling predicting radon concentration in future buildings, exceeds this level. A soil radium-226 concentration greater than 3 pCi/gram could result in a radon concentration in future buildings exceeding the 4 pCi/liter radon action level.

Site RAOs for soil in OU3 are as follows:

- Reduce the exposure to radon that would occur in future buildings constructed on the Main Plant and the Soil Amendment Area. Reduce surface gamma radiation exposure to acceptable levels (based on current risk assumptions, this level is 20 µrem/hour above background).
- Ensure that areas where surface and subsurface chemical risks that are acceptable based on industrial or agricultural use are not used for other purposes, and that proper handling and disposal of soil occurs when it is disturbed.
- Provide easily accessible information on the locations of the material for TWC plant workers, future Site purchasers, or regulatory agencies, where there are areas with subsurface contamination. This includes the PCB contamination in the Fabrication Area, and the residual radionuclide contamination in the Fabrication Area and Extraction Area.

The EPA-selected remedy combined source removal with ICs to reduce risk to human health and the environment posed by contamination in surface and subsurface soils at the Site. Remedial actions include:

- Excavation of contaminated material exceeding the gamma radiation action level of 20 µrem/hour above background levels. Transportation of the excavated material to an appropriate off-site facility for disposal.
- For areas of the Site where modeling indicates that radon concentrations in future buildings could exceed 4 pCi/liter, ICs require that future buildings be constructed using radon resistant construction methods.
- Requirement that information on areas of subsurface PCB and radionuclide contamination which do not pose a risk if they are not disturbed, be incorporated into the TWC facilities maintenance plan and be made available to future Site purchasers or regulatory agencies.
- Because the determination that action is not required for certain areas of the Site is based on scenarios which do not allow unrestricted use, should excavation occur as part of future development of the Main

Plant or the Soil Amendment Area, excavated material must be properly handled and disposed of in accordance with federal and state laws.

- ICs requiring that land use remain consistent with current industrial zoning (See Table 2).

EPA amended the soil remedy with a September 28, 2001, ESD (EPA 2001a). This amendment did not change the RAOs. The amendment includes:

- Change 1: TWC will conduct Final Site closure for radionuclides pursuant to TWC's Oregon Radioactive Materials License (Broad Scope Naturally Occurring Radioactive Material License) and the Energy Facility Siting Council (EFSC) Administrative Rules, Chapter 345, Division 50.

- Change 2: TWC will control on-site surface gamma emissions through in-place management of contamination. Prior to Site decommissioning under Oregon Health Authority (OHA) and EFSC, TWC must keep surface gamma emissions below cleanup levels through in-place management under an EPA- and ODEQ-approved management plan, and additional excavation of contamination as part of on-going excavation occurring during on-site construction.

- Change 3: If the Site is not decommissioned under OHA and EFSC to EPA's cleanup requirements, radiation management shall be a condition of property transfer to ensure that these controls remain protective. Any partial or complete property transfer by TWC shall be conditioned on implementation and maintenance of an appropriate EPA- and ODEQ-approved radiation management program.

- Change 4: Excavation and either engineered berms or off-site disposal are acceptable remedies for the Soil Amendment Area if ICs cannot be implemented.

The EPA, ODEQ, and City of Millersburg signed a Consent Decree on March 27, 2006 that contains a Scope of Work (SOW) for Implementation of Soil Amendment Area Remedy (EPA et al., 2006). The SOW includes the following:

- Radon. The SOW references EPA's cleanup level of 4 pCi/liter for radon in indoor air if buildings are constructed in the Soil Amendment Area and requires future construction activities to decrease worker exposure below the 4 pCi/liter cleanup level.

- Alternatives to Addressing Radium:

    - Option 1: Radon-Resistant Construction Methods. Includes using radon-resistant construction methods outlined in the SOW, and to monitor indoor air quality.

    - Option 2: Excavation of Contaminated Soil. Contaminated soils could be excavated as outlined in the SOW. Sampling must follow the Multi-Agency Radiation Survey and Site Investigation Manual (DOD et al., 2000).

    - Option 3: Modeling for Certain Buildings. Buildings that are not appropriate for radon controls (e.g., park structures, open-sided sheds) can use estimated indoor radon concentrations and EPA-approved methods to demonstrate that radon levels will be less than the indoor air cleanup level.

Status of Implementation

Schmidt Lake - The Schmidt Lake Excavation Project, conducted in December 1992, removed 2,016 cubic yards of materials containing zircon sands with elevated levels of thorium and uranium and transported to the US Ecology low-level radioactive waste site in Washington for disposal. Surface gamma radiation exceeded the Site cleanup level requiring the additional removal of 12 to 15 cubic yards of soil from Schmidt Lake in 1998. The area was excavated and lined in 2010 (CH2M HILL, 1998; GSI, 2011b). Site cleanup levels have been met and no further excavation is anticipated.

Sand Unloading Area – In 1997, the Sand Unloading Area required removal of soil which exceeded surface gamma radiation cleanup levels. Excavation ceased when the northwestern edge of the material appeared to extend beneath a concrete slab in front of the mobile maintenance shop and under the shop itself, and when the northernmost end of the excavation would have interfered with on-site traffic with no evidence that the limit of contamination had been reached. The 1,890 cubic yards of soil was disposed at a permitted low-level radioactive waste facility. Most of the Sand Unloading Area is now overlain by TWC's natural gas-powered electricity-generating Co-Generation (CoGen) Plant that was constructed on a 14-inch-thick concrete slab in 2001. No further excavation is anticipated.

Front Parking Lot Area - TWC removed low-level, radioactive titanium dioxide sand from the Front Parking Lot Area. Samples of the sand indicated that radium-226 levels could cause radon concentrations in future buildings to exceed the action level of 4 pCi/L, thus requiring future buildings to be constructed with radon-resistant construction methods. A Certificate of Completion was issued for the Front Parking Lot in August 1999.

Soil Amendment Area - TWC obtained ODEQ solid waste permits in 1975 and 1976 for one-time applications of solids from the primary wastewater treatment plant. These were experimental soil amendments on the 40-acre Soil Amendment Area. The solids contained low levels of metals, radionuclides, and organic compounds. The RI/FS subsequently indicated that the radionuclide contamination in the Soil Amendment Area could result in an unacceptable risk from radon inhalation in any future buildings constructed on this area, and that organic compounds are above levels that would allow unrestricted use of the property. Between March 1989 and 1990, TWC conducted a property transfer and exchanged property with the City of Millersburg (City) through a deed agreement. The City acquired the 40-acre Soil Amendment Area, and TWC acquired property contiguous to its Farm Ponds Area. The City is currently responsible for fulfilling the obligations of the 2006 Consent Decree for remediation. During the last FYR, EPA required an evaluation of risks to agricultural workers from soil resuspension due to tilling.

ATI performed a gamma radiation scoping survey on behalf of the City in November 2021 following the EPA and ODEQ approved Work Plan (GSI, 2021f). The scoping survey performed in November 2021 found that 11 percent, or approximately 18,400 m2 (4.54 acres)of the Site had gamma radiation readings that met or slightly exceeded the Derived Concentration Guideline Level (DCGL) of 20 µrem/hour above background, or 33 µrem/hour. The Site's highest gamma radiation reading was 4 µrem/hour above the DCGL.

2019 Optimization Study

In 2019, EPA performed a Remedial Process Optimization Study through a third-party independent contractor and published an Optimization Review Report (EPA, 2019). The Optimization Review Report included an overview of the Site and several recommendations. The following optimization recommendations were implemented:

- Optimization recommendations completed:
    - The EISB performance monitoring period in the Former Crucible Cleaning Area (FCCA) ended in December 2020. An injection and performance summary report demonstrating significant reduction in the plume was submitted in June 2021 (GSI, 2021a).
    - A source area DNAPL assessment of the ASA was performed in July 2021, with a revised assessment report submitted in April 2022 (GSI, 2022c). In December 2021 ATI issued a request for proposals for remedial design implementation. GSI was selected and the Remedial Design Work Plan was finalized in August 2022. Implementation began in October 2022.
    - Multiple actions were taken in the Farm Ponds Area. A soil data gaps assessment for the Farm Ponds Parcels was performed, along with an incremental sampling methodology event in October 2021 (GSI, 2021e). The final Farm Ponds Parcels Site Characterization Data Evaluation was submitted in May 2022 (GSI, 2022d). Additionally, a gamma radiation scoping survey was conducted at the Soil Amendment Area in November 2021, with the findings submitted in April 2022 (GSI, 2022d). EPA and ODEQ are working with the City of Millersburg to prepare the Soil Amendment Area for potential transfer of ownership and redevelopment.
- Additional optimization action items continue to move forward but have not yet been completed. Several of the action items are discussed in the following sections and key recommendations that were implemented but not completed are provided below:
    - It was determined in 2021 that there were enough items to clarify in the OU2 ROD that an updated decision document should be drafted, including elimination of the 15-year time horizon to achieve cleanup standards, and addressing updated EPA maximum contaminant levels that affect cleanup levels. EPA, ODEQ, and ATI will continue to identify items to be included in the upcoming updated decision document in 2023, with the goal to draft it in early 2023.
    - Extraction wells FW-1, FW-2, FW-3, and FW-4 were shut down on June 9, 2020, with EPA and ODEQ's approval. Pilot test performance monitoring will continue through 2024.
    - Modifying the remedial approach in the FMA has continued through 2021. ATI shared an annotated outline for the monitored natural attenuation (MNA) Evaluation Statement of Work with EPA and ODEQ in December 2021. EPA provided comments in January 2022. The draft Work Plan is anticipated to be submitted in winter 2023 with a target to implement in summer 2023.
    - To address data reliability concerns at perimeter monitoring well PW-21A, EPA approved replacing the well with nearby existing well CW-3 in 2022. Well PW-21A will be decommissioned in spring of 2023.
    - In accordance with EPA's well attainment analysis guidance, ATI developed a restoration completeness evaluation (RCE) protocol to assess on a well-by-well basis whether COC concentrations in groundwater have been reduced to below cleanup levels and will remain below cleanup levels in the future. The SEA RCE was submitted in the 2020 annual report (GSI, 2021e), the Farm Ponds Parcels RCE was submitted in April 2022 (GSI, 2022f), and the draft Solids Area RCE was submitted in March 2022 (GSI, 2022e). The final RCE reports for the Solids Area, Extraction Area, and Fabrication Area are anticipated to be completed by Spring 2023.

- Transducers were installed in the ASA to monitor the groundwater divide for 1 year starting in April 2021 (GSI, 2021b). Transducers remain in place to evaluate potential seasonal shifts of the groundwater divide in the area.

- EPA, ODEQ, and ATI had multiple discussions throughout 2021 regarding decision logic flow charts that EPA drafted. Discussions for implementation will continue into 2023.

Institutional Control Summary Table

Institutional controls are required throughout the Site (Table 2). The ICs include government, proprietary, and enforcement controls which define and address land use through zoning, codes, deed restrictions, and other actions to ensure long-term protectiveness is maintained.

Table 2: Summary of ICs Implemented Across the Site

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Sludge	Yes	Yes	Finley Buttes Landfill (off-site)	Long term assurance that risks associated with contaminant migration from waste from OU1 will be minimal.	ODEQ Oregon Title V Operating Permit 25-0001-TV-01, February 22, 2010
Soil and Groundwater	Yes	Yes	Main Plant and Solids Area	Restrict access to portions of the affected groundwater which remain above cleanup levels to ensure that the property and groundwater are used only for purposes appropriate to the cleanup levels achieved.	Restrictive Covenants (April 18, 1991)
Soil and Groundwater	Yes	Yes	Solids Area	Prohibit residential and agricultural uses	Restrictive Covenants (April 18, 1991)
Soil	Yes	Yes	Main Plant	Prevent potential radon exposure	Plant Standards established and implemented by TWC
Soil and Groundwater	Yes	Yes	Main Plant and Farm Ponds Areas	Deed restrictions and ICs on land and groundwater use for both the main plant and Farm Ponds Area to ensure that the property and groundwater are used only for purposes appropriate to the cleanup levels achieved.	Deed Restriction (May 8, 1990) Check zoning Restrictive Covenant (April 18, 1991)
Groundwater	Yes	Yes	BNSF Railroad Company (West of Site)	Prevent installation or use of groundwater supply wells	Easement Agreement (April 9, 1999)

Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Impacted Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Groundwater	Yes	Yes	Simpson Timber Company (adjacent to Site)	Prevent installation or use of groundwater supply wells	Equitable Servitude and Easement Agreement (November 1998)
Groundwater	Yes	Yes	City of Albany (Adjacent to Site)	Prevent use of groundwater for potable purposes	Development Code Restrictions (Public Improvements 12.410)
Soil	Yes	Yes	Soil Amendment Area (City of Millersburg)	Prohibit residential development in the Soil Amendment Area and requires radon resistant construction methods and testing. Prevent use of groundwater for potable purposes	Environmental Protection Easement and Equitable Servitude Agreement (rerecorded December 14, 2007) The City of Millersburg Land Use Development Code Section 7.500
Soil	Yes	Yes	Main Plant	Establish protectiveness controls for radioactive materials remaining in areas by requiring decontamination to release the Site for unrestricted use upon permanently discontinuing manufacturing activities.	Broad Scope Radioactive Materials License (#ORE90001) for the facility
Soil	Yes	Yes	Farm Ponds Area – Parcel 105	Limit exposure to soil Parcel by zoning Parcel 105 for industrial use in perpetuity.	Deed Restriction is currently being processed by Linn County

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the Fifth FYR (Table 3) as well as the recommendations from the Fifth FYR and the current status of those recommendations (Tables 4 and 5).

Table 3: Protectiveness Determinations/Statements from the Fifth FYR

OU #	Protectiveness Determination	Protectiveness Statement
OU1	Protective	The remedy for OU1 is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.
OU2	Short-term Protective	The remedy at OU 2 currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup goals through on-site and off-site deed restrictions on groundwater use, zoning, and access controls, and the remedy is operating and making progress toward meeting the RAOs. However, for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness: • TWC must determine when and if ROD cleanup levels will be achieved and determine whether additional response actions are needed in order to achieve ROD cleanup levels. • TWC must evaluate groundwater monitoring data in the FCCA and recommend modifications to reduce contaminant concentration levels. • TWC must evaluate GETS and the current soil flushing regime and improve effectiveness. • Exceedances of cleanup levels identified during the 2016 sitewide monitoring event must be evaluated to determine if additional wells need to be added to the monitoring program, and if further measures need to be taken to address the exceedances of the ROD cleanup levels.
OU3	Short-term Protective	The remedy at OU 3 currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup levels. However, in order for the remedy to be protective in the long-term, air samples shall be collected during tilling in the Soil Amendment Area to reassess remaining levels of radionuclides and determine the risk to human health and the environment from the disturbance of soil.
Sitewide Protectiveness	Short-term Protective	The Site remedy currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup goals through on-site and off-site deed restrictions on groundwater use, zoning, and access controls, and the remedy is operating and making progress toward meeting the RAOs. However, in order for the remedy to be protective in the long-term, TWC must determine when and if ROD cleanup levels will be achieved and determine whether additional response actions are needed in order to achieve ROD cleanup levels. TWC must evaluate groundwater monitoring data in the FCCA and recommend modifications to reduce contaminant concentration levels and must evaluate GETS and the current soil flushing regime to improve effectiveness. Exceedances of cleanup levels identified during the 2016 sitewide monitoring event must be evaluated to determine if additional wells need to be added to the monitoring program, and if further measures need to be taken to address the exceedances of the ROD cleanup levels. Exceedances in perimeter monitoring wells must be addressed. Activity based air samples shall be collected and analyzed during tilling in the Soil Amendment Area to reassess remaining levels of radionuclides and determine if there is a risk to human health and the environment from the disturbance of soil.

Status of Recommendations from the Fifth FYR for OU1

There were no issues or recommendations for OU1 stated in the last FYR.

Status of Recommendations from the Fifth FYR for OU2

Issues and recommendations from the last FYR for OU2 are described in Table 4 along with the current status of those recommendations.

Table 4: **Status of Recommendations from the Fifth FYR for OU2**

OU 2	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	TWC completed source removal and chemical oxidation treatment in the ASA in 2016. Since some source material was left in place, and current hot-spots remain, the cleanup levels are not expected to be achieved by the time frame in the ROD.	TWC must determine when and if ROD cleanup levels will be achieved and determine whether additional response actions are needed in order to achieve ROD Cleanup levels.	Ongoing	ATI successfully performed an investigation in July 2021 to delineate the extent and nature of DNAPL in the Acid Sump Area. Furthermore, ATI began to implement a remedial effort in the Acid Sump Area in 2022; the associated final work plan was submitted to EPA in August 2022 and work was implemented in October 2022. The field implementation completion report is scheduled to be submitted by March 2023.	
2	TWC implemented EISB in the FCCA and while there have been reductions in contaminant levels, the trends are inconsistent. Areas of contamination still exceed the ROD cleanup levels.	TWC must evaluate groundwater monitoring data in the FCCA and recommend modifications to reduce contaminant concentration levels.	Ongoing	ATI performed an additional EISB string in August 2019 to address contaminant levels, with the performance monitoring period ending in December 2020. A summary report was submitted in June 2021, as well as the 2021 annual report in August 2022 showing COCs persist in several areas of the Main Plant. Monitoring and evaluation are on-going.	
3	Low pH conditions persist in the FMA that contribute to COCs above ROD cleanup levels. ROD cleanup levels will not likely be achieved in 2017.	TWC must evaluate GETS and the current soil flushing regime and improve effectiveness.	Ongoing	ATI will perform a monitored natural attenuation evaluation consistent with EPA guidance for radium in the FMA. An annotated outline of the work plan was discussed with EPA and ODEQ during the annual meeting in February 2022. Field implementation is anticipated to occur in Spring 2023.	
4	Results from the 2016 sitewide monitoring event noted concentrations of manganese, cyanide, arsenic, and radium	Exceedances must be evaluated to determine if additional wells need to be added to the monitoring	Ongoing	(1) All 2016 sitewide monitoring event exceedances have been resampled and results provided in the 2018 progress summaries. If the confirmation sample results were also above the ROD cleanup	

	226/228 that exceed ROD cleanup levels in wells not currently in the monitoring program. Of note are exceedance of radium 226-228 concentrations in groundwater from perimeter monitoring well PW-15AR.	program, and if further measures need to be taken to address the exceedances of the ROD cleanup levels.		level, constituents were added to the 2020 monitoring schedule submitted to EPA in January 2020. (2) The confirmation sample for radium - 226/228 at PW-15AR was below the combined radium cleanup level.	

Status of Recommendations from the Fifth FYR for OU3

Issues and recommendations from the last FYR for OU3 are described in Table 5 along with the status of those recommendations.

Table 5: Status of Recommendations from the Fifth FYR for OU3

OU 3	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	The last FYR noted that tilling for agricultural purposes was being conducted at the Soil Amendment Area. Although the RI/FS determined that agricultural practices did not pose a risk to human health or the environment, EPA is revisiting the issue since it has been more than 20 years since soil radionuclide data were collected and the original evaluation did not address risks to the agricultural workers from soil resuspension due to tilling.	TWC must collect and analyze air samples for radium at the next opportunity to measure the risk to human health and the environment from the disturbance/resuspension of soil and remaining levels of radionuclides in the soils. Since earlier testing did not demonstrate human health risk, the City may continue to use the property for agricultural activities. Following EPA's reassessment of the contaminated soils should there be an indication of human health risk to those exposed to these soils under current agricultural practices, EPA will share those results with the City of Millersburg and discuss appropriate actions for future use of the property.	Completed	A personal breathing zone sample was collected by ATI in September 2018 following OSHA-approved methods. Due to a lack of particulate recovery in the positive pressure cab, the laboratory was unable to analyze the sample or determine the level of risk. ATI performed a gamma radiation scoping survey on behalf of the City in November 2021 following the EPA and ODEQ approved Work Plan (GSI, 2021f). The scoping survey performed in November 2021 found that 11 percent, or approximately 18,400 m2 of the Site had gamma radiation readings that met or slightly exceeded the DCGL of 20 µrem/hour above background, or 33 µrem/hour. The Site's highest gamma radiation reading was 4 µrem/hour above the DCGL.	October 2022

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A public notice was made available in the Albany Democrat-Herald on 6/1/2022, stating that a review of the Teledyne Wah Chang Superfund Site was underway, and inviting the public to submit any comments to the EPA. A copy of this notice is included in Appendix C. EPA received no comments or inquiries from the public. The results of the review and the report will be made available on-line at: https://cumulis.epa.gov/supercpad/cursites/csitinfo.cfm?id=1000421.

During the FYR process, interviews were conducted to document any perceived problems or successes with the remedy that has been implemented to date. Interviews were conducted with the ODEQ, OHA, and the representatives of the City of Millersburg. Interview questionnaires are included as Appendix D. No concerns or issues were identified during the interview process.

Data Review

OU1 – Sludge Ponds

SCS Engineers conducts semiannual groundwater monitoring at the Finley Buttes Landfill monocell in Boardman, Oregon where excavated materials from the Sludge Ponds were disposed. Wells MW-4 and MW-5 are used to monitor upgradient and downgradient groundwater conditions, respectively. The EPA conducted a review of the most recent annual report of landfill monitoring (SCS Engineers 2022) and confirmed that trace metal results were not detected in the landfill monitoring wells above the established concentration limits in 2021.

Per ROD, O&M and monitoring are the responsibility of the disposal facility.

OU2 – Groundwater and Sediment

For OU2, since the last FYR, data was collected to monitor GETS operations, groundwater concentration trends, sediment, surface water, and uninvestigated areas. The following presents a summary of data and trends since the last FYR.

Groundwater Extraction Treatment System Operations

ATI is responsible for the O&M of the groundwater extraction systems in operation at the Fabrication Area and Extraction Area.

Since the GETS began operating, 111,350 to 2.3 million gallons of water a month have been pumped from the aquifer. The GETS is operating five extraction wells (FW-1, FW-2, FW-3, FW-4, FW-5) in the Fabrication Area and three extraction wells (EW-1, EW-2, EW-3) in the Extraction Area. In 2020, the four extraction wells (FW-1, FW-2, FW-3, FW-4) in the Fabrication Area were idled for a shutdown pilot test in June 2020 with EPA approval (GSI, 2022a).

The environmental benefit of extraction wells EW-1, EW-2, and EW-3 in the Extraction Area was reviewed as part of the FMA hydraulic test in the 2019 Millersburg Operations Progress Summary (GSI, 2020a). As discussed in that report, the results of the hydraulic tests indicate that pumping only EW-2 continuously provides the same or better radium mass removal relative to pumping EW-1, EW-2, and EW-3 together. As such, only EW-2 was left in operational in 2021 which is continuing. However, overall, very little mass is being removed using the system, and a total of only 3.92 x 10^{-8} pounds of radium was removed over the last 3 years. Further evaluation is warranted to develop recommendations for modifications to the remedial approach for the FMA (GSI, 2022a).

The GETS Fabrication Area Shutdown Pilot Test was conducted since the quantity of COC mass removed by extraction wells FW-1, FW-2, FW-3, and FW-4 in the Fabrication Area has diminished from the baseline quantities, as indicated by the COC concentrations measured in the extracted water. EPA questioned whether these four extraction wells were providing any environmental benefit and agreed with the Optimization Review Report recommendation that ATI consider a shutdown test (EPA, 2019). ATI submitted a Shutdown Pilot Test Work Plan in June 2020 (GSI, 2020b). With EPA and ODEQ approval, FW-1, FW-2, FW-3, and FW-4 were taken offline on June 9, 2020.

The capture zones for extraction wells FW-1 through FW-4 decreased significantly over time due to reduced extraction rates. The Shutdown Pilot Test Work Plan (GSI, 2020b) included the calculated capture zones for each extraction well. In 2019, wells FW-2, FW-3, and FW-4 had capture zones that did not extend beyond the immediate vicinity of the extraction wells. Using these same aquifer parameters to calculate seepage velocities for the Linn Gravel in these portions of the Site, groundwater would be expected to take less than 0.5 years to reach the monitoring points except near FW-3 (and associated monitoring wells PW-82A and PW-99A). In this portion of the Site, it would take between 0.6 to 0.9 years to see increases in COC concentrations due to the shutdown of well FW-3.

Year 2 of the work plan's performance monitoring period occurred in 2021, with two performance monitoring events coinciding with the routine spring and fall monitoring events. Additionally, Mann-Kendall trends were provided for COCs in monitoring wells with results within an order of magnitude of the associated cleanup level. In accordance with the work plan's objectives, CVOC and field parameter data will be used to develop multiple lines of evidence that MNA is degrading CVOCs in the vicinity of and downgradient to the extraction wells.

Almost all CVOCs within the performance monitoring well network show stable or decreasing trends. One monitoring well exhibited a probable increasing trend for cis-dichloroethene, but the maximum detected value is still less than half of the applicable cleanup level and is located near the center of the Main Plant. There were no potential property boundary threats identified in 2021.

Available mass removal data in the Fabrication Area since the last FYR are presented in Table 6.

Table 6: Mass Removal (gallons and pounds) from the Fabrication Area

	2017	2018	2019	2020	2021
Water Extracted (gallons)	874,732	1,289,576	741,301	210,778	91,207
VOCs removed (pounds)	1.9	3.5	5.9	1.6	0.8
Source: GSI 2018, GSI, 2019, GSI 2022a, GSI 2022a					

Groundwater pumped from the GETS is treated and processed in the Central Wastewater Treatment System; then, the water is discharged to the Publicly Owned Treatment Works. These activities are conducted in compliance with the Site Publicly Owned Treatment Works permit. Available mass removal data since the last FYR are presented in Table 7.

Table 7: Mass Removal (pounds) in the Feed Makeup Area

	2017	2018	2019	2020	2021
Water Extracted (gallons)	12,376	16,786	44,795	35,257	20,144
Fluoride	3	4.37	0	15	1,239
Ammonia	60	99.39	227	169	100
Radium 226	$2.57x10^{-9}$	$5.87\ x10^{-9}$	$2.08\ x10^{-8}$	$1.41\ x10^{-8}$	$3.78\ x10^{-9}$
Radium 228	$4.17x10^{-9}$	$1.99\ x10^{-8}$	$2.52\ x10^{-10}$	$1.90\ x10^{-10}$	$6.57\ x10^{-11}$
Total Dissolved Solids	1,582	4,863	12, 407	14,245	6,929
Source: GSI 2018, GSI, 2019, GSI 2022a					

Groundwater Monitoring

EPA obtained data through Spring 2021 from ATI (GSI, 2021g) and conducted an independent review of the data as part of this FYR, including preparing summary tables, included at the end of this document. The data tables used for this review are presented in Appendix E and trend charts are presented in Appendix F - labelled as follows:

Fabrication Area:	Tables A-1 through A-11; Figure F-1a through F-7
Extraction Area, FMA:	Tables B-1 and B-2; Figure F-8
Farm Ponds Area:	Tables D-1 and D-2
Solids Area:	Tables C-1 and C-2; Figure F-9
Surface Water:	Table F-1

A detailed discussion of contaminant concentrations by area, since the last FYR, follows this general summary of the highlights of the data review.

- Groundwater in the Fabrication Area continues to have contaminant concentrations of numerous COCs in excess of the ROD cleanup levels, especially chlorinated VOCs in the ASA, Material Recycle Area, and FCCA. Nitrates were detected in the ASA, FCCA, and ASSA. Ammonium persists in the Ammonium Sulfate Storage Area, as does fluoride in the FCCA and ASA. Excess arsenic concentrations were present in the FCCA and East Perimeter wells (Figure F-4 and F-6)

- Fluoride, radium-226/228, cadmium, pentachlorophenol, arsenic, beryllium, and nitrate were detected above ROD levels in the FMA, as were Vinyl Chloride (VC) and arsenic in the South Extraction Area (Figure F-8).

- CVOCs were detected in the Farm Ponds Area, however, only groundwater from monitoring well PW-104S (Figure 20) exhibited concentrations of COCs over the ROD cleanup levels (Table D-1).

- Groundwater results indicate concentrations at levels of concern for arsenic, radium-228, and cyanide were present in the Solids Area (Figure F-9)

Fabrication Area

The Fabrication Area is separated into specific areas of interest. The groundwater monitoring network in the Fabrication Area includes wells grouped in specific areas of interest across the Site; the ASA, Material Recycle Building, the Ammonium Sulfate Storage Building, the FCCA, and the Dump Master Building. The wells are further grouped into “Hot-Spot Area Wells”, “Non-Hot-Spot Area Wells”, and “Perimeter Wells.” Although the current concentrations may not correlate with the “hot-spot” and “non-hot-spot” designations, these historical names have been preserved for consistency with past documents. Additional wells were sampled in 2021 as part of the 2021 sitewide monitoring event.

Acid Sump Area

Results of sitewide sampling indicate the presence of CVOCs (Table A-3; Figure F-1a through F-1c) throughout the ASA. Concentrations of TCA, DCA, PCE, TCE, DCE, VC, fluoride, and nitrate were detected in groundwater in hot-spot area wells since the last FYR. Concentrations of DCE, VC, and fluoride also exceeded the MCL in the non-hot-spot area wells. Perimeter wells indicate MCL exceedances of DCE.

Fluctuations in TCA were detected at hot-spot area wells PW-13 and PW-98A (Figure F-1a). Fluctuations above MCL were observed at well PW-98A, with large fluctuations detected at well PW-13 between Fall 2018 and Fall 2021 and peaking during Fall 2020. DCA concentrations exceeded the MCL at well PW-13 during Fall 2020 but decreased below the MCL by Fall 2021. A spike in PCE was detected in well PW-13 in 2018 above the MCL with a decreasing trend to below the MCL by Spring 2021. Fluctuations above and below the MCL in well PW-98A persisted throughout the duration of the period and have remained above MCL since Fall 2020. No trends above the MCL were observed in non-hot-spot area or perimeter wells.

Fluctuations were detected in TCE concentrations in hot-spot area wells PW-12, PW-13, and PW-98, with PW-98 and PW-12 persisting above the MCL. Concentrations of DCE above and below the MCL were detected throughout the five-year period at wells E-11, PW-13, PW-90A, with PW-98A and PW-99A fluctuating above the MCL during the five-year period. A decreasing trend in VC was detected in well PW-98 but persisted above the MCL. An increasing trend in VC in well PW-12 above the MCL was observed between Fall 2019 through Fall 2021. DCE concentrations above the MCL were detected in non-hot-spot area well PW-84AR and peaked in Fall 2019, with a decreasing trend in fluctuations above and below the MCL through Fall 2021. A single spike in VC at non-hot-spot area well PW-80A above the MCL was detected in Spring 2018 with fluctuations at or below the MCL until Fall 2019. MCL exceedances of DCE at perimeter wells also persisted with a decreasing tend between Fall 2017 and Fall of 2021 at well PW-78A. A peak in VC was detected at perimeter well PW-79A above the MCL during Fall 2018, with no trends during the rest of the five-year period.

Fluctuations above the MCL at hot-spot area wells were detected for fluoride and nitrate with large fluctuations in nitrate measured in wells PW-98A and PW-13, with an overall decreasing trend from Spring 2018 to Fall 2021. Fluoride also persisted in non-hot-spot area well PW-10 and PW-16. No trends in fluoride or nitrate at perimeter wells were observed.

Additional assessment of the ASA was conducted in July 2021 in accordance with the EPA approved Revised Acid Sump Area Source Area Remedial Design Work Plan (GSI, 2021c) and the Acid Sump Area Source Area DNAPL Assessment Operations Plan (GSI, 2021d). The purpose of this investigation was to determine the nature and extent of DNAPL in the ASA and to determine the source of CVOCs detected in monitoring well PW-98A.

The highest TCA concentrations were observed on the northern side of the former excavation area located adjacent to the acid sump, and on the western side of the investigation area at boring AS6 where TCA concentrations were measured as high as 210,000 µg/L, exceeding 10 percent of TCA aqueous solubility (Figure 17). Free product was observed in groundwater samples using hydrophobic dye, even though DNAPL was not measured or purged at any of the temporary wells. Therefore, it was concluded that the DNAPL is present as dendritic accumulations and not as pooled material at the base of the Linn Gravel Formation. The largest accumulations of DNAPL were concentrated immediately adjacent to the acid sump and along the perimeter of the historic excavation area. This likely indicates that the bulk of source material was successfully removed during the excavation conducted in 2016.

The limits of the potential DNAPL source material in the ASA was delineated to 1 percent of the aqueous solubility of TCA (13,000 µg/L). The DNAPL material is limited to the ASA courtyard and encircles the former excavation area immediately south of the acid sump (Figure 18).

Groundwater data obtained as part of the assessment indicates that the source of CVOC impact is likely due to releases in the open storage area located southeast of well PW-98A. Concentrations of TCA were elevated adjacent to this storage area and declined to near detection limits at the upgradient edge of the storage area. Borings 98A5 and 98A6 were completed as wells TMW-10 and TMW-11, respectively, to evaluate conditions in this portion of the Site over time.

Material Recycle Area

The persistence of TCE, DCE, VC at hot-spot area wells were observed at the Material Recycle Area (Figure F-2a through F-2c). Large fluctuations were detected in TCE at well PW-42A which peaked in Fall 2019, with a decreasing trend above MCL thereafter. Concentrations of TCE in wells PW-85 and PW-86A fluctuated above and below the MCL. Hot-spot area wells exceeded the MCL for DCE at PW-85A and PW-42A, with a slight decreasing trend observed throughout the five-year period in PW-42A that peaked in Spring 2019, and an increasing trend in PW-85 which peaked in Fall 2021. Exceedance of MCL for VC was detected in well PW-86A during all fall measurements except Fall 2017. An increasing trend occurred in PW-42A during Fall measurements between Fall 2018 and Fall 2021. No trends were observed in non-hot-spot area or perimeter wells, except for DCE non-hot-spot area well PW-91A that peaked above MCL in Fall 2018, and an increasing trend in PW-75A at and above MCL from Spring 2020 through Fall 2021.

Ammonia Sulfate Storage Building

Fluctuations in TCE, DCE, VC, Nitrate, Fluoride, and Ammonium exceeded their corresponding MCLs in the Ammonia Sulfate Storage Area (Figure F-3a through F-3c). Fluctuations in TCE above the MCL were detected in Fall 2020 and Fall 2021 at hot-spot area well PW-03A. Hot-spot area well PW-01A fluctuated above and below the MCL for DCE between Fall 2017 until Fall 2019, Fall 2020, and Fall 2021, with a decreasing trend since Spring of 2018. A similar pattern existed with VC in hot-spot area well PW-01A, which increased from Fall 2017, peaked in 2018, and decreased in concentration through Fall of 2021. Well PW-01A peaked above MCL for fluoride and nitrate in Spring 2021. Ammonium concentrations exceeded the MCL at well PW-01A, peaked in Spring 2017 and showed a decreasing trend approaching the MCL by Fall 2021.

Peaks in non-hot-spot area wells were detected in TCE at wells PW-84AR and PW-89A. Although a peak above the MCL was detected at well PW-84AR in Fall 2019, concentrations have been falling since then although elevated for fall events from the beginning of the FYR period. Increasing concentrations in DCE in a non-hot-spot area well PW-84AR were detected from the Spring 2017 to the Fall 2019 and decreased until Fall 2021. Concentrations of fluoride persisted above the MCL at non-hot-spot area well PW-89A and peaked above the MCL in nitrate concentrations on Spring 2018 and Spring 2021.

Former Crucible Cleaning Area

Concentrations in TCA, PCE, TCE, DCE, VC, fluoride, and nitrate were detected in the FCCA (Figure F-4a through F-4c). Hot-spot area wells which exceeded the MCL for TCA include PW-94A, PW-100A, PW-95A, PW-69A, and PW-93A. A decreasing trend in well PW-94 was measured from Spring 2017 until Fall 2020 with concentrations increasing by Fall 2021. Hot-spot area wells fluctuated above and below the TCE MCL from Spring 2017 through Fall 2021, with exception of well PW-93A, which peaked in concentrations in the Fall 2020. Large fluctuations above MCL in DCE persisted throughout the five-year period for hot-spot area wells with the highest concentrations detected during the Fall 2019 in well PW-95A. Large fluctuations in VC persisted throughout the five-year period with a decreasing trend from Spring 2018 to below the MCL by Spring 2021 in well PW-100A. Fluoride persists in hot-spot area wells above the MCL since Fall 2017, with the exception of Well PW-71A and PW-100A which maintained concentrations below the MCL for the duration of the five-year period.

No concentrations above the MCL were detected in non-hot-spot area wells except for VC in well PW-101A in Spring 2018. Nitrate was detected above the MCL during Fall 2018, 2019, and 2020 in well PW-31A, and fluoride at well PW-72A in Fall 2021. Arsenic remained above MCL wells PW-69A, PW-93A, and PW-94A for all fall events beginning in Fall 2018.

Recycle Yard

Concentrations in TCA, TCE, DCE, and VC were detected in the Recycle Area (Figure F-5a through F-4c). A decreasing trend in TCA at hot-spot area well PW-30A was measured throughout the duration, peaking in Fall 2017 and then falling below the MCL in Fall 2021. Fluctuations in TCE were detected in hot-spot area well PW-42A, PW-85A, and PW-86A. A decreasing trend between Fall 2019 to Fall 2021 was detected in well PW-42A but exceeded MCL in Fall 2021 and Fall 2022. Concentrations in DCE remained above the MCL for all Fall events for hot-spot area well PW-42A, and large fluctuations above and below the MCL at well PW-85, with an increasing trend detected during Fall monitoring events from Fall 2018 through Fall 2021. Concentrations in VC peaked once above the MCL in hot-spot area well PW-73B during Spring 2018 with levels remaining below the MCL during other monitoring events.

No trends above the MCL were detected in non-hot-spot area wells in the Recycle Yard.

East Perimeter Area

Hot-spot area wells in the East Perimeter Area exhibited elevated concentrations of DCE and VC (Figure F-6). Hot-spot area wells which persisted above the MCL for DCE throughout the five-year period included MW-01A, which showed an increasing trend from Fall 2019 to Fall 2021. All hot-spot area wells fluctuated above MCL for DCE with all wells exceeding MCL in Fall 2020. Hot-spot area wells for VC showed large fluctuations for wells MW-02A and MW-01A, with well MW-04A fluctuating above, at, and below the MCL. Arsenic also exceeded MCL for well MW-02A during all fall events beginning in 2018. Well MW-03A fluctuated above and below MCL for all fall events beginning in 2018 (Figure F-6b).

Northern Perimeter Wells - Murder Creek

Concentrations above the MCL for Northern Perimeter wells were observed for DCE and VC (Figure F-7). Concentrations decreased but remained above MCL for DCE in well PW-78A and the other wells fluctuated near the MCL. Concentrations of VC peaked in Fall 2018 at well PW-77A but remained below the MCL for the five-year period.

Extraction Area

Arsenic, VC, radium-226/228, nitrate, beryllium, cadmium, and pentachlorophenol were detected in the Extraction Area during throughout the five-year period (Figure F-8).

Feed Makeup Area

Radium-226/228, nitrate, beryllium, cadmium, and pentachlorophenol persist in the Feed Makeup Area (Figure F-9). Fluctuations above the MCL in Radium-226/228 was detected in almost all wells, with the greatest concentrations persisting in PW-52A (radium-226) and PW-28A (radium-228) throughout the five-year period, with an exception for Fall 2018, when concentrations dropped to the MCL. Well PW-27A fluctuated above and below MCL over the FYR period, with large fluctuations in nitrate were detected in wells PW-51A and PW-21A over time with the maximum concentration occurring in PW-51A in Fall 2021. Concentrations of beryllium peaked in Fall 2018 in most wells but show a decreasing trend above MCL. Spring concentrations between 2018 and 2021are generally below the MCL except for well PW-28, which maintained concentrations above the MCL in all samples between 2018 and 2021. Cadmium concentrations also show a decreasing trend which peaked in Fall 2017 and have since returned to levels below the MCL. Pentachlorophenol was observed in well PW-50A, fluctuating since Fall 2018 and peaking in concentration in Fall 2021. Well EW-3 fluctuated around the MCL from Fall 2018 to Fall 2021 for pentachlorophenol.

South Extraction Area

Groundwater samples from the South Extraction Area exceeded the MCL for arsenic and VC (Figure 8). Well PW-96A showed levels of arsenic in excess of the MCL during Spring 2019, Fall 2020, and Fall 2021. Spikes in VC in well PW-22A were detected throughout the five-year period with measurements below the MCL during Fall 2017, Spring 2019 through Spring 2020, and Spring 2021.

Farm Ponds Area

The Farm Ponds Area monitoring events occurred in Spring 2017 through Spring 2021 (Table D-1). Winter event monitoring occurred in 2019 and 2022 (Table D-1). Concentrations exceeding cleanup levels were detected in only one well, PW-104S during the monitoring events. CVOC exceedances included PCE, TCE, 1,1,2-TCA, and 1,2-DCA. The peak concentration for PCE was detected in Winter 2019, while TCE concentrations exceeded cleanup levels for every event, peaked in Winter 2019 and decreased over time to Spring 2021. Concentrations for 1,1,2,2-TCA also were measured above the cleanup level for all monitoring events and peaked in Winter of 2019 then decreased through Spring 2021. Cleanup levels were exceeded for 1,2-DCA for each monitoring event but fluctuated closer to cleanup levels during the five-year time period.

Solids Area

In the Solids Area, arsenic, cyanide, and radium-228 fluctuated above the MCL since the previous FYR (Figure F-9). A decreasing trend in arsenic was detected between Fall 2018 to Fall 2021 for all fall events, except in well PWD-1 and PWE-1. Cyanide increased in concentration between Fall 2018 to Fall 2019 until it decreased below the MCL in Spring of 2021 in well PWF-1 and PWF-2. Radium-226 peaked in Fall 2018 in well PWB-3 then fluctuated near or below the MCL until Spring 2021, and well PWB-3 fluctuated at or above MCL in radium-228 from Fall 2018 until Spring 2021.

Surface Water and Sediment

Surface water samples are collected by ATI to the creeks, with samples collected upstream and downstream of the facility (Table E-1).

Murder Creek - VOCs were detected in the downstream surface water below ROD cleanup levels since the 2012 FYR at Murder Creek.

Truax Creek - VOCs were detected downstream below the ROD cleanup levels at Truax Creek since the previous FYR.

Environmental Evaluations of Uninvestigated Areas

ATI informally provided an initial arsenic and manganese background study to EPA and ODEQ in January 2021 using water supply well data from four to thirty miles from the Site as a starting point for discussing the study approach. Arsenic concentrations ranged from 0.09 to 20.5 µg/L. EPA made some suggestions regarding the background study, and ATI will complete and submit the report for review in 2023.

OU3 – Surface and Subsurface Soils

Soil Amendment Area Radium Sampling

Proposed redevelopment of the Soil Amendment Area required an assessment of in-situ gamma exposure rate, radium concentrations, and naturally occurring radioactive material leachability in 2021. Results of the analysis confirm that the radium concentrations are consistent with those observed in the EFSC’s pathway exempt materials determination. The data collected also verified that the Soil Amendment Area soils pass the leachability test, which was not the case at the time of the original pathway exemption determination of 1987 (Figures 22-23, ATI, 2022).

Farm Ponds Area

The Farm Ponds Parcels Site Characterization Incremental Sampling Methodology (ISM) sampling was performed in October 2021. Zirconium levels exceeding applicable EPA risk screening criteria were found at three parcels (DU-102 through DU-104), which include where the farm ponds were formerly located. Additionally, one ISM sample from DU-05 has zirconium which is slightly higher than the Regional Screening Level. Furthermore, a minor exceedance of Radium-226 was identified at one of the former pond locations (DU-102). All other analyzed parameters were below applicable ODEQ and EPA screening criteria.

Site Inspection

The Site inspection was conducted on 10/3/2022. In attendance were RPM Chan Pongkhamsing (lead agency), Charles D. Clabaugh, and Kathleen Peshek of EPA, Region 10; Dave Nazy of EA Engineering, Science, and Technology, Inc., PBC (contractor for EPA, Region 10); Michael Riley, Noel Mak and Tory Alexander of ATI (representing the PRP); and Renee Fowler of GSI (contractor for ATI overseeing Site monitoring activities). The purpose of the inspection was to assess the protectiveness of the remedy. A Site inspection form is included in Appendix D.

The Site visit included observations of the Recycle Yard, SEA treatment area, the FMA treatment area, Truax Creek, the soils storage area, Cell 3, Solids Area, Murder Creek (and associated sampling locations), ASA, Materials Storage Area, and the Farm Ponds Area. No issues were noted.

During the Site inspection, extraction wells were observed to be operating as expected. Treatment systems appeared to be well maintained and spare parts were observed. Totalizers were functioning and metered treatment equipment was observed treating water prior to pumping for additional treatment. Inspection logs and Site access control logs were observed.

Several color-coded drums were present in the Recycle Yard that contained products to be recycled. Overall, the Site appeared to be clean and well-organized. All stormwater is captured and returned to the on-site wastewater treatment plant before discharge to Murder Creek. Pumps and a storage tank were observed at the Murder Creek outfall to be used in case any product is detected in the discharge, which is sampled every four hours.

Several of the flush-completed wells in the monitoring well system were observed to be in good condition. ATI manufactures steel caps to cover flush-completed wells in areas of high traffic. All wells with above ground completions were found to be labeled, locked, capped, and protected with yellow-painted barrier posts. Inside the protective casing nearly all wells were found to have marked measurement points.

The excavation procedure was available and included required excavation controls and procedures to address potentially contaminated areas.

V. TECHNICAL ASSESSMENT

Technical Assessment of OU1

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

EPA issued a Certification of Completion for OU1 RA to TWC on June 30, 1993 (EPA 1993). The RA for OU1 is considered complete. A review of the most recent annual report of landfill monitoring (SCS Engineers 2022) confirmed that trace metals were not detected in the landfill monitoring wells above the concentration limits established in 2021.

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

There are no changes to the exposure assumptions, toxicity data, cleanup levels, and RAOs that would bring the selected remedy into question.

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 would call into question the protectiveness of the remedy.

Technical Assessment of OU2

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

EPA has determined that the remedy in OU2 is functioning as intended by the decision documents by preventing exposure to Site contaminants, however, the cleanup levels have not been met in the expected 15-year cleanup period from the time of completion of GETS. Institutional controls are in place and effectively preventing unacceptable exposures.

Specific concerns identified during the data review include:

- Removal of mass from the system is currently inadequate and requires further evaluation to develop recommendations for modifications in the FMA, especially for radium-226/228.
- A probable increasing trend for cis-dichlorothene is exhibited in one monitoring well near the main plant.
- The continued presence of DNAPL in the ASA.
- A TCE source area is present within the ACA courtyard.
- Arsenic presence in the FCCA requires investigation.
- Remaining COCs in the South Extraction Area (VC, fluoride, and arsenic) are still in the remediation monitoring phase and will be addressed using MNA.

Progress is being made toward cleanup, as noted below:

- The GETS is functioning; however, enhancements will be needed to accelerate cleanup in the FMA. A round of EISB injections occurred in the FCCA in August 2019 to address TCA, TCE and daughter compound concentrations. However, there continue to be exceedances of the cleanup levels in this area and additional assessment/actions may be needed.

- An investigation to determine the nature and extent of DNAPL and source area for CVOCs detected in monitoring well PW-98A was completed in July 2021 and it was determined that the source of CVOCs is likely releases in the open storage area located southeast of well PW-98A. Concentrations of TCA were elevated adjacent to this storage area and declined to near detection limits at the upgradient edge of the storage area. Two borings were completed as wells TMW-10 and TMW-11 to evaluate conditions in this portion of the Site over time.

- EISB remedial actions to address DNAPL in the ASA were started in July 2022. Injection was conducted in October 2022 and performance monitoring and reporting will occur through 2024.

- As discussed in the data review section, cleanup goals have been met in the SEA.

- No exceedances of cleanup levels in non-hot-spot area wells in the Material Recycle Area were observed in this five-year review period.

- COCs in the Recycle Yard and East Perimeter Area include CVOCs and arsenic. The historical use of MNA has been addressing COCs in the East Perimeter Area, with MNA being used in the Recycle Yard since 2020.

- Discharges to surface water from the Site do not exceed federal or state water quality standards for aquatic receptors, however, there have been exceedance of the MCLs in some of the Fabrication Area perimeter monitoring wells (Table G-2b; Table G-6b).

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

There have been no physical changes to the site that would adversely affect the protectiveness of the remedy.

Previous FYRs noted that the manganese human health water quality criterion has been removed, and the arsenic human health water quality criterion has been revised to 2.1 µg/L.

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 would call into question the protectiveness of the remedy.

Technical Assessment of OU3

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

The remedy is functioning as intended by the decision documents. Final Site closure for radionuclides will be conducted pursuant to ATI's Oregon Radioactive Materials License and the EFSC Administrative Rules. This work will be conducted under the oversight of the OHA and in consultation with ODEQ and EPA. Currently, Site safety is in place through ATI's radiation management programs. A deed restriction application has been submitted to Linn County to maintain industrial zoning in perpetuity on Parcel 105 of the Farm Ponds Area.

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

There have been no changes to the exposure assumptions, toxicity data, cleanup levels, and RAOs that would affect the remedy for the soils OU since the last FYR.

At the Soil Amendment Area, the City of Millersburg 2006 Consent Decree expanded remedy alternatives to include excavation of radium contaminated soil for off-site disposal or creating on-site berms. EPA, ODEQ, and the City of Millersburg are currently in discussions on redevelopment proposals for the Soil Amendment Area. Since the last gamma radiation survey hasn't been conducted since 1995, ATI conducted a gamma radiation scoping survey of the surface soils in November 2021. The survey concluded that only 11% of the Soil Amendment Area had gamma radiation readings that met or slightly exceeded the EPA cleanup level of 20 µrem/hr over background level of 12.5 µrem/hr. Furthermore, the ODOE confirmed through a June 16, 2022 letter that the soils at the Soil Amendment Area do not meet the definition of radioactive wastes.

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 would call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
Operable Unit 1

<table>
<tr><th colspan="5">Issues and Recommendations Identified in the Five-Year Review:</th></tr>
<tr><td rowspan="3">OU(s): OU2</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: ATI implemented EISB in the FCCA, but areas of contamination still exceed the ROD cleanup levels.</td></tr>
<tr><td colspan="4">Recommendation: ATI must continue to collect and evaluate groundwater monitoring data in the FCCA and recommend modifications to on-going remedial actions to reduce contaminant concentration levels and meet CULs.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA</td><td>12/19/2026</td></tr>
</table>

<table>
<tr><th colspan="5">Issues and Recommendations Identified in the Five-Year Review (continued)</th></tr>
<tr><td rowspan="3">OU(s): OU2</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: Groundwater quality data indicates DNAPL in the Acid Sump Area persists, and likely limited to the Acid Sump Area courtyard and due to releases in the open storage area.</td></tr>
<tr><td colspan="4">Recommendation: ATI must provide an evaluation of exceedances to EPA to determine if additional wells need to be added to the monitoring program, and if further measures need to be taken.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA</td><td>12/19/2026</td></tr>
</table>

<table>
<tr><th colspan="5">Issues and Recommendations Identified in the Five-Year Review (continued)</th></tr>
<tr><td rowspan="3">OU(s): OU2</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: The 15-Year Time Horizon to Achieve Cleanup Standards in the ROD has expired and an assessment of modifications of the remedial alternatives meet CULs in a reasonable time frame needs to be completed.</td></tr>
<tr><td colspan="4">Recommendation: Evaluate projected timeline to meet RAOs based on assessment of potential modification of the remedial alternatives. Document changes to the remedy in a decision document.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>EPA</td><td>EPA</td><td>12/19/2026</td></tr>
</table>

<table>
<tr><th colspan="5">Issues and Recommendations Identified in the Five-Year Review (continued)</th></tr>
<tr><td rowspan="3">OU(s): OU2</td><td colspan="4">Issue Category: Changed Site Conditions</td></tr>
<tr><td colspan="4">Issue: ATI provided a sitewide map showing applicable regulatory limits for each property boundary. Down-gradient property lines were shown as being subject to AWQC based on aquatic receptors or human health and fish consumption, however decision documents are not clear as to whether MCLs or AWQC should apply.</td></tr>
<tr><td colspan="4">Recommendation: Evaluate modification to remedy to clarify the RAO and applicable cleanup levels and prevent migration of contaminated groundwater to surface water.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>EPA</td><td>EPA</td><td>12/19/2026</td></tr>
</table>

<table>
<tr><th colspan="5">Issues and Recommendations Identified in the Five-Year Review (continued)</th></tr>
<tr><td rowspan="3">OU(s): OU2</td><td colspan="4">Issue Category: Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: Pump & Treat will not be a management approach going forward unless it (1) is part of a specific source remediation, (2) is providing sufficient mass removal, or (3) is required for hydraulic containment to prevent exceedance of AWQC at the property perimeter. Select areas of concern will be addressed on a case-by-case basis. ATI will implement actions to address source areas and move to a sitewide monitored natural attenuation (MNA) approach.</td></tr>
<tr><td colspan="4">Recommendation: Focus activities on identifying and eliminating as much remaining source material as possible. Additionally, P&T should generally not be a priority as a management approach unless it is part of a specific source remediation, provides beneficial mass removal, or is required for hydraulic containment at the property perimeter.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA</td><td>12/19/2026</td></tr>
</table>

<table>
<tr><th colspan="5">Issues and Recommendations Identified in the Five-Year Review (continued)</th></tr>
<tr><td rowspan="3">OU(s): OU2</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: Following hydraulic testing in the FMA in 2019 ATI modified the CSM. ATI seeks a significant modification of the remedial action in the FMA. It includes termination of the current soil flushing approach and replacing the current approach with a recirculation system. An updated FMA CSM was discussed with EPA in the Second Quarter 2021 meeting. A Focused Feasibility Study (FFS) Work Plan and implementation were identified as the next steps. ATI submitted an MNA Evaluation annotated outline to EPA in December 2021.</td></tr>
<tr><td colspan="4">Recommendation: ATI must incorporate EPA's review comments on the MNA Evaluation Work Plan's annotated outline and implement the work plan in summer 2023. ATI must incorporate the findings of the MNA Evaluation into a subsequent FFS.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA</td><td>12/19/2023</td></tr>
</table>

<table>
<tr><th colspan="5">Issues and Recommendations Identified in the Five-Year Review (continued)</th></tr>
<tr><td rowspan="3">OU(s): OU2</td><td colspan="4">Issue Category: Remedy Performance</td></tr>
<tr><td colspan="4">Issue: Environmental benefits provided by extraction at pumping wells FW-1, FW-2, FW-3, and FW-4 may be limited. ICs are in place prevent human exposure, and no additional protectiveness is provided by pumping at these wells. In conjunction with continued efforts to characterize and remediate sources, “shutdown tests" were conducted to assess changes in water quality without extraction. EPA and ODEQ's approved the revised Work Plan, and extraction wells FW-1, FW-2, FW-3, and FW-4 were shut down on June 9, 2020.</td></tr>
<tr><td colspan="4">Recommendation: Performance monitoring described in the Fabrication Area Extraction Well Shutdown Pilot Test Work Plan must continue through 2024. Results from the ongoing performance monitoring will be discussed in the annual progress summaries and adjustments to groundwater monitoring and operation of extraction wells will be modified if appropriate to achieve cleanup levels.</td></tr>
<tr><td>Affect Current Protectiveness</td><td>Affect Future Protectiveness</td><td>Party Responsible</td><td>Oversight Party</td><td>Milestone Date</td></tr>
<tr><td>No</td><td>Yes</td><td>PRP</td><td>EPA</td><td>12/19/2026</td></tr>
</table>

Other Findings

In addition, the following are recommendations that were identified during the FYR and may improve performance of the remedy, but do not affect current and/or future protectiveness:

- **Issue:** Second Lake – collection of porewater samples along Second Lake will verify that VC is not impacting the lake above AWQC. The VC exceedance at monitoring well PW-22A justifies further investigation.

- **Issue:** Arsenic and manganese – high concentrations of arsenic and manganese, up to four to five times above the MCL in PW-94A in the FCCA, were measured in groundwater during this review period throughout the Site, justifying further monitoring and investigation. After discussing their review of offsite data with EPA and ODEQ, ATI will complete a background study to evaluate the range of naturally occurring arsenic and manganese in groundwater.

- **Issue:** Farm Ponds Area Partial Deletion Justification - one ISM sample from Parcel 105 detected zirconium that was slightly higher than the Regional Screening Level. A deed restriction for industrial zoning in perpetuity is required to be recorded with Linn County in order to proceed with partial deletion.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)

Operable Unit:	*Protectiveness Determination:*
OU1	Protective

Protectiveness Statement:

The remedy for OU1 is protective of human health and the environment, and exposure pathways that could result in unacceptable risks are being controlled.

Operable Unit:	*Protectiveness Determination:*
OU2	Short-term Protective

Protectiveness Statement:

The remedy at OU 2 currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup goals through on-site and off-site deed restrictions on groundwater use, zoning, and access controls, and the remedy is operating and making progress toward meeting the RAOs. However, for the remedy to be protective in the long-term, the following actions need to be taken to ensure protectiveness:

- EISB remedial actions to address DNAPL in the ASA were started in July 2022. Injection was conducted in October 2022 and performance monitoring and reporting will occur through 2024.
- EPA will determine whether additional response actions are need to meet cleanup goals identified in the ROD based on ATIs evaluation. ATI must evaluate groundwater monitoring data in the FCCA and recommend modifications to reduce contaminant concentration levels.
- ATI must evaluate GETS and the current soil flushing regime and improve effectiveness.
- Exceedances of cleanup levels identified during the 2021 sitewide monitoring event must be evaluated to determine if additional wells need to be added to the monitoring program, and if further measures need to be taken to address the exceedances of the ROD cleanup levels.

Operable Unit:	*Protectiveness Determination:*
OU3	Short-term Protective

Protectiveness Statement:

The remedy at OU 3 currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup levels. However, in order for the remedy to be protective in the long-term, additional deed restriction to zone Parcel 105 of the Farm Ponds Area for industrial use in perpetuity is required for partial deletion justification.

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The Site remedy currently protects human health and the environment because ICs are in place preventing exposure to contaminants of concern above cleanup goals through on-site and off-site deed restrictions on groundwater use, zoning, and access controls. The remedy is operating and making progress toward meeting the RAOs, surface and groundwater monitoring is continuing, and recommended actions identified in the 2019 Optimization Report have been planned, completed, or are in progress. However, in order for the remedy to be protective in the long-term, EPA will determine whether additional response actions are needed to achieve ROD cleanup levels based on the ATI evaluation. ATI must continue to evaluate groundwater monitoring data in the FCCA and ASA and recommend modifications to reduce contaminant concentration levels and must continue to operate and evaluate GETS and the current soil flushing regime to improve effectiveness. Exceedances of cleanup levels identified during 2021 sitewide monitoring must be evaluated to determine adequacy of the monitoring program, and if further measures need to be taken to address any data gaps and exceedances of the ROD cleanup levels. Exceedances in perimeter monitoring wells must be addressed.

VIII. NEXT REVIEW

The next FYR for the Teledyne Wah Chang Superfund Site is required 5 years from the completion date of this review.

REFERENCE LIST

ATI 2014. Wah Chang Facility Biennial Report of Environmental Evaluations: January 2012 - December 2013. September 2014.

ATI 2015a. *Results of Buildings 73 and 198 Testing.* Memorandum from Noel Mak to Ravi Sanga, U.S. EPA Region 10, June 1.

ATI 2015b. Letter from Noel Mak, ATI, to Ravi Sanga, EPA Region 10. *Extraction Area Groundwater Year 2014 Remedial Action Progress Summary-Response to EPA Comments.* 18 December.

ATI 2016a. Quality Assurance Project Plan for Site-Wide Remedial Actions. March 2016.

ATI 2016b. Wah Chang RFI Bimonthly Progress Report and for March and April 2016. May 6, 2016.

ATI 2016c. Wah Chang May through June 2016 Bimonthly Progress Report, Consent Decree Requirement, Section 10, Paragraph 30. July 11, 2016.

ATI 2016d. Wah Chang September through October 2016 Bimonthly Progress Report, Consent Decree Requirement, Section 10, Paragraph 30. November 9, 2016.

ATI 2016f. ATI Millersburg Operations Facility Biennial Report of Environmental Evaluations: January 2014-December 2015. September 2016.

ATI 2016g. Wah Chang RFI Bimonthly Progress Report for May and June 2016. July 11, 2016.

ATI 2022. Final 2022 Water Monitoring Schedule and Second Lake Porewater Sampling. Prepared by ATI. June 2022.

CH2M HILL 1998. Groundwater Remedial Design Report/Remedial Action Report Work Plan for the Wah Chang Facility—Farm Ponds Area. Prepared for Oremet-Wah Chang. Prepared by CH2M HILL. December 1998.

CH2M Hill 2002. 2002 Truax Creek Sediment Remedial Action Confirmation Sampling Report. September 30, 2002.

CH2M Hill 2003. Solids Area Groundwater Three-Year Review. Prepared by CH2M HILL. August 2003.

CH2M Hill 2006. Addendum to Wah Chang Fabrication Area Groundwater Remedy 3-Year Evaluation, Wah Chang, Albany, Oregon. Prepared by CH2M Hill, Corvallis, Oregon. August 2006.

CH2M Hill 2007. Fabrication Area Groundwater 2006 Remedial Action Progress Report, Wah Chang, Albany, Oregon. Prepared by CH2M Hill, Corvallis, Oregon. February 2007.

DOD et al. 2000. Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM). Revision 1. Prepared by the U.S. Department of Defense (DOD), U.S. Department of Energy (DOE), U.S. Environmental Protection Agency (EPA), and U.S. Nuclear Regulatory Commission (NRC). Report Numbers: NUREG-1575, Rev.1; EPA-402-R-97-016, Rev. 1; and DOE/EH-0624, Rev. 1. August 2000.

U.S. Environmental Protection Agency (EPA) 1986. Guidelines for Groundwater Classification under the EPA Groundwater Protection Strategy.

EPA 1989. Record of Decision, Decision Summary and Responsiveness Summary for Interim Response Action, Teledyne Wah Chang Albany Superfund Site, Operable Unit #1 Sludge Pond Units, Albany, Oregon. Prepared by the United States Environmental Protection Agency. June 10, 1994.

EPA 1993. Certificate of Completion for Operable Unit 1.

EPA 1994. Record of Decision, Declaration, Decision Summary and Responsiveness Summary for Final Remedial Action of Groundwater and Sediments Operable Unit, Teledyne Wah Chang Albany Superfund Site, Millersburg, Oregon. Prepared by the United States Environmental Protection Agency. June 10, 1994.

EPA 1995. Record of Decision for Surface and Subsurface Soil Operable Unit, Teledyne Wah Chang Albany Superfund Site, Millersburg, Oregon. Prepared by the United States Environmental Protection Agency. September 27, 1995.

EPA 1996a. Scope of Work for Remedial Design/Remedial Action, Groundwater, Sediment, Surface Soil and Subsurface Soil. September 19, 1996.

EPA 1996b. Explanation of Significant Differences from the June 10, 1994 ROD for Final Remedial Action of Groundwater and Sediment Operable Unit. Prepared by the United States Environmental Protection Agency. October 8, 1996.

EPA 2001a. Explanation of Significant Differences to the September 27, 1995 Record of Decision for Surface and Subsurface Soil Operable Unit, Teledyne Wah Chang Albany Superfund Site, Millersburg, Oregon. Prepared by the United States Environmental Protection Agency. September 28, 2001.

EPA 2001b. Comprehensive Five-Year Review Guidance. EPA 540-R-01-007. Prepared by United States Environmental Protection Agency, Office of Emergency and Remedial Response. June 2001.

EPA 2008. Third Five Year Review Report for the Teledyne Wah Chang Superfund Site. Prepared by the U.S. EPA. Region 10. January 8, 2008.

EPA 2009. Explanation of Significant Differences to the June 10, 1994 Record of Decision for Final Remedial Action of Groundwater and Sediments Operable Unit, Teledyne Wah Chang Albany Superfund Site, Millersburg, Albany. Prepared by the United States Environmental Protection Agency. June 19, 2009.

EPA 2011. EPA’s Approval of New and Revised Human Health Water Quality Criteria for Toxics and Implementation Provisions in Oregon’s Water Quality Standards Submitted on July 12 and 21, 2011. October 17, 2011.

EPA 2012a. Fourth Five-Year Review Report for the Teledyne Wah Chang Superfund Site. Prepared by the U.S. EPA. Region 10. December 28, 2012.

EPA 2012b. Addendum - Third Five Year Review Report, Teledyne Wah Chang Superfund Site. Prepared by the U.S. EPA. Region 10. March 28, 2012.

EPA 2013. Explanation of Significant Differences to the June 10, 1994 Record of Decision for Final Remedial Action of Groundwater and Sediments Operable Unit, Teledyne Wah Chang Albany Superfund Site, Millersburg, Albany. Prepared by the United States Environmental Protection Agency. April 25, 2013.

EPA 2016. US EPA Comments- Extraction Area Groundwater Year 2015 Remedial Action Progress Summary, Extraction Area, Groundwater and Sediments OU 2, Teledyne Wah Chang Superfund Site, Albany, Oregon. December 12, 2016.

EPA 2017. Regional Screening Levels (RSLs) - Generic Tables (May 2016). https://www.epa.gov/risk/regional-screening-levels-rsls-generic-tables-may-2016. Viewed 4/28/2017.

EPA 2019 Optimization Review. Teledyne Wah Chang Superfund Site. Final Report. Prepared by the United States Environmental Protection Agency. November 25, 2019.

GSI 2011a. Acid Sump Source Area Enhanced In Situ Bioremediation Project and Performance Summary. Prepared by GSI Water Solutions, Inc. (GSI). September 2011.

GSI 2011b. Solids Area Groundwater Data Summary – Year 2010. Prepared by GSI Water Solutions, Inc. (GSI). February 2011.

GSI 2011c. EISB Pilot Test Summary, South Extraction Area, ATI Wah Chang Facility, Albany, Oregon. Prepared by GSI Water Solutions, Inc. (GSI). August 2011.

GSI 2012. Fabrication Area Groundwater Year 2011 Remedial Action Progress Report. November 30, 2012.

GSI 2013a. Former Crucible Cleaning Area Enhanced In Situ Bioremediation Project and Performance. March 13, 2013.

GSI 2013b. Farm Ponds Area Groundwater Data Summary – Year 2012. Prepared by GSI Water Solutions, Inc. (GSI). September 2013.

GSI 2013c. Wah Chang Farm Ponds Area Groundwater Data Summary - Year 2012. September 21, 2013.

GSI 2014a. Addendum to the Farm Ponds Area Groundwater Data Summary – Year 2012. Prepared by GSI Water Solutions, Inc. (GSI). January 2014.

GSI 2014b. Truax Creek Sediment Sampling and Analysis Plan – Updated. July 15, 2014.

GSI 2015a. Extraction Area Groundwater Year 2012-2013 Remedial Action Progress Summary. June 15, 2015.

GSI 2015b. Farm Ponds Phase 2 Work Plan. April 24, 2015. Revised July 9, 2015.

GSI 2015c. Fabrication Area Groundwater Years 2012 and 2013 Remedial Action Progress Report. July 15, 2015

GSI 2015d. Extraction Area Groundwater Year 2014 Remedial Action Progress Summary. September 15, 2015.

GSI 2015e. Feed Makeup Area Groundwater Soil Flushing Project and Performance Summary. Prepared by GSI Water Solutions, Inc. (GSI). October 2015.

GSI 2015f. Fabrication Area Groundwater Years 2014 Remedial Action Progress Summary. October 15, 2015.

GSI 2015g. RCRA SWMU MTLG089OT01, Deep Hole Boring Machine Porewater Sampling Results. November 13, 2015.

GSI 2015h. Truax Creek Sediment Sampling Results – 2015. November 20, 2015.

GSI 2015i. Wah Chang Farm Ponds Area Groundwater Data Summary – Year 2014. May 29, 2015.

GSI 2015j. Wah Chang Solids Area, Groundwater Remedial Action Progress Summary – Year 2014. May 29, 2015.

GSI 2016a. Farm Ponds Area, Phase 2 Well Installations – August 2015. March 29, 2016.

GSI 2016b. PW-30A Conversion to Groundwater Extraction Well – Fabrication Area. September 30, 2016.

GSI 2016c. Feed Makeup Area Groundwater Extraction System – Proposed Operational Modifications to Accelerate Attainment of Cleanup Levels at EW-2 and PW-28A. December 29, 2016.

GSI 2016d. Fabrication Area Groundwater Year 2015 Remedial Action Progress Summary. October 18, 2016.

GSI 2016e. Extraction Area Groundwater Year 2015 Remedial Action Progress Summary. November 2, 2016.

GSI 2017a. Sitewide Groundwater and Surface Water Sampling Results – 2016. March 2017.

GSI 2017b. Acid Sump Area, Source Area Removal Construction Report. February 14, 2017.

GSI 2018. Extraction Area Groundwater Remedial Action Progress Summary – Year 2016-2017. December 19, 2018.

GSI 2019. Extraction Area Groundwater Remedial Action Progress Summary – Year 2018. March 29, 2019.

GSI 2020a. Millersburg Operations Groundwater Remedial Action Progress Summary – Year 2019. Prepared by GSI Water Solutions, Inc. (GSI). March 2020.

GSI 2020b. Fabrication Area Extraction Well Shutdown Pilot Test Work Plan. Prepared by GSI Water Solutions, Inc. (GSI). June 2020.

GSI 2021a. Former Crucible Cleaning Area Enhanced In Situ Bioremediation String 3 Injection and Performance Summary. Prepared by GSI Water Solutions, Inc. for ATI Millersburg Operations.

GSI 2021b. 2021 Water Monitoring Schedule and Transducer Installation. Prepared by GSI Water Solutions, Inc. (GSI). February 2021.

GSI 2021c. Revised Acid Sump Area Source Area Remedial Design Work Plan. Prepared for ATI Millersburg Operations. Prepared by GSI Water Solutions, Inc. (GSI). February 2021.

GSI 2021d. Acid Sump Area Source Area DNAPL Assessment Operations Plan. Prepared for ATI Millersburg Operations. Prepared by GSI Water Solutions, Inc. (GSI). July 14, 2021.

GSI 2021e. Farm Ponds Parcels Site Characterization Work Plan, Revised. Prepared by GSI Water Solutions, Inc. Revised August 2021.

GSI 2021f. Soil Amendment Area Scoping Survey Work Plan, Revised. Prepared by GSI Water Solutions, Inc. Revised October 2021.

GSI 2021g. Millersburg Operations Remedial Action Progress Summary Year 2020. Prepared by GSI Water Solutions (GSI). Revised December 2021.

GSI 2022a. Millersburg Operations Remedial Action Progress Summary Year 2021. Prepared by GSI Water Solutions, Inc. for ATI Millersburg Operations.

GSI 2022b. Draft Soil Amendment Area Scoping Survey Summary. Prepared by GSI Water Solutions, Inc (GSI). February 2022.

GSI 2022c. Acid Sump Area Source Assessment Report. Prepared by GSI Water Solutions, Inc. (GSI). March 2022.

GSI 2022d. Draft Farm Ponds Parcels Site Characterization Data Evaluation. Prepared by GSI Water Solutions, Inc (GSI). March 2022.

GSI 2022e. Draft Solids Area Restoration Completeness Evaluation. Prepared by GSI Water Solutions, Inc (GSI). March 2022.

GSI 2022f. Farm Ponds Parcels Restoration Completeness Evaluation. Prepared by GSI Water Solutions, Inc (GSI). April 2022.

GSI 2022g. Acid Sump Area Source Treatment Work Plan. Prepared by GSI Water Solutions, Inc (GSI). August 2022.

Oremet-Wah Chang 1999a. Letter from James H. Denham to Joan Shirley regarding BNSF Equitable Servitude. March 29, 1999.

Oremet-Wah Chang 1999b. Letter from James H. Denham to Joan Shirley regarding the Simpson Equitable Servitude. April 9, 1999.

Oremet-Wah Chang 1999c. Letter from James H. Denham to Joan Shirley regarding the Simpson Equitable Servitude. April 23, 1999.

Parametrix 2012. Removal of Farm Ponds Berm and Well SS Technical Memorandum. November 15, 2012.

SCS Engineers 2022. 2021 Annual Environmental Monitoring Report, Finley Buttes Regional , Boardman, Oregon. March 8, 2022.

Stoel Rives 1999. Letter from J. Mark Morford to Joan Shirley regarding Wah Chang; Second Lake Shoreline Property. March 4, 1999.

United States of America (USA) and State of Oregon 1997. Order Entering Consent Decree CV-97-169-RE. Teledyne Wah Chang Albany. January 31, 1997.

USA and State of Oregon 2006. Order Entering Consent Decree CV-06089-TC. City of Millersburg. June 19, 2006.

US Attorney District of Oregon 1997. United States of America and the State of Oregon versus Teledyne Wah Chang Albany, Civil Action No. CV'97-169 -RE, Consent Decree. Jan 31, 1997.

Wah Chang 1997. Letter from Charles R. Knoll to Kevin Rochlin regarding Statement of Work Requirement 5.2.6.1 Institutional Controls/Deed Restrictions.

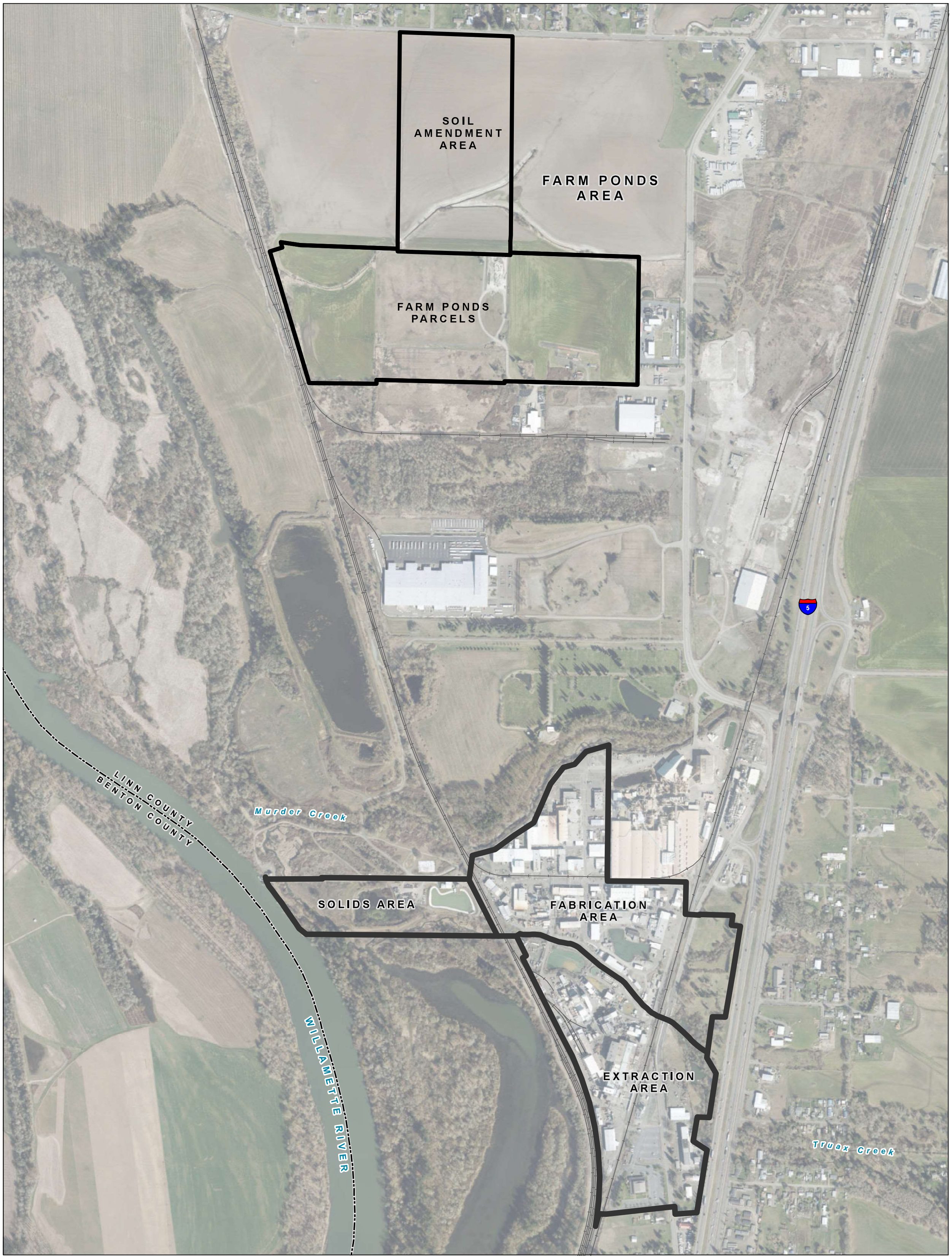
Wah Chang 2001. Letter from Noel Vaughn, PE to Kevin Rochlin regarding the East Perimeter Deed Restriction Submittals -Wah Chang/Linn County and Wah Chang/Union Pacific Railroad.

Wah Chang 2008. Results of Buildings 73 and 198 Radon Testing. December 17, 2008.

Wah Chang 2009. Fabrication Area Groundwater Year 2008 Remedial Action Progress Summary. March 30, 2009.

Wah Chang 2012. EPA Request for Information of Teledyne Wah Chang Superfund Site. Letter to EPA with attachment prepared by Stoel Rives, LLP, re: Linn County, OR Deed Restrictions. July 6, 2012.

FIGURES



LEGEND

Property Boundary

Railroad

County Boundary

FIGURE 1

Millersburg Operations

ATI Millersburg Operations, Oregon

N

0 400 800 1,200

Feet

GSI Water Solutions, Inc.

Date: March 24, 2022
Data Sources: OGIC, USGS, GeoTerra Imagery (2019)

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure1_Millersburg_Operations.mxd

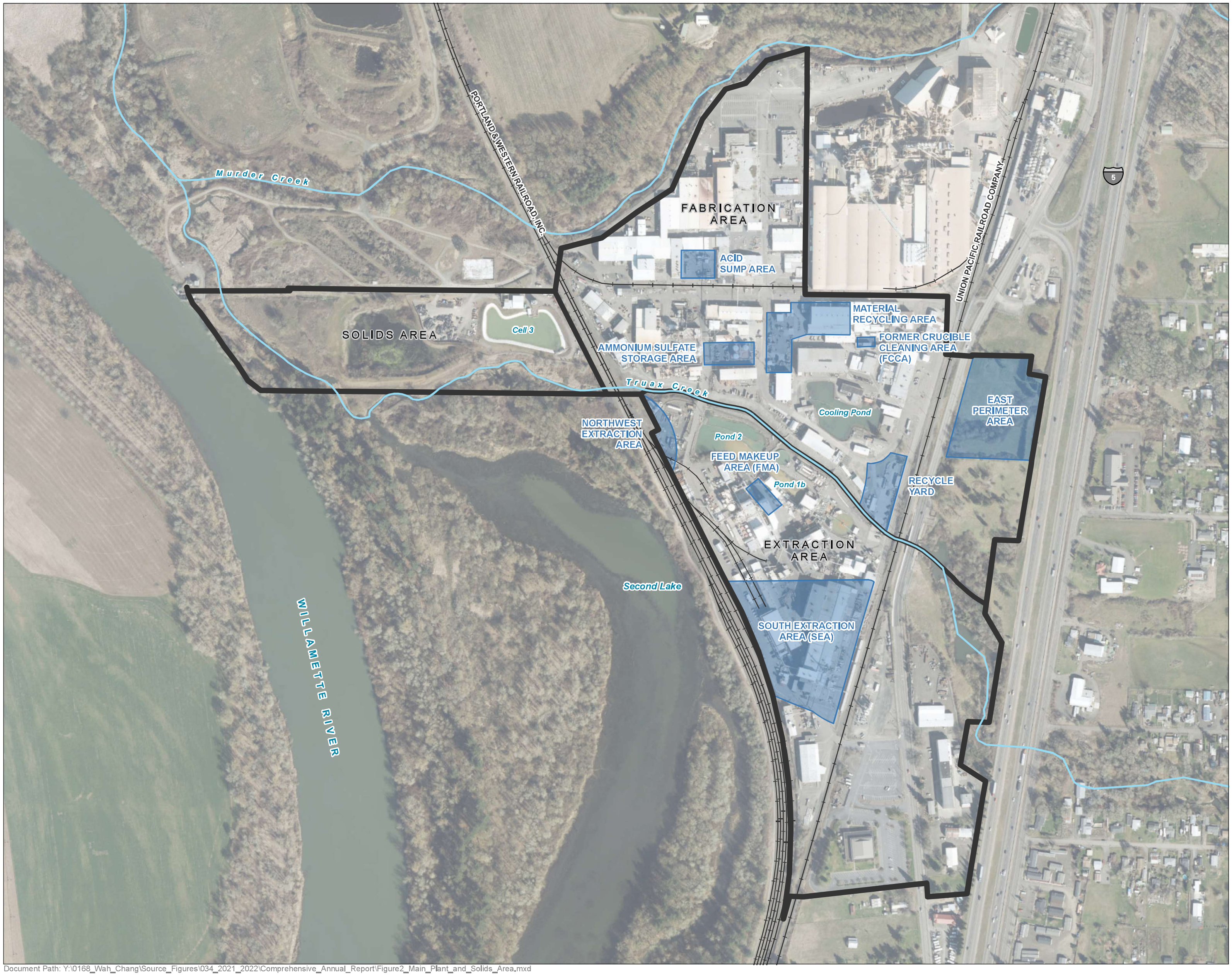


FIGURE 2

Main Plant and Solids Area

ATI Millersburg Operations, Oregon

LEGEND

- Watercourse
- Boundary
- ▨ Remediation Subarea
- Railroad

N

0 225 450 675
Feet

Date: April 28, 2022
Data Sources: Linn Co., ESRI,
GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure2_Main_Plant_and_Solids_Area.mxd

FIGURE 3

Solids Area Site Map

ATI Millersburg Operations, Oregon

LEGEND

- PWB-1 ● Monitoring Well Screened in Recent Alluvium or Willamette Silt
- PWB-2 ● Monitoring Well Screened in Linn Gravel
- PWB-3 ● Monitoring Well Screened in Blue Clay or Spencer Formation
- → Groundwater Flow Direction
- 🟫 Former Chlorinator Residue Pile
- 🟦 Former Magnesium Resource Recovery Area
- 🟪 Lower River Solids Pond
- 🟪 Schmidt Lake
- ◯ Cell 3 Boundary
- ☐ Property Boundary
- ┼ Railroad
- ～ Watercourse

NOTES

1. Wells W-10 and PW-08 abandoned in 1991.
2. Locations of the LRSP, Schmidt Lake, Former Magnesium Resource Recovery Pile, and Chlorinator Residue Pile are from Figure 6-7 of the ROD (EPA, 1994).

N

0 100 200 300
Feet

Date: December 20, 2021
Data Sources: City of Albany GIS, ATI, GeoTerra, Inc. 2019.

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Restoration_Comp_Eval\Figure3_Solids_Area_Site_Map.mxd

FIGURE 4

Farm Ponds Area Location Map

Farm Ponds Parcels
Site Characterization Data Evaluation
ATI Millersburg Operations, Oregon

LEGEND

- ▭ Site Area
- ▭ Tax Lot
- ┼ Railroad

N

0 250 500 750
Feet

Date: June 29, 2021
Data Sources: Linn Co., OGIC, USGS, GeoTerra 2019

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\029_2020\Site_Characterization\Farm_Ponds_Area\Figure2_FarmSite.mxd

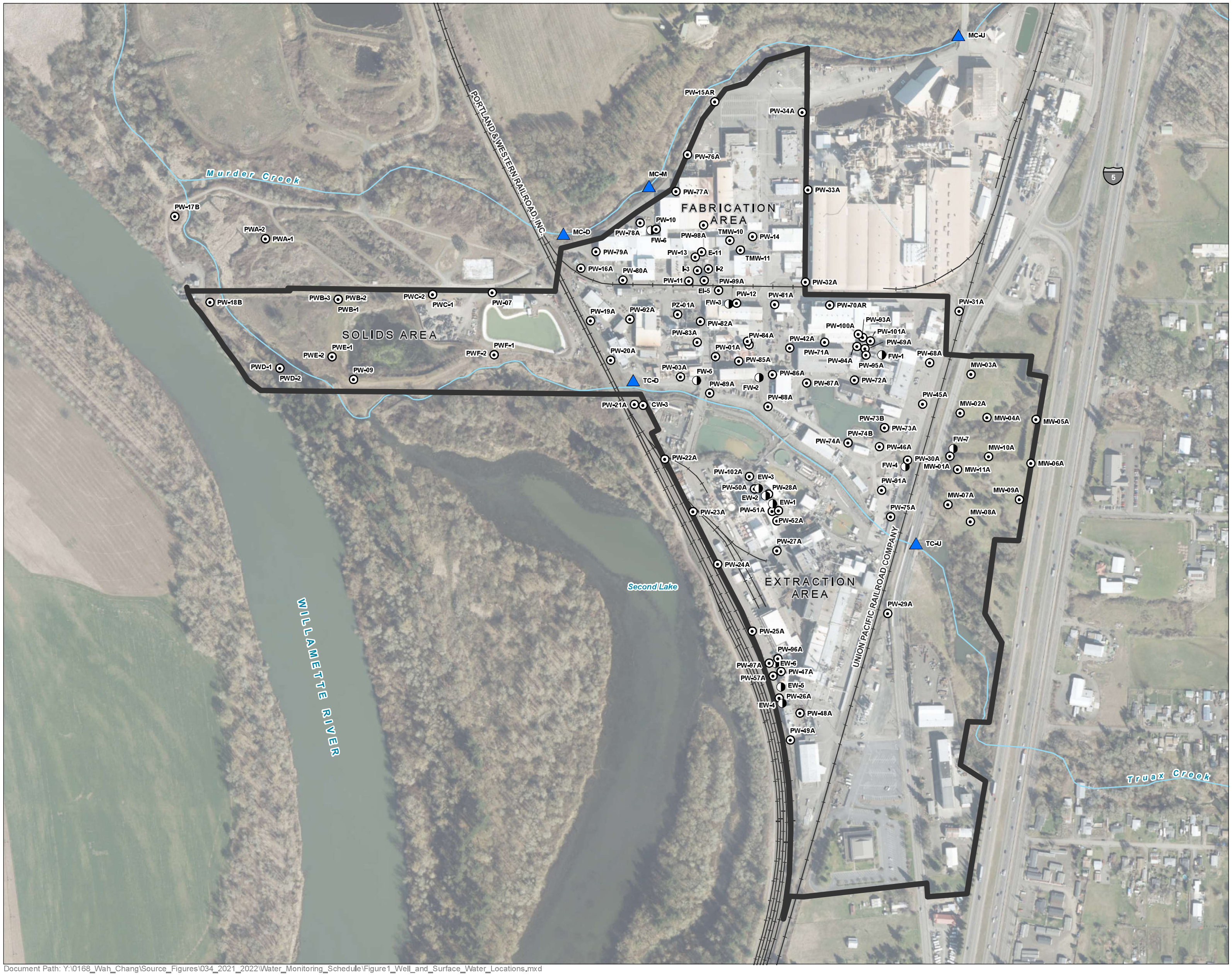


FIGURE 5

Well and Surface Water Locations in the Main Plant and Solids Area

ATI Millersburg Operations, Oregon

LEGEND

⊙ Monitoring Well
◐ Extraction Well
▲ Surface Water Sample Location
▬ Property Boundary

All Other Features

┼ Railroad
〜 Watercourse

N

0 225 450 675
Feet

Date: March 31, 2022
Data Sources: Linn Co., ESRI,
GeoTerra Imagery (2019)

GSI
Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Water_Monitoring_Schedule\Figure1_Well_and_Surface_Water_Locations.mxd

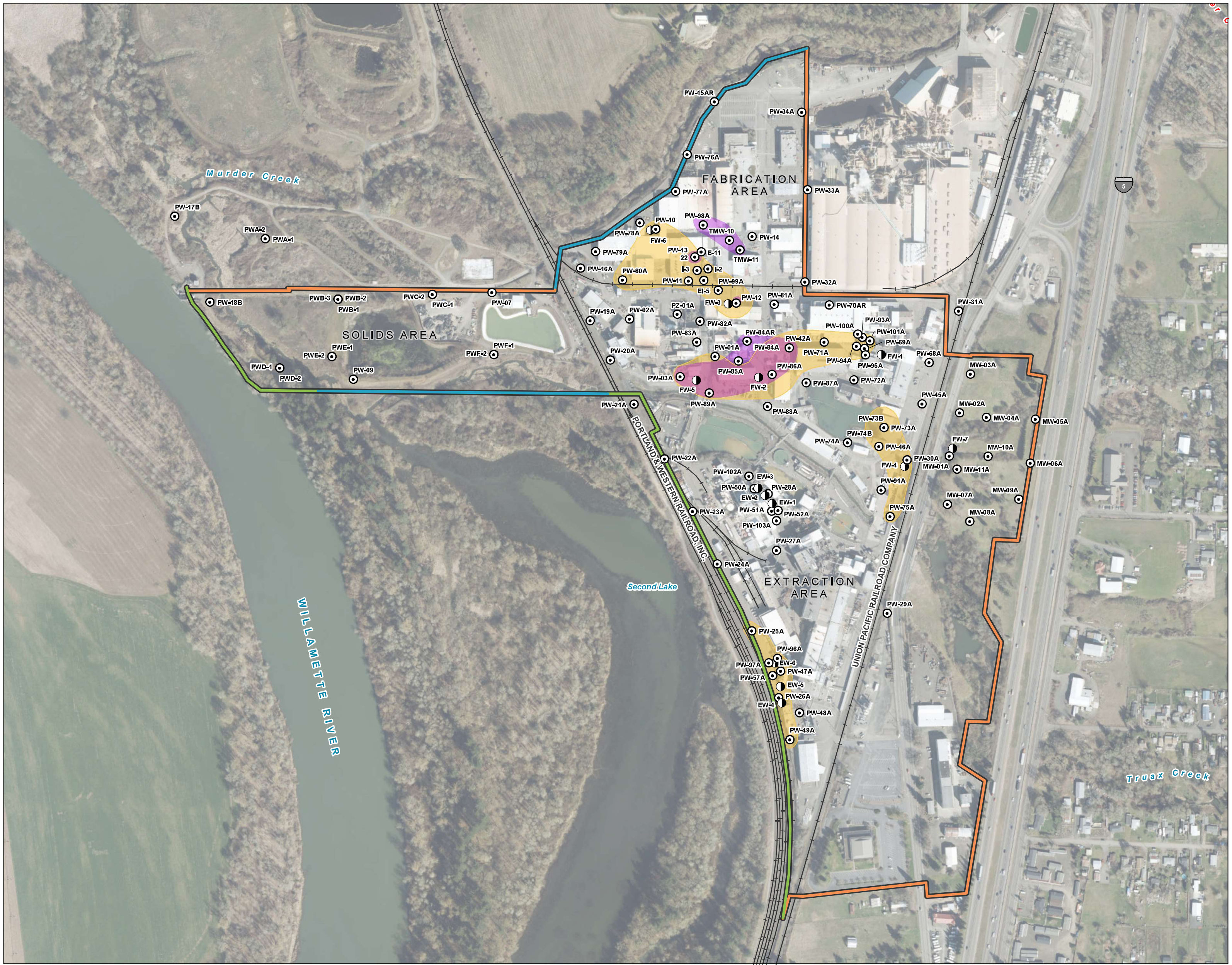


FIGURE 6

TCE Distribution in Fall 2021 and 2000

ATI Millersburg Operations, Oregon

LEGEND

⊙ Monitoring Well

◑ Extraction Well

🟪 Fall 2021 TCE Concentrations above the Cleanup Level (5 µg/L)

🟨 2000 TCE Concentrations above the Cleanup Level (5 µg/L)

Property Boundary

— AWQC for Aquatic Receptors, Standard: 21,900 µg/L

— AWQC for Human Health and Fish Consumption, Standard: 1.4 µg/L

— Groundwater MCL, Standard: 5 µg/L

All Other Features

—+— Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in fall 2021.
Cleanup Level = 5 µg/L

µg/L: micrograms per liter
AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
TCE: trichloroethene

N

0 225 450 675
Feet

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure8a_TCE_Distribution_Fall_2021_and_2000.mxd

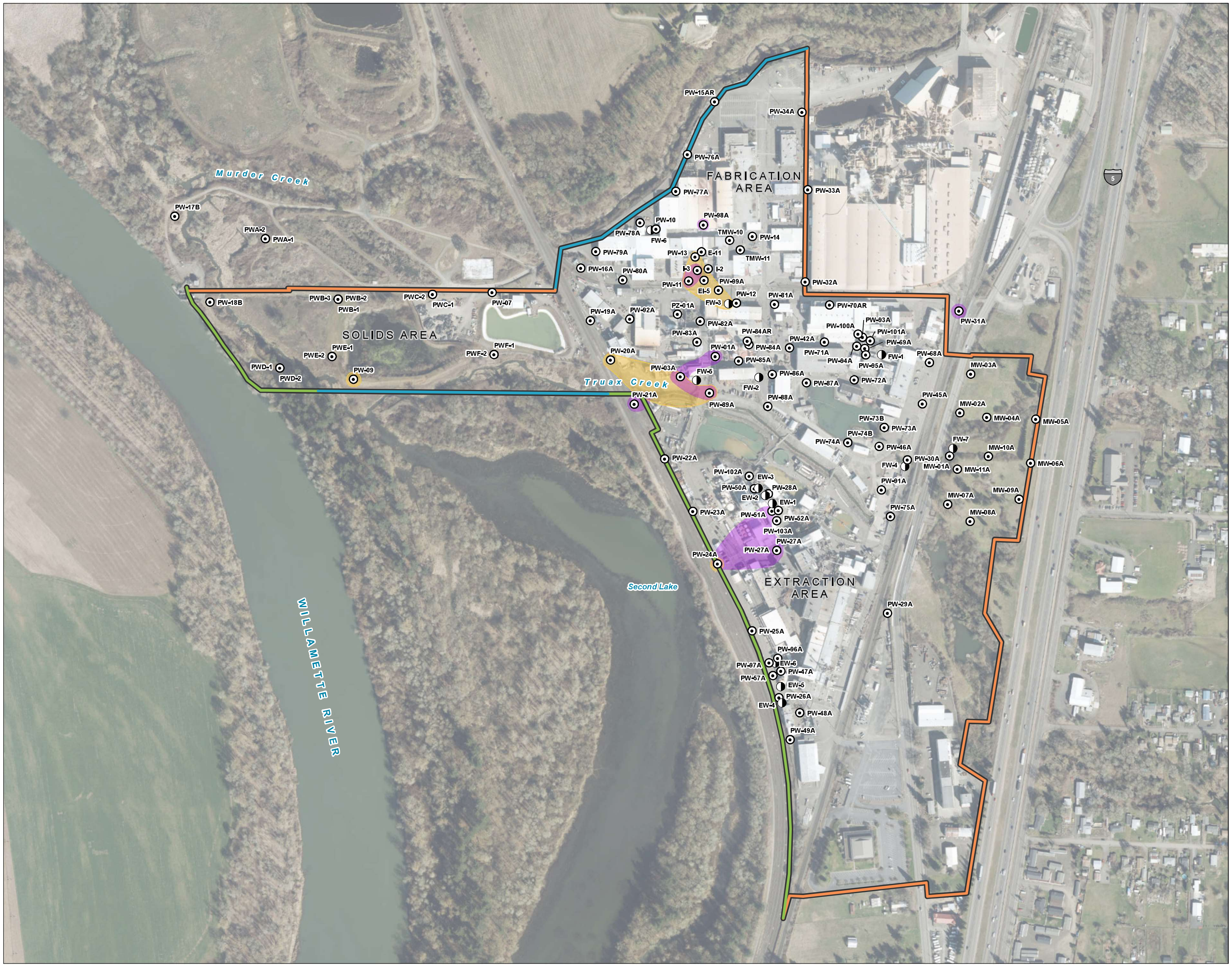


FIGURE 7

Nitrate Distribution in Fall 2021 and 2000

ATI Millersburg Operations, Oregon

LEGEND

- ⊙ Monitoring Well
- ◐ Extraction Well
- 🟪 Fall 2021 Nitrate Concentrations above the Cleanup Level (10 mg/L)
- 🟨 2000 Nitrate Concentrations above the Cleanup Level (10 mg/L)

Property Boundary

- 🟦 AWQC for Aquatic Receptors, Standard: not established
- 🟩 AWQC for Human Health and Fish Consumption, Standard: not established
- 🟧 Groundwater MCL, Standard: 10 mg/L

All Other Features

- ┼ Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in fall 2021.
Cleanup Level = 10 mg/L

AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
mg/L: milligrams per liter

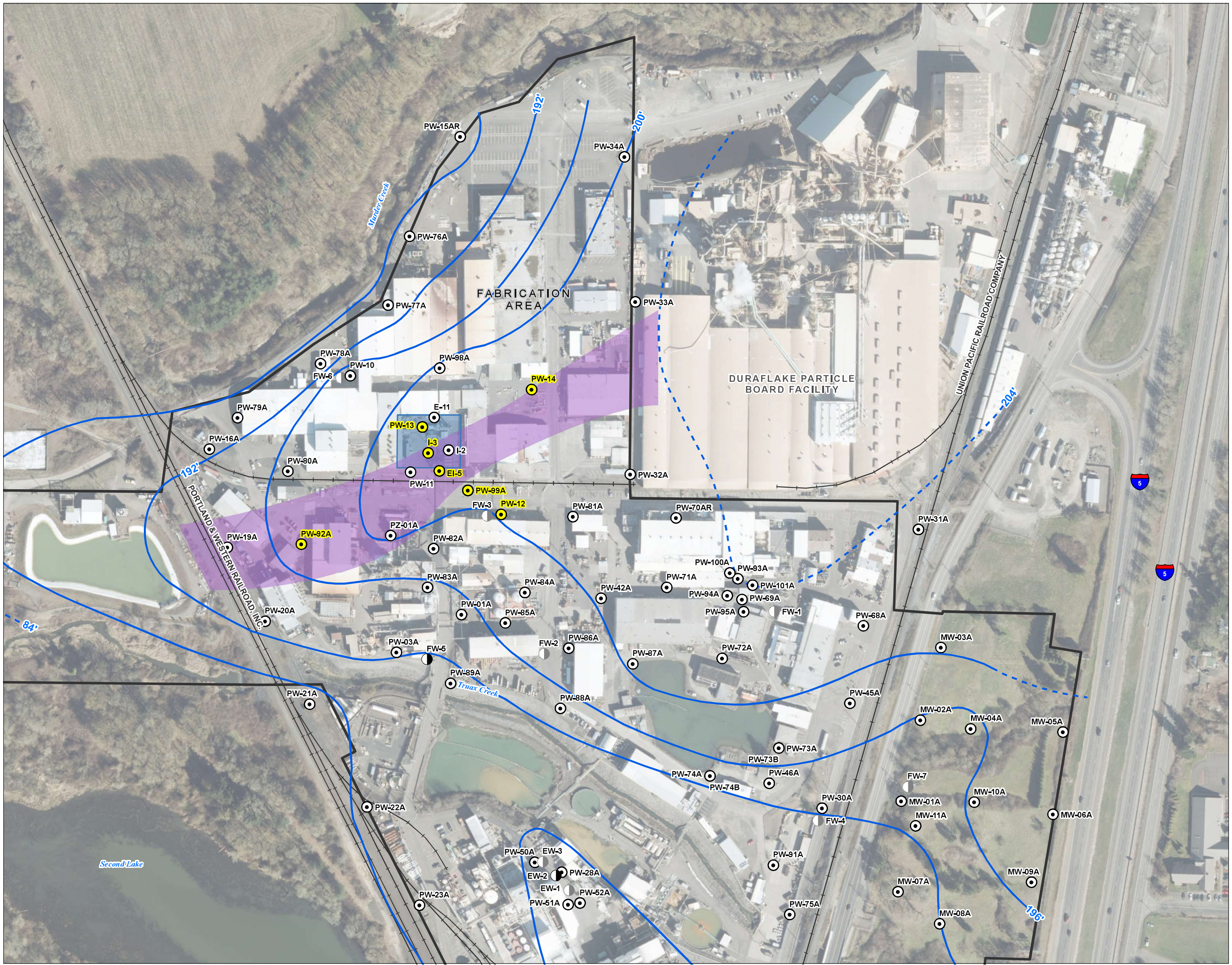
N

0 225 450 675
Feet

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure13_Nitrate_Distribution_Fall_2021_and_2000.mxd



Document Path: Y:\0168_Wah_Chang\Source_Figures\031_Acid_Sump_Investigation\Subsurface_Investigation\Figure4_Transducer_Locs_Fall_2020_GW_Contours.mxd

FIGURE 8

Transducer Locations
(Fall 2020 Groundwater Elevations)

ATI Millersburg Operations, Oregon

LEGEND

- ⊙ Monitoring Well with Transducer Placement
- ⊙ Monitoring Well
- ◑ Extraction Well
- ◐ Extraction Well, Inactive
- ~ Fall 2020 Linn Gravel Groundwater Contour (dashed where inferred)
- ▨ Historic Shift in Groundwater Divide, 2017 - June 2021
- 🟦 Acid Sump Area

All Other Features

- — Property Boundary
- ┼ Railroad

NOTE

1. The following Linn Gravel monitoring wells were not used for contouring:
   - FW-6 is used for contouring instead of PW-10 at EPA's request.
   - PW-48A is a shallow well. The bottom of the screen (19.6') is above the static water level at other nearby Extraction Area wells.
   - PW-69A is 3 feet from an outdoor freshwater spraying station that operates 24 hours a day and may leak through cracks in concrete pads.
   - PW-72A, PW-73A, and PW-74A are likely hydraulically connected to the cooling pond.

N

0 110 220 330
Feet

Date: October 6, 2021
Data Sources: Linn Co., ESRI, Digiglobe 2018

GSI Water Solutions, Inc.

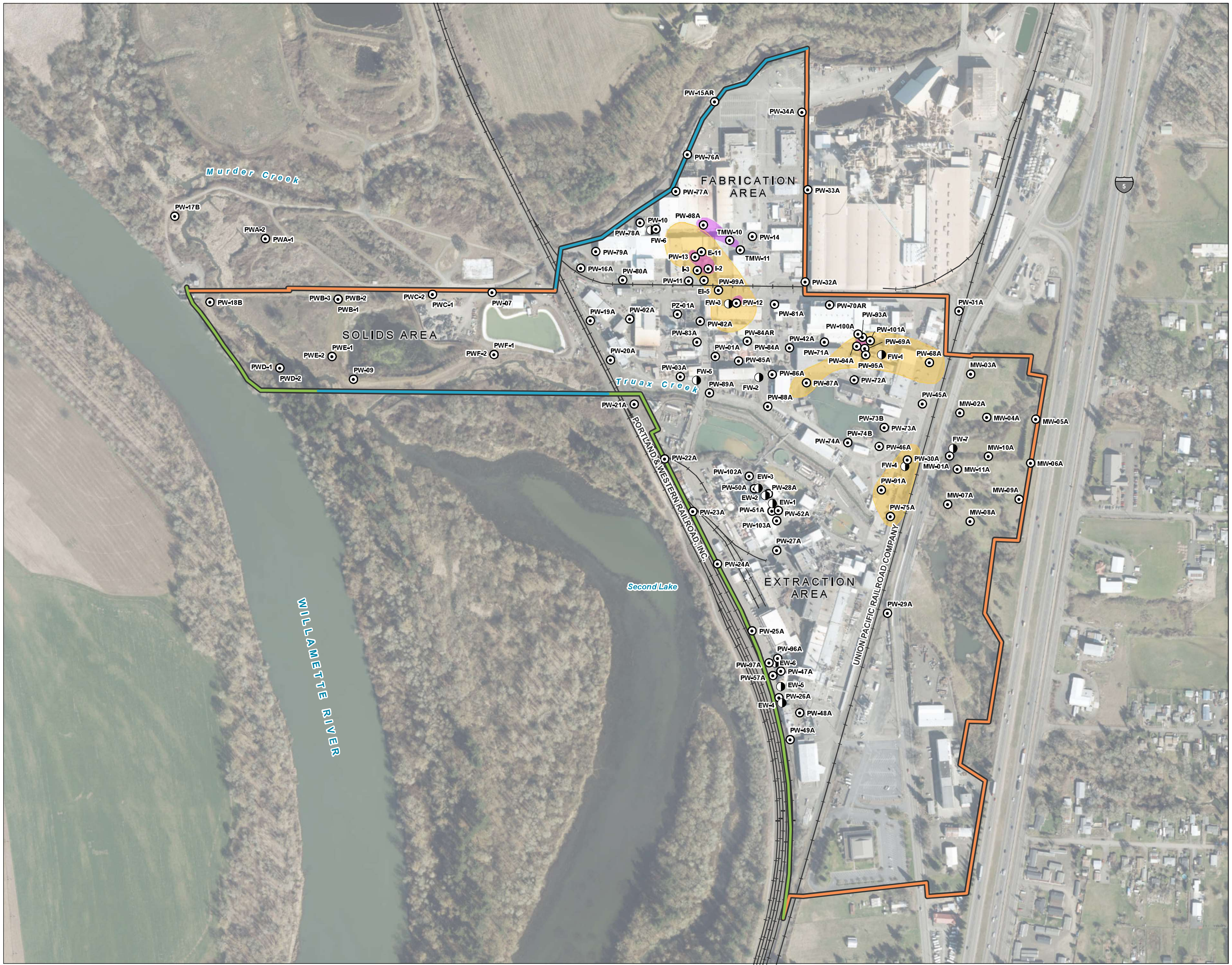


FIGURE 9

TCA Distribution in Fall 2021 and 2000

ATI Millersburg Operations, Oregon

LEGEND

⊙ Monitoring Well

◐ Extraction Well

🟪 Fall 2021 TCA Concentrations above the Cleanup Level (200 µg/L)

🟨 2000 TCA Concentrations above the Cleanup Level (200 µg/L)

Property Boundary

— AWQC for Aquatic Receptors, Standard: 18,000 µg/L

— AWQC for Human Health and Fish Consumption, Standard: not established

— Groundwater MCL, Standard: 200 µg/L

All Other Features

—+— Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in fall 2021.
Cleanup Level = 200 µg/L

µg/L: micrograms per liter
AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
TCA: 1,1,1-trichloroethane

N

0 225 450 675
Feet

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure5a_TCA_Distribution_Fall_2021_and_2000.mxd

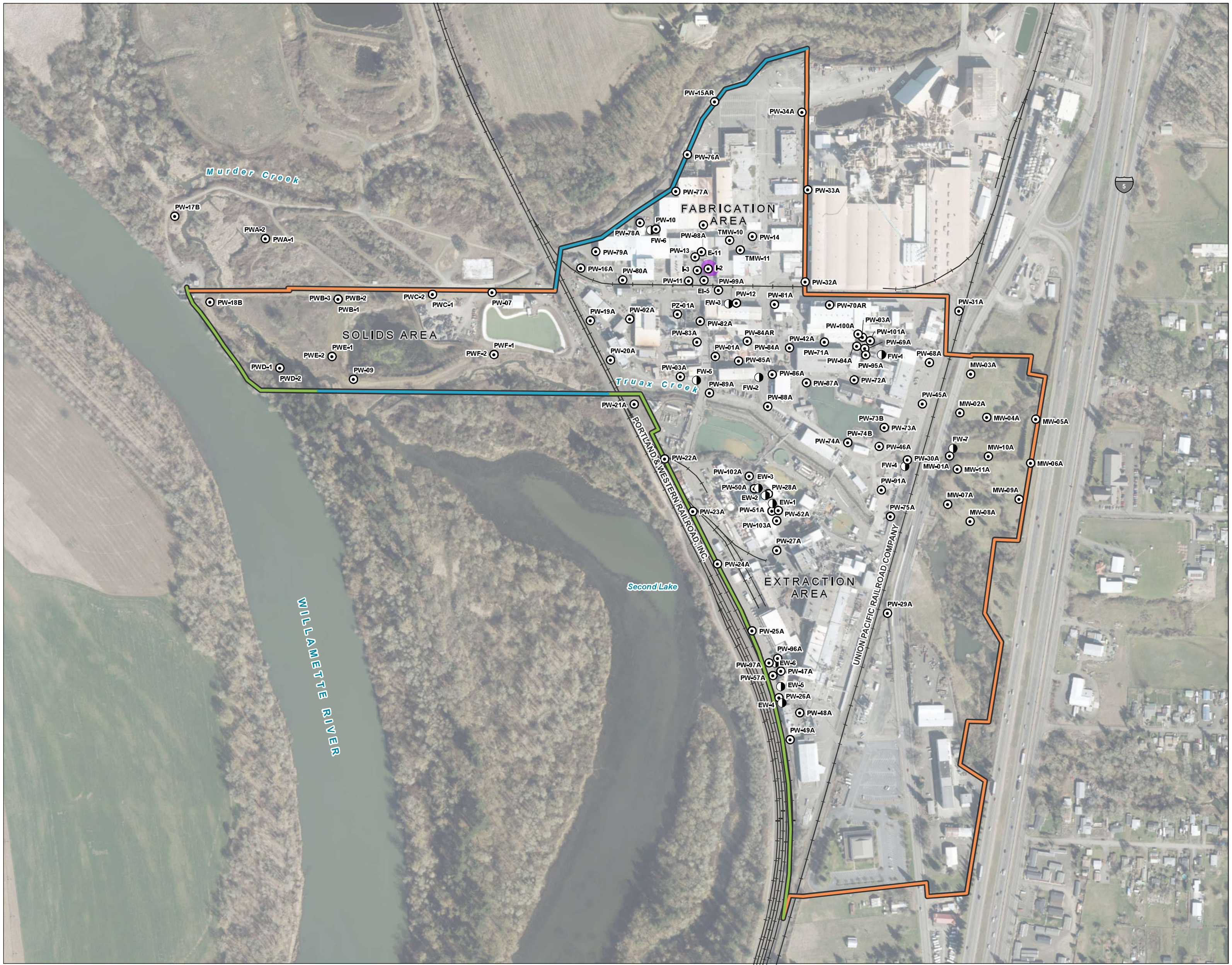


FIGURE 10

DCA Distribution in Fall 2021

ATI Millersburg Operations, Oregon

LEGEND

⊙ Monitoring Well

◐ Extraction Well

Fall 2021 DCA Concentrations above the Cleanup Level (3,700 µg/L); boundary dashed where inferred

Property Boundary

AWQC for Aquatic Receptors, Standard: not established

AWQC for Human Health and Fish Consumption, Standard: not established

Groundwater MCL, Standard: 3,700 µg/L in Fabrication Area and 1,280 µg/L in Extraction Area

All Other Features

Railroad

NOTES

1. There were no DCA cleanup level exceedances in 2000.
2. Wells without a displayed concentration were below the cleanup level in fall 2021.
3. Cleanup Level = 3,700 µg/L in the Fabrication Area and 1,280 µg/L in the Extraction Area.

µg/L: micrograms per liter
AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
DCA: 1,1-dichloroethane

N

0 225 450 675
Feet

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure6_DCA_Distribution_Fall_2021.mxd

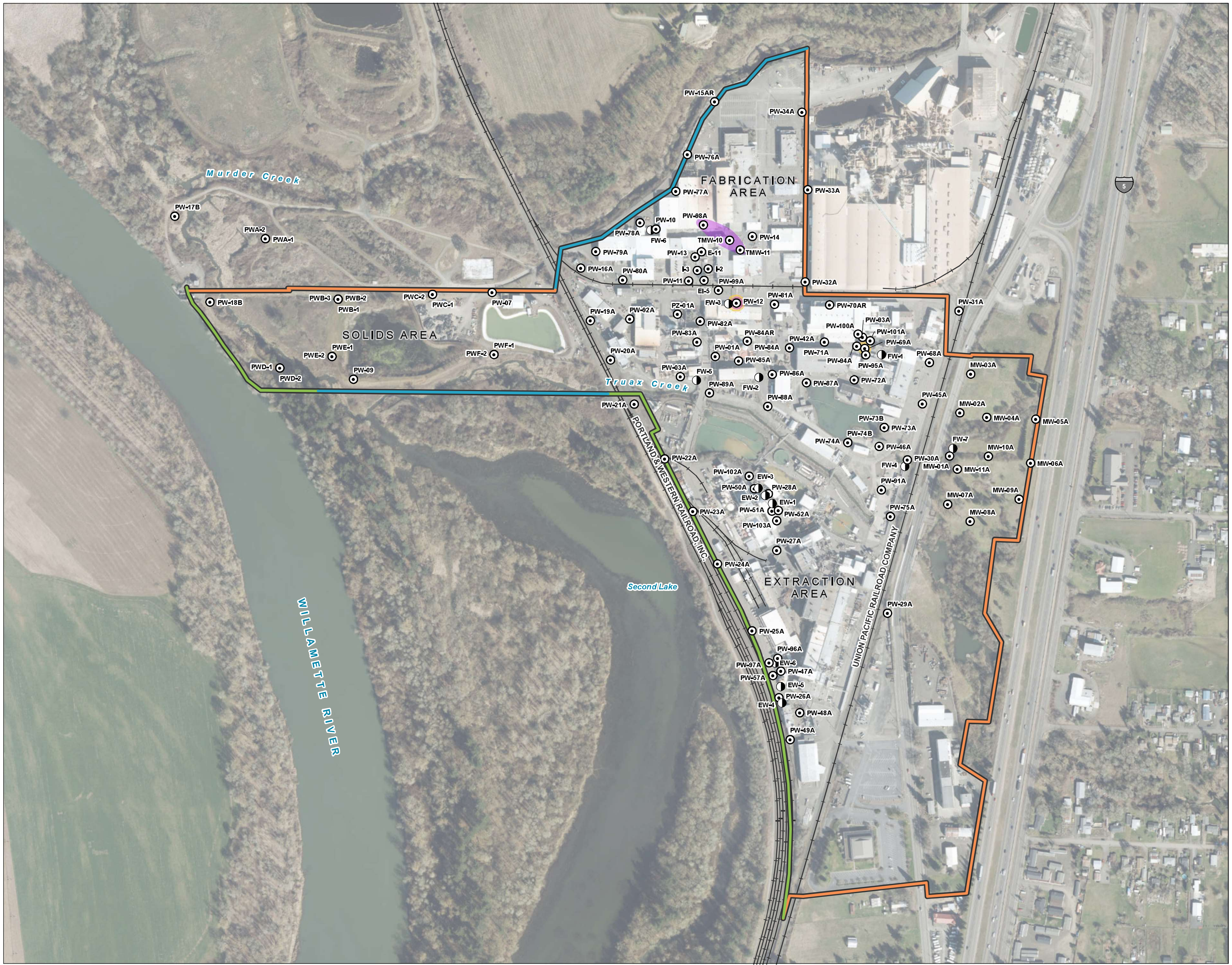


FIGURE 11

PCE Distribution in Fall 2021 and 2000

ATI Millersburg Operations, Oregon

LEGEND

- ⊙ Monitoring Well
- ◐ Extraction Well
- ▨ Fall 2021 PCE Concentrations above the Cleanup Level (5 µg/L)
- ▨ 2000 PCE Concentrations above the Cleanup Level (5 µg/L)

Property Boundary

- — AWQC for Aquatic Receptors, Standard: 840 µg/L
- — AWQC for Human Health and Fish Consumption, Standard: 0.24 µg/L
- — Groundwater MCL, Standard: 5 µg/L

All Other Features

- —+— Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in fall 2021.
Cleanup Level = 5 µg/L

µg/L: micrograms per liter
AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
PCE: tetrachloroethene

N

0 225 450 675
Feet

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure7a_PCE_Distribution_Fall_2021_and_2000.mxd

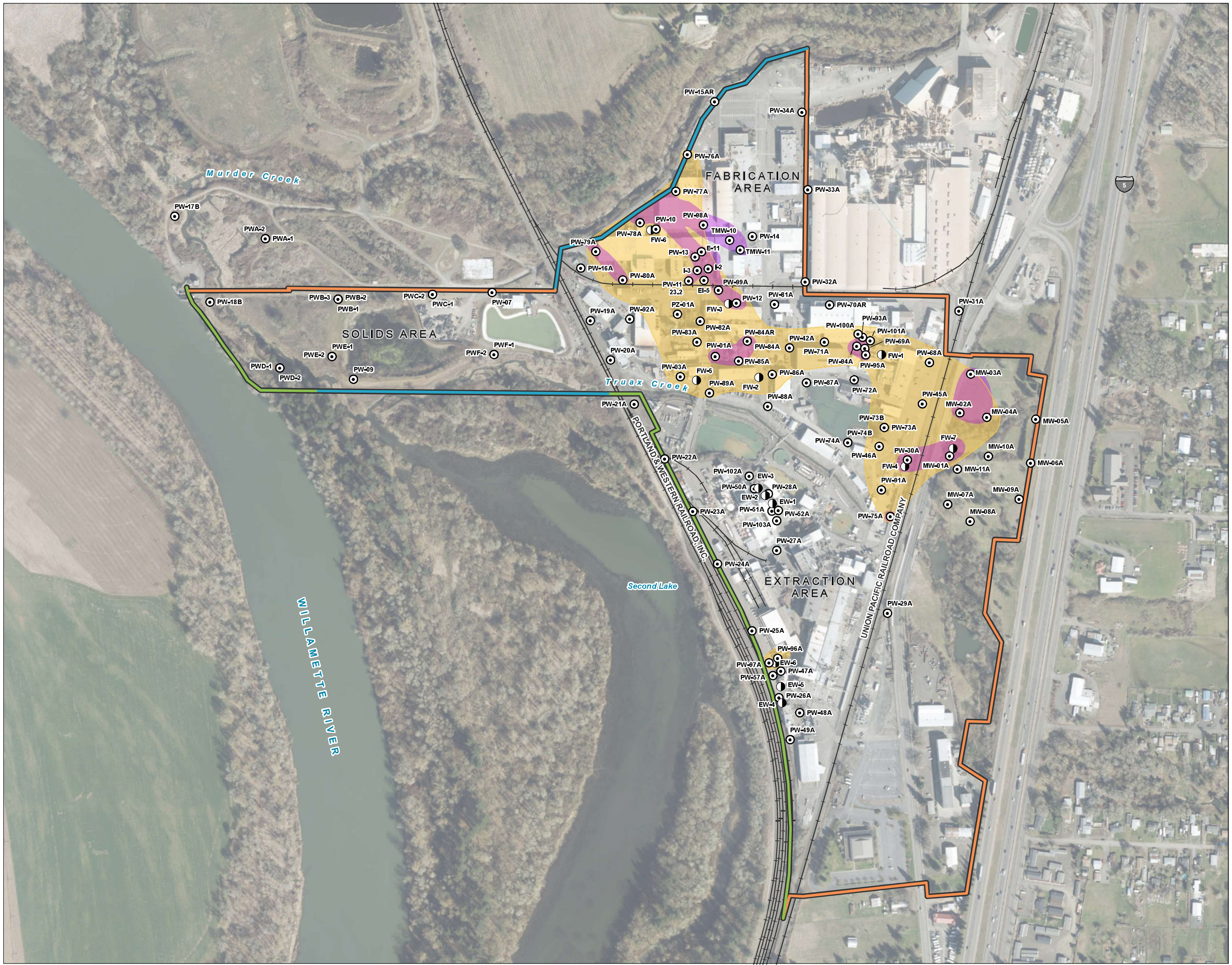


FIGURE 12

DCE Distribution in Fall 2021 and 2000

ATI Millersburg Operations, Oregon

LEGEND

- ⊙ Monitoring Well
- ◑ Extraction Well
- 🟪 Fall 2021 DCE Concentrations above the Cleanup Level (7 µg/L)
- 🟨 2000 DCE Concentrations above the Cleanup Level (7 µg/L)

Property Boundary

- 🟦 AWQC for Aquatic Receptors, Standard: 11,600 µg/L
- 🟩 AWQC for Human Health and Fish Consumption, Standard: 230 µg/L
- 🟧 Groundwater MCL, Standard: 7 µg/L

All Other Features

- ┼ Railroad

NOTES

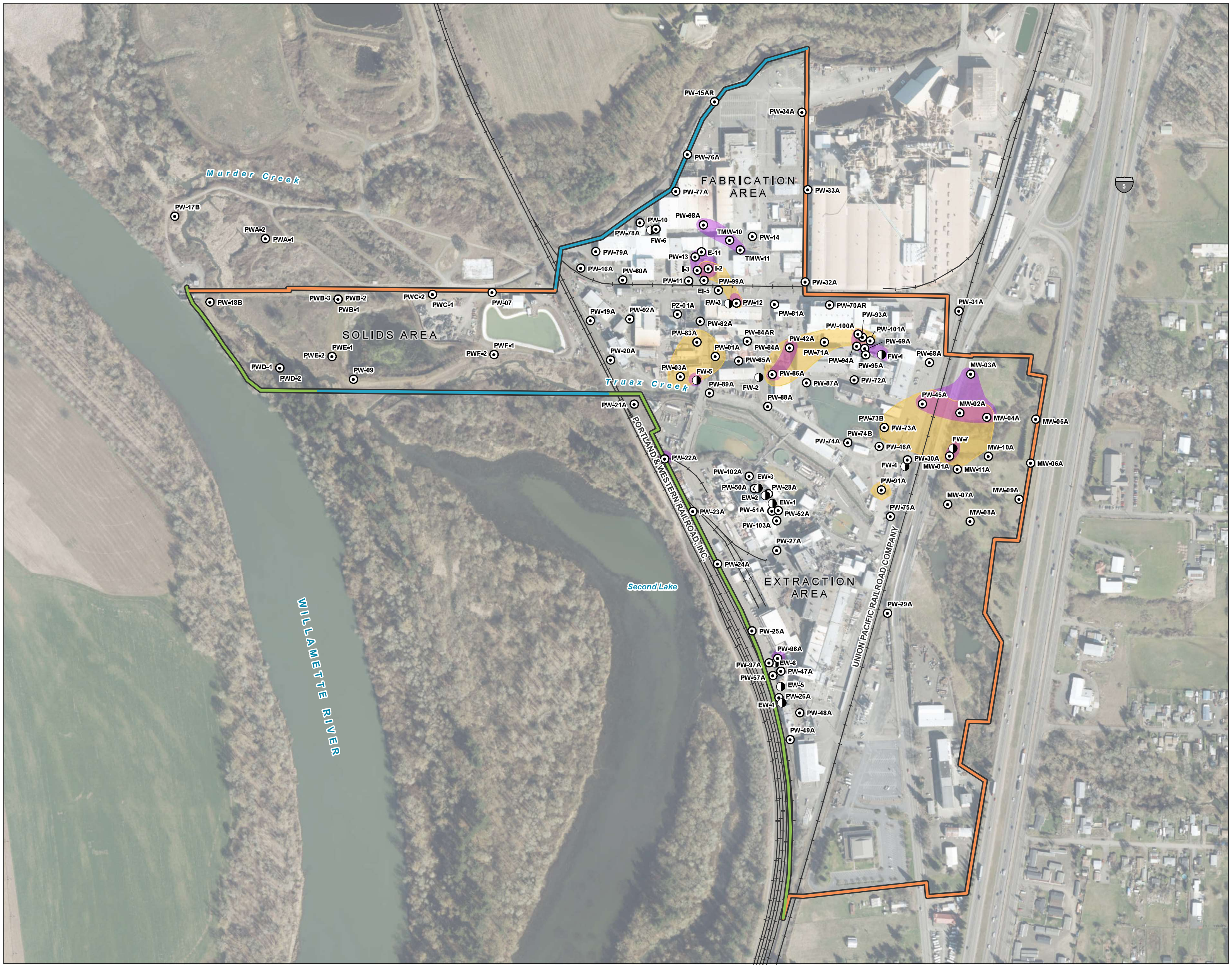
Wells without a displayed concentration were below the cleanup level in fall 2021.
Cleanup Level = 7 µg/L

µg/L: micrograms per liter
AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
DCE: 1,1-dichloroethene

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure9a_DCE_Distribution_Fall_2021_and_2000.mxd



Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure10a_VC_Distribution_2000_2021.mxd

FIGURE 13

VC Distribution in Fall 2021 and 2000

ATI Millersburg Operations, Oregon

LEGEND

⊙ Monitoring Well

◑ Extraction Well

Fall 2021 VC Concentrations above the Cleanup Level (2 µg/L)

2000 VC Concentrations above the Cleanup Level (2 µg/L)

Property Boundary

AWQC for Aquatic Receptors, Standard: not established

AWQC for Human Health and Fish Consumption, Standard: 0.023 µg/L

Groundwater MCL, Standard: 2 µg/L

All Other Features

Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in fall 2021.
Cleanup Level = 2 µg/L

µg/L: micrograms per liter
AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
VC: Vinyl Chloride

N

0 225 450 675
Feet

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

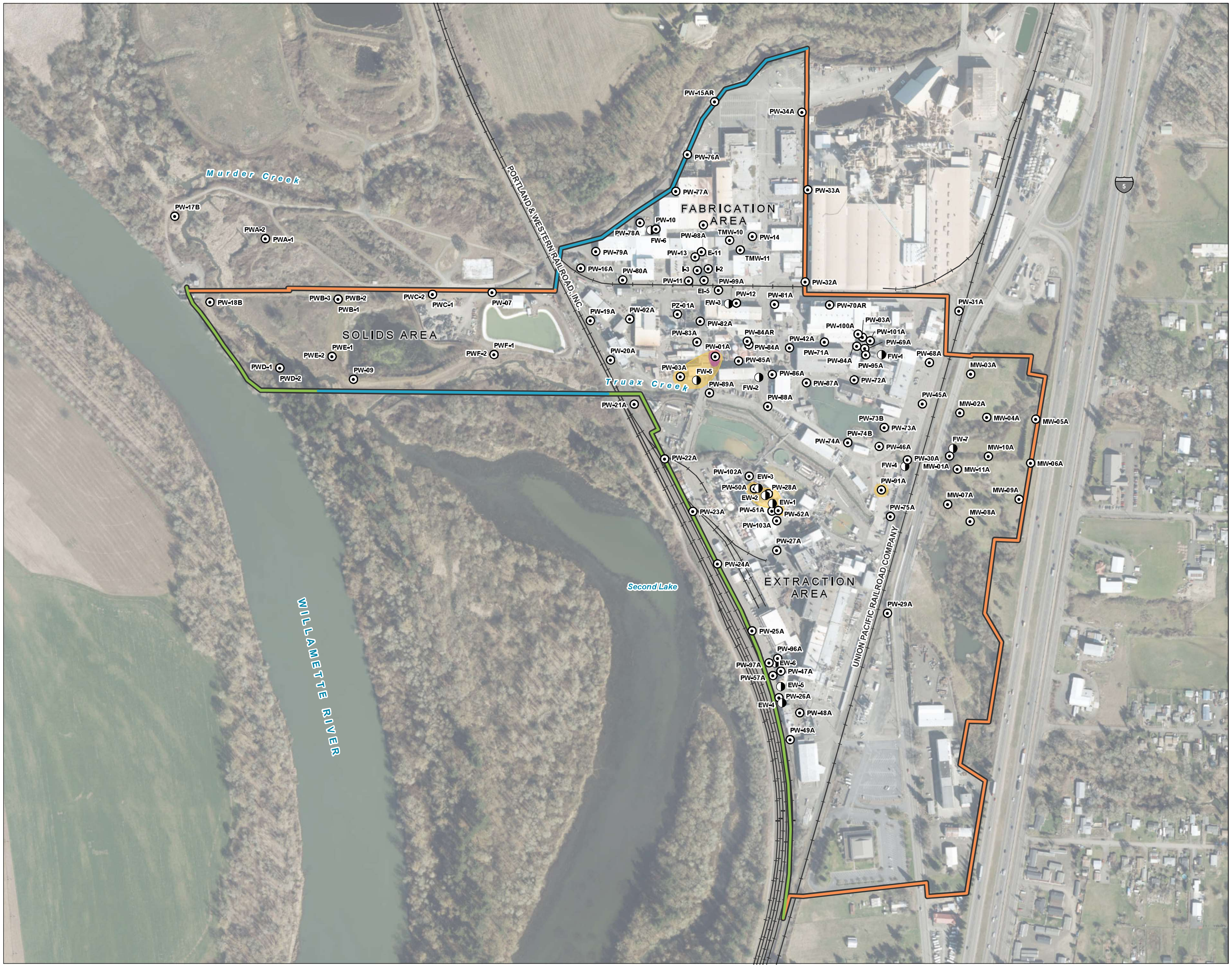


FIGURE 14

Ammonium Distribution in Fall 2021 and 2000

ATI Millersburg Operations, Oregon

LEGEND

⊙	Monitoring Well
◐	Extraction Well
▨	Fall 2021 Ammonium Concentrations above the Cleanup Level (250 mg/L)
▨	2000 Ammonium Concentrations above the Cleanup Level (250 mg/L)

Property Boundary

—	AWQC for Aquatic Receptors: Standard function based value dependent on pH and temperature.
—	AWQC for Human Health and Fish Consumption, Standard: not established
—	Groundwater MCL, Standard: 250 mg/L

All Other Features

—+—	Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in fall 2021.
Cleanup Level = 250 mg/L

AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
mg/L: milligrams per liter

N

0 225 450 675
Feet

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure11_Ammonium_Distribution_Fall_2021_and_2000.mxd

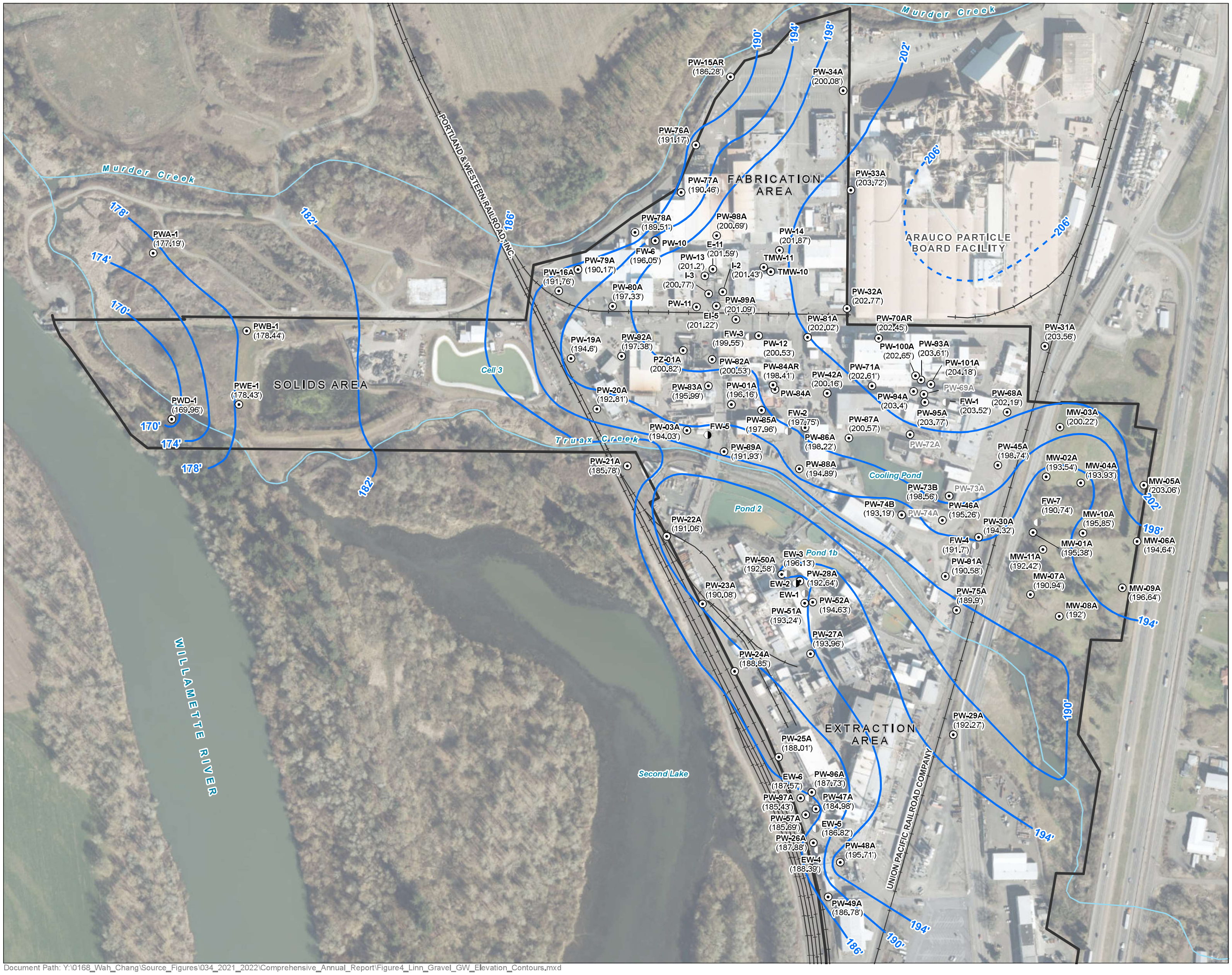


FIGURE 15

Linn Gravel
Groundwater Elevation Contours
Fall 2021

ATI Millersburg Operations, Oregon

LEGEND

⊙ Monitoring Well

◑ Extraction Well

◑ Extraction Well, Inactive

〜 Groundwater Elevation Contour (feet) (dashed where inferred)

All Other Features

— Property Boundary

┼ Railroad

〜 Watercourse

NOTES

1. Water levels measured concurrently. Solids Area wells measured on September 1, 2020. Fabrication Area and Extraction Area wells measured on September 1 and 2, 2021.
2. The following Linn Gravel monitoring wells were not used for contouring and values shown in grey:
   - FW-6 is used for contouring instead of PW-10 at EPA's request.
   - PW-69A is 3 feet from an outdoor freshwater spraying station that operates 24 hours a day and may leak through cracks in concrete pads.
   - PW-72A, PW-73A, and PW-74A are likely hydraulically connected to the cooling pond.
3. Cell 3 is lined. Operational levels are from 197 feet to 202.5 feet.
4. Pond elevations are variable and controlled by float switches. Ponds discharge to publicly owned treatment work wetlands.

EPA: U.S. Environmental Protection Agency

N

0 175 350 525
Feet

Date: March 24, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure4_Linn_Gravel_GW_Elevation_Contours.mxd

FIGURE 16

1,1,1-Trichloroethane and Breakdown Products Soil Concentrations

ATI Millersburg Operations, Oregon

LEGEND

🟦	Boring Location TCA Concentrations in mg/kg DCA Concentrations in mg/kg Chloroethane Concentrations in mg/kg
⌜ ⌟	Excavation Boundary
▨	General Boring Investigation Area

NOTES

DCA: 1,1-Dichloroethane
TCA: 1,1,1-trichloroethane
mg/kg: milligrams per kilogram
U: Result not detected,
result reported at reporting limit.
J: The reported result is an estimate.
The value is less than the minimum calibration level
but greater than the estimated detection limit.

N

0 15 30 45
Feet

Date: October 6, 2021
Data Sources: Wah Chang, City of Albany GIS,
GeoTerra Inc. 2019

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\031_Acid_Sump_Investigation\Subsurface_Investigation\Figure6_TCA_Breakdown_Prod_Soil_Concentrations.mxd

Document Path: Y:\0168_Wah_Chang\Source_Figures\031_Acid_Sump_Investigation\Subsurface_Investigation\Figure7_GW_Results_TCA_and_Daughter_Products.mxd

FIGURE 17

Groundwater Results - 1,1,1-Trichloroethane and Daughter Products

ATI Millersburg Operations, Oregon

LEGEND

■ Boring Location
TCA Concentrations in µg/L
DCA Concentrations in µg/L
Chloroethane Concentrations in µg/L

⌐ ¬ Excavation Boundary

▨ General Boring Investigation Area

NOTES

13,000 µg/L= 1% TCA DNAPL Concentration

DCA: 1,1-Dichloroethane
TCA: 1,1,1-trichloroethane
µg/L: micrograms per liter
U: The analyte was not detected in the sample at the estimated detection limit.
J: The reported result is an estimate. The value is less than the minimum calibration level but greater than the estimated detection limit.
E: Exceeds calibration range.

Date: October 6, 2021
Data Sources: Wah Chang, City of Albany GIS, GeoTerra Inc. 2019

GSI Water Solutions, Inc.

FIGURE 18

Horizontal Limit of DNAPL

ATI Millersburg Operations, Oregon

LEGEND

- ■ Boring Location
- ● EISB Injection/Extraction Well
- ◐ Monitoring Well
  TCA Concentration in µg/L
- ● Temporary Boring
  TCA Concentration in µg/L
- ○ 2009 Biobarrier Temporary Well
  TCA Concentration in µg/L
- ~ 13,000 µg/L Isoconcentration Line (1% aqueous solubility), dashed where inferred
- ⬚ Excavation Boundary
- ⬚ General Boring Investigation Area

NOTES

1. "IB" borings are from the "Design Investigation and Remedy Selection Report" dated March 18, 2009.

EISB: enhanced in situ bioremediation
GIS: geographic information system
GW: groundwater
ND: non-detect
TCA: 1,1,1-trichloroethane

N

0 10 20 30
Feet

Date: October 6, 2021
Data Sources: Wah Chang, City of Albany GIS, GeoTerra Inc. 2019

GSI
Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\031_Acid_Sump_Investigation\Subsurface_Investigation\Figure8_Horizontal_Limit_DNAPL.mxd

FIGURE 19

Restoration Completeness Evaluation Results

ATI Millersburg Operations, Oregon

LEGEND

Monitoring Well Status

- PWB-1 ● Restoration Complete, Decommission
- PWB-2 ● Restoration Complete, Sample Every 5 Years
- PWB-3 ● Restoration Incomplete, Continue Sampling (COCs in parenthesis have not been restored)

All Other Features

- Property Boundary
- Cell 3 Boundary
- Railroad
- Watercourse

NOTES

1. Wells W-10 and PW-08 abandoned in 1991.

COCs: Contaminants of Concern
As: Arsenic
Ra: Combined Radium-226/228
F: Fluoride
Cn: Cyanide

N

0 100 200 300
Feet

Date: March 8, 2022
Data Sources: City of Albany GIS, ATI, GeoTerra, Inc. 2019.

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Restoration_Comp_Eval\Figure4_Restoration_Completeness_Eval_Results_Solids_Area.mxd

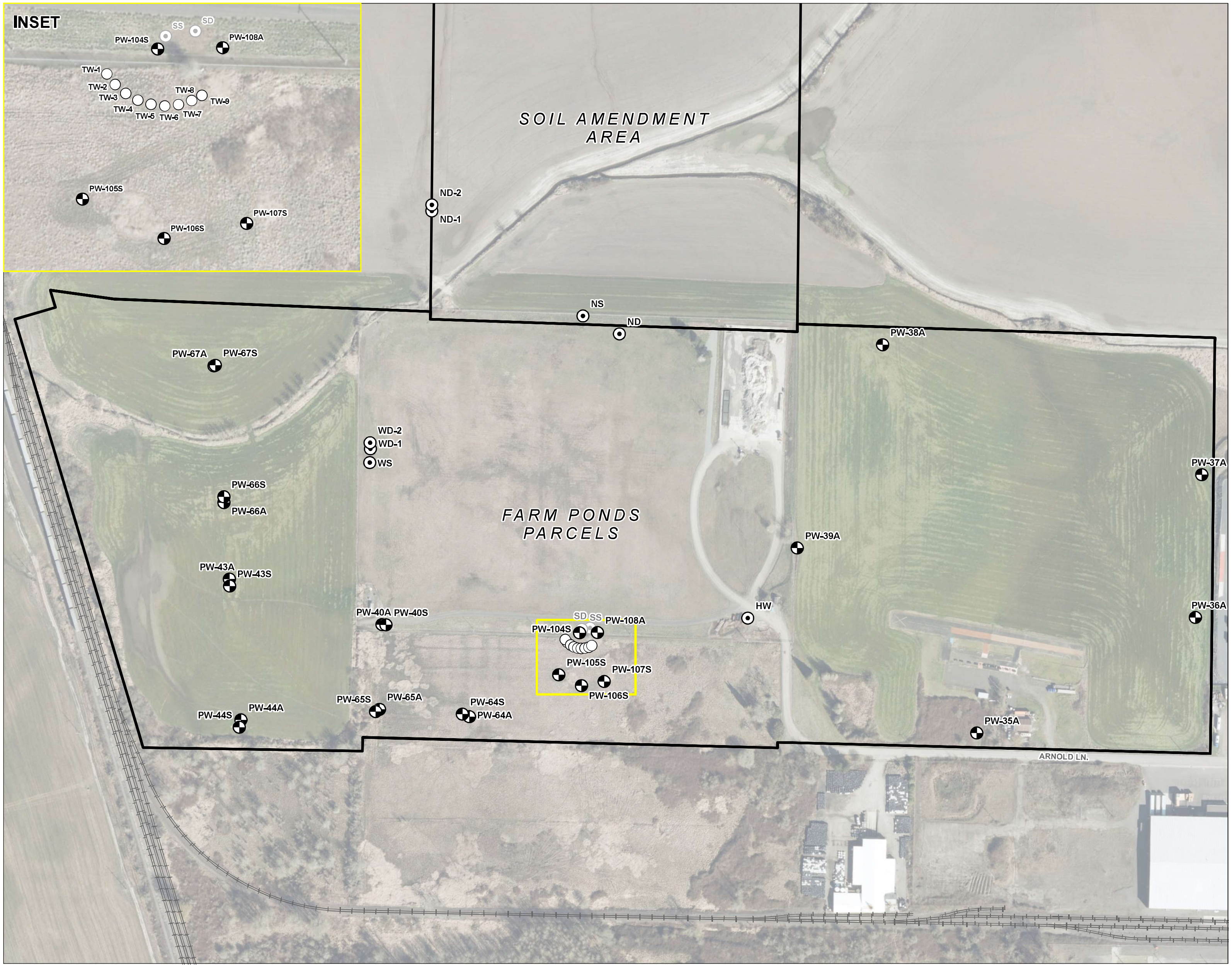


FIGURE 20

Farm Ponds Area Monitoring Wells

Farm Ponds Parcels
Site Characterization Data Evaluation
ATI Millersburg Operations, Oregon

LEGEND

- ◐ Monitoring Well
- ⊙ NPDES Well
- ◎ Abandoned Well
- ○ Temporary Well
- ▭ Investigation Area Boundary
- ┼ Railroad

NOTES

Temporary wells installed in August 2012.

NPDES: National Pollutant Discharge Elimination System

N

0 125 250 375
Feet

Date: June 29, 2021
Data Sources: Wah Chang, City of Albany GIS, GeoTerra 2019

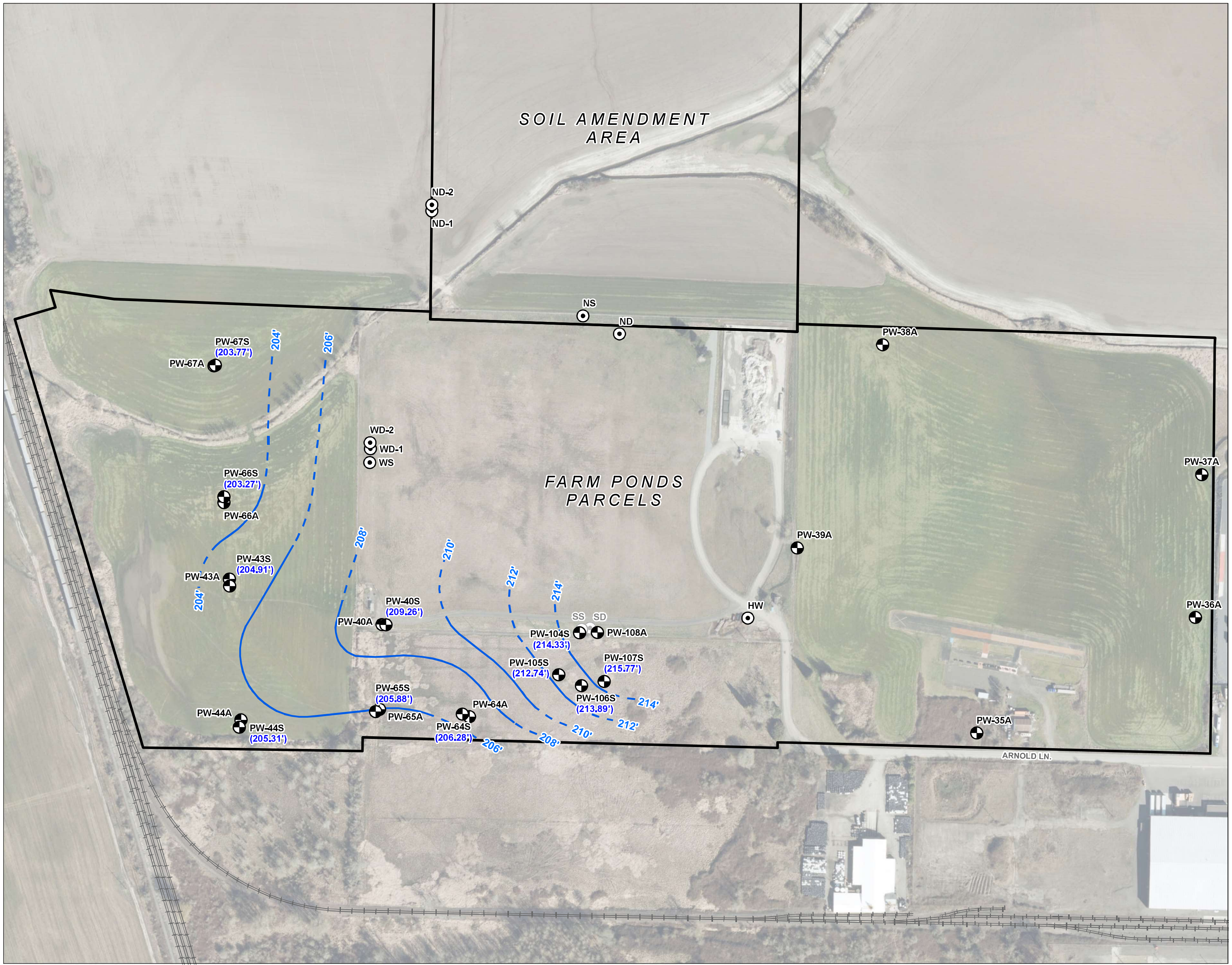
GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\029_2020\Site_Characterization\Farm_Ponds_Area\Figure3b_Farm_Ponds_Area_MWs.mxd

FIGURE 21

Willamette Silt Groundwater Contours 2021

ATI Millersburg Operations, Oregon



LEGEND

- ● Monitoring Well
- ⊙ Monitoring NPDES Well
- ○ Abandoned Well
- Groundwater Contour (ft) (dashed where inferred)
- ☐ Property Boundary
- Railroad

NOTES

1. Wells screened in Willamette Silt used for water level contouring.
2. All water levels collected on June 14, 2021.

NPDES: National Pollutant Discharge Elimination System

N

0 125 250 375
Feet

Date: March 3, 2022
Data Sources: Wah Chang, City of Albany GIS, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Farm_Ponds\Figure4_Farm_Ponds_Area_GW_Contours_2021.mxd

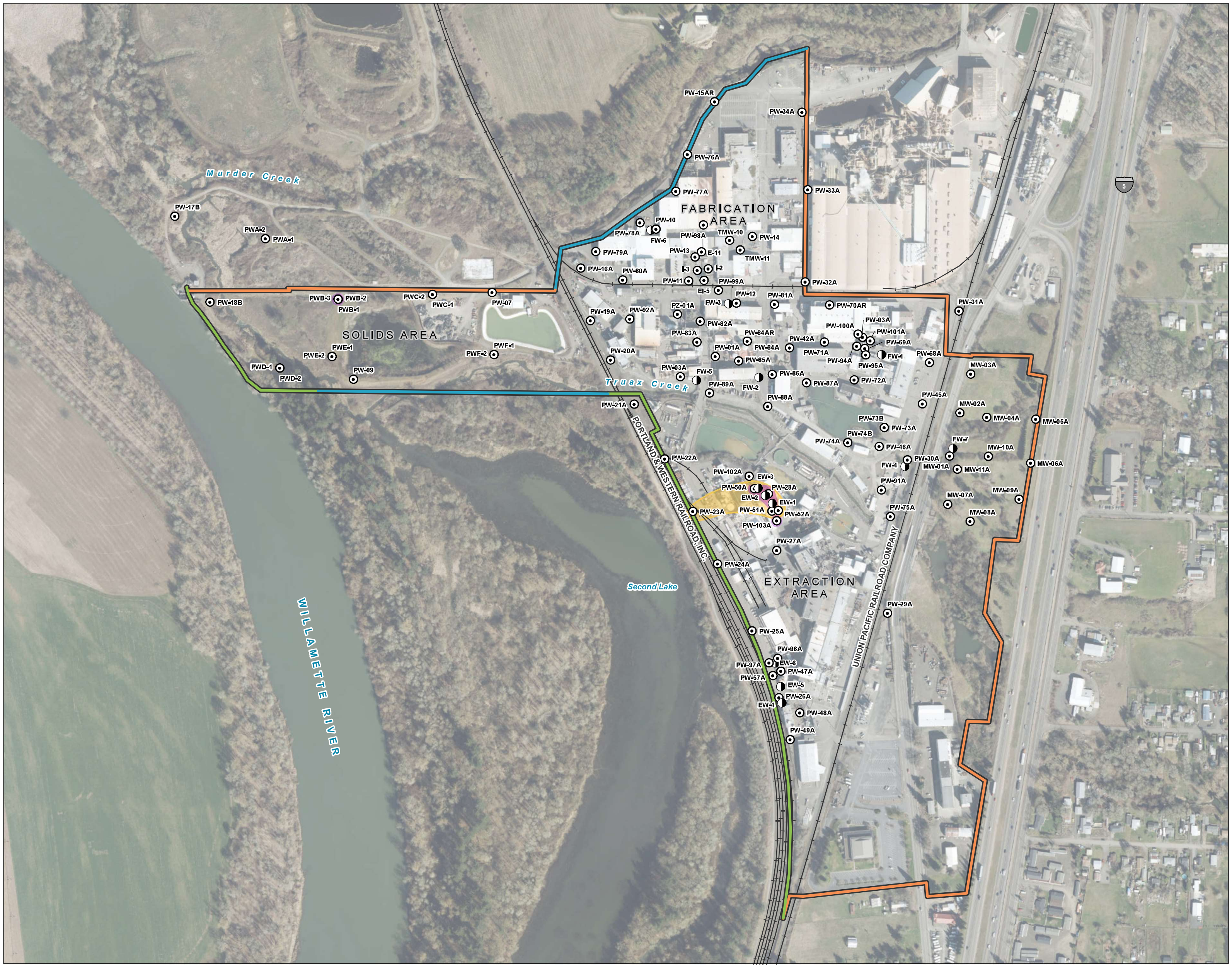


FIGURE 22

Radium-226/228 Distribution in Fall 2021 and 2000

ATI Millersburg Operations, Oregon

LEGEND

⊙ Monitoring Well

◑ Extraction Well

🟪 Fall 2021 Radium-226/228 Concentrations above the Cleanup Level (5 pCi/L)

🟨 2000 Radium-226/228 Concentrations above the Cleanup Level (5 pCi/L)

Property Boundary

— AWQC for Aquatic Receptors, Standard: not established

— AWQC for Human Health and Fish Consumption, Standard: not established

— Groundwater MCL, Standard: 5 pCi/L

All Other Features

┼ Railroad

NOTES

Wells without a displayed concentration were below the cleanup level in fall 2021.
Cleanup Level = 5 pCi/L

AWQC: Ambient Water Quality Criteria, Oregon Department of Environmental Quality
MCL: Maximum Contamination Level, U.S. Environmental Protection Agency's Drinking Water Regulation
pCi/L: picocuries per liter

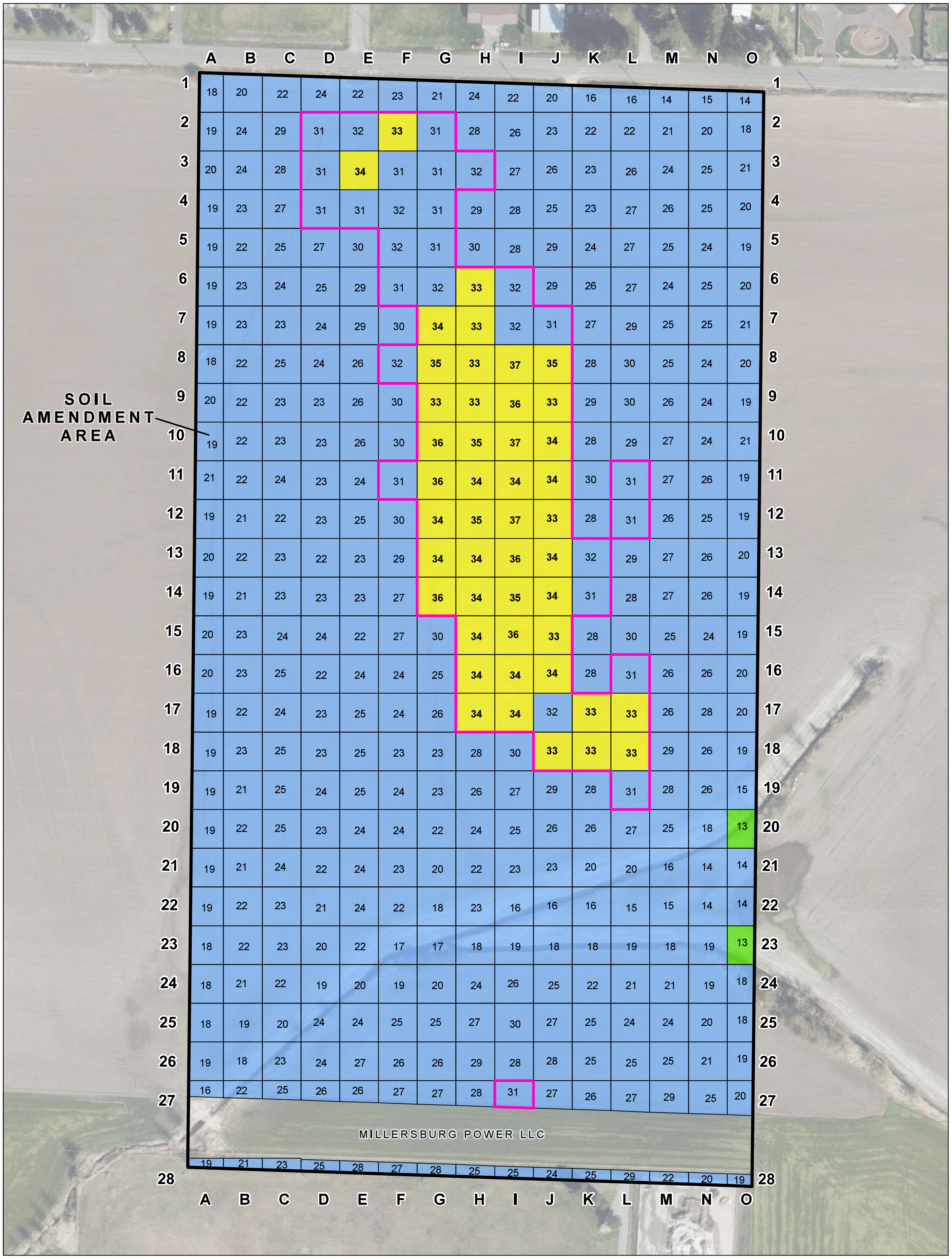
N

0 225 450 675
Feet

Date: June 30, 2022
Data Sources: Linn Co., ESRI, GeoTerra Imagery (2019)

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Comprehensive_Annual_Report\Figure14_Radium_Distribution_Fall_2021_and_2000.mxd



	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	18	20	22	24	22	23	21	24	22	20	16	16	14	15	14
2	19	24	29	31	32	**33**	31	28	26	23	22	22	21	20	18
3	20	24	28	31	**34**	31	31	32	27	26	23	26	24	25	21
4	19	23	27	31	31	32	31	29	28	25	23	27	26	25	20
5	19	22	25	27	30	32	31	30	28	29	24	27	25	24	19
6	19	23	24	25	29	31	32	**33**	32	29	26	27	24	25	20
7	19	23	23	24	29	30	**34**	**33**	32	31	27	29	25	25	21
8	18	22	25	24	26	32	**35**	**33**	**37**	**35**	28	30	25	24	20
9	20	22	23	23	26	30	**33**	**33**	**36**	**33**	29	30	26	24	19
10	19	22	23	23	26	30	**36**	**35**	**37**	**34**	28	29	27	24	21
11	21	22	24	23	24	31	**36**	**34**	**34**	**34**	30	31	27	26	19
12	19	21	22	23	25	30	**34**	**35**	**37**	**33**	28	31	26	25	19
13	20	22	23	22	23	29	**34**	**34**	**36**	**34**	32	29	27	26	20
14	19	21	23	23	23	27	**36**	**34**	**35**	**34**	31	28	27	26	19
15	20	23	24	24	22	27	30	**34**	**36**	**33**	28	30	25	24	19
16	20	23	25	22	24	24	25	**34**	**34**	**34**	28	31	26	26	20
17	19	22	24	23	25	24	26	**34**	**34**	32	**33**	**33**	26	28	20
18	19	23	25	23	25	23	23	28	30	**33**	**33**	**33**	29	26	19
19	19	21	25	24	25	24	23	26	27	29	28	31	28	26	15
20	19	22	25	23	24	24	22	24	25	26	26	27	25	18	13
21	19	21	24	22	24	23	20	22	23	23	20	20	16	14	14
22	19	22	23	21	24	22	18	23	16	16	16	15	15	14	14
23	18	22	23	20	22	17	17	18	19	18	18	19	18	19	13
24	18	21	22	19	20	19	20	24	26	25	22	21	21	19	18
25	18	19	20	24	24	25	25	27	30	27	25	24	24	20	18
26	19	18	23	24	27	26	26	29	28	28	25	25	25	21	19
27	16	22	25	26	26	27	27	28	31	27	26	27	29	25	20
28	19	21	23	25	28	27	28	25	25	24	25	29	22	20	19

LEGEND

Maximum Gamma Reading (µrem/hr)

🟩 0 - 13

🟦 14 - 32

🟨 >= 33

— >= 31 (Maximum Gamma Reading Plus Average Percent Difference of 6.8% Exceeds 33 µrem/hr)

☐ 33 20 Meter x 20 Meter Survey Grid with Maximum Gamma Readings (µrem/hr)

☐ Site Area

☐ Millersburg Power Property

NOTES

µrem/hr: microrem per hour
Background level: 13 µrem per hour
Exceedence level: 33 µrem per hour

Date: April 25, 2022
Data Sources: OGIC, USGS, GeoTerra 2019

FIGURE 23

Maximum Gamma Radiation Readings

Soil Amendment Area
Scoping Survey Summary
City of Millersburg, Oregon

N

0 80 160 240
Feet

GSI Water Solutions, Inc.

Document Path: Y:\0168_Wah_Chang\Source_Figures\034_2021_2022\Soil_Amendment_Gamma_Survey\Scoping_Survey\Figure2_Max_Gamma_Readings.mxd

APPENDIX A
SITE CHRONOLOGY

Chronology of Site Events

Event	Date
Production of zirconium begins	1957
Melting and fabrication facilities added	1959
Teledyne Industries, Inc. purchased Wah Chang	1967
Chlorinator residues disposed of at Teledyne Wah Chang	1972-1978
Application of lime solids to Soil Amendment Area	1976
Confirmation of radioactive materials in unlined sludge ponds (OSHD)	1977
NORM license granted to Teledyne Wah Chang	3/1978
Use of V-2 Pond discontinued	1979
Farm Ponds constructed	1979
TWC facility proposed for inclusion on National Priorities List (NPL)	1982
TWC listed on NPL	10/1983
Magnesium Resource Recovery Pile (MRRP) project	1983-1988
All underground storage tanks removed	1987
V-2 pond emptied	1989
Record of Decision (ROD) for Sludge Ponds Unit is signed	12/28/1989
Schmidt Lake soil removal	6/19-11/6/1991
Removal action for Lower River Solids Pond (LRSP) and Schmidt Lake	1991-1993
Teledyne Wah Chang completed Remedial Investigation/Feasibility Study (RI/FS)	3/1993
Supplemental radioactive material removal action for Schmidt Lake	8/1992-1/1993
Polychlorinated biphenyl (PCB) soil removal in the Building 114 area	11/1992
EPA issued certification of completion for the Sludge Ponds Unit	6/1993
Ownership of Soil Amendment Area transferred to the City of Millersburg	1994
Groundwater and Sediments ROD signed	6/10/1994
Surface and Subsurface Soil ROD signed	9/27/1995
Remedial actions for the OU2 and OU3 RODs implemented in accordance with Scope of Work (SOW)	9/19/1996
Groundwater Explanation of Significant Differences (ESD)	10/8/1996
Consent Decree lodged with U.S. District Court and State of Oregon	1/31/1997
Sediment cleanup of Truax Creek complete	1997
Sand Unloading Area removal	10/1997
First Five-Year Review	1997
Access Agreement signed for Sapp property	9/18/1998
Teledyne Wah Chang becomes Allegheny Technologies Inc. (ATI) Wah Chang	1999
Front Parking Lot Certificate of Completion	8/1999
Operation of South Extraction Area Groundwater Extraction and Treatment System (GETS) begins	10/2000
Soil and Subsurface Soil ESD	9/28/2001
Operation of Fabrication Area GETS begins	4/2001-8/2001
Operation of Feed Makeup Area GETS begins	4/2002
Second Five-Year Review	2003

Event	Date
Land Transfer of Solids Area to City of Albany	2004
Soil Amendment ICs implemented	2006
Proposed Consent Decree for the Soil Amendment ICs lodged with U.S. District Court: 3/27/06.	3/27/2006
Three-Year Groundwater Remedy Evaluation Reports for the Fabrication, Extraction, Solids and Farm Ponds Areas submitted.	2/2007 -9/2007
Discovery of DNAPL during drilling of FW-8 in the Acid Sump Area	9/2007
Third Five-Year Review	1/2008
In Situ Bioremediation Pilot project begins in the South Extraction Area	3/2008
Second ESD for OU 2	6/2009
In Situ Bioremediation begins in the Acid Sump Area	2009
In Situ Bioremediation begins in the Crucible Cleaning Area	2010
Cell 3 (formerly Schmidt Lake) lined with high density polyethylene	9/2010
Groundwater Extraction System in South Extraction Area Shut Down	4/2011
Berm and well removal at Farm Ponds Area	2012
Deep Hole Boring Machine Area Groundwater Investigation	8/2012
Fourth Five-Year Review	1/2013
Third ESD for OU2	4/2013
Soil Flushing Treatability Study in Feed Makeup Area	6/2013
Wastewater Release OU2	2/2014
Deep Hole Boring Machine Area Pore Water Investigation	7/2015
Deed Restriction Farm Ponds Area	2/2016
Well Installation at Farm Ponds Area	3/2016
Acid Sump Area Source Removal	8/2016
Fifth Five-Year Review	12/2017
Resample event for additional constituents from 2016 special sampling. Begin optimization effort for FMA extraction system.	2018
Former Crucible Cleaning Area Enhanced In Situ Bioremediation String 3 Operations Plan	6/20/2019
Additional EISB injection at FCCA performed. ATI proposal for modified monitoring program.	8/2019
Remedial Process Optimization Study and Optimization Review Report	2019
GEM excavation was performed north of a former process building in Feed Makeup Area	2019
EISB injection event was conducted in Former Crucible Cleaning Area	2019
GETS Fabrication Area Shutdown Pilot Test	2020
Acid Sump Area Source Area DNAPL Assessment	7/2021
Farm Ponds Parcels Restoration Completeness Evaluation	2021
Farm Ponds Parcels Site Characterization	10/2021
Soil Amendment Area Scoping Survey	10/2021
Sixth Five-Year Review	12/2022

APPENDIX B
PUBLIC NOTICES

EPA
United States
Environmental Protection
Agency

Public invited to comment on Five Year Review for ATI Millersburg Operations Plant - Teledyne Wah Chang Superfund Site

We want to hear from you

If you have observations, information, or concerns about the site or questions about EPA's review, please contact:

Chan Pongkhamsing
EPA Project Manager
206-553-1806

To submit written comments:

Email: pongkhamsing.chan@epa.gov

Mail to:

Chan Pongkhamsing, 12-D12-1
U.S. EPA Region 10
1200 Sixth Avenue, Suite 155
Seattle, WA 98101

More information is available

Prior Five-Year Reviews, site information, and other documents are available:

Online at: www.epa.gov/superfund/teledyne-wah-chang

In person at:

Albany Public Library
2450 14th Avenue SE
Albany, OR 97322

What and why

The U.S. Environmental Protection Agency has started the sixth Five-Year Review of the remedy for the ATI Millersburg Operations Plant - Teledyne Wah Chang Superfund site in Millersburg, Oregon. The purpose of the review is to ensure the selected cleanup actions continue to effectively protect people's health and the environment.

Site background

The 225-acre ATI Millersburg Operations plant (formerly Teledyne Wah Chang) site is located in Millersburg, Oregon. It is one of the largest producers of rare earth metals and alloys in the United States. The site consists of a 110-acre plant and a 115-acre area that included four ponds containing sludges from the plant's wastewater treatment facility. It also includes a 60-acre field where sludges containing radium were used as a soil amendment. Process wastes disposed of on the site contained radionuclides, heavy metals, chlorinated solvents, and other volatile organic compounds that contaminated soils, sediments, and groundwater.

Site cleanup

Initial cleanups took place during the mid and late 1990s. The cleanups combined soil excavation, installation of a system that extracted and treated contaminated groundwater, and land use restrictions. Groundwater extraction and treatment, enhanced microbial and chemical treatment, operation and maintenance activities, and monitoring are ongoing.

Five-Year Reviews

The National Contingency Plan requires review of remedial actions that result in any hazardous substances, pollutants or contaminants remaining above levels that allow for unlimited use and unrestricted exposure every five years. The sixth Five-Year Review is scheduled to be completed and available to the public after December 2022.

APPENDIX C
INTERVIEW FORMS

TELEDYNE WAH CHANG SUPERFUND SITE
FIVE-YEAR REVIEW INTERVIEW FORM

Site Name: Teledyne Wah Chang Albany Superfund Site		
EPA ID: ORD050955848		
Contact Made By:		
Name: Chan Pongkhamsing	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Name: Dave Nazy	**Title:** Consultant Project Manager	**Organization**: EA Engineering
Individual Contacted:		
Name: Janelle Booth	**Title:** Assistant City Manager	**Organization:** City of Millersburg
Contact Address: 4222 NE Old Salem Rd, Albany, OR 97321 **Phone:** 458-233-6300 **Email:** jbooth@cityofmillersburg.org		
Interview date: 9/21/2022	**Interview time:**	
Interview location: Email		
Interview format (circle one): In Person Phone Mail [✓ Email] Other:		

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environment continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the sixth five-year review for the Teledyne Wah Chan Albany Superfund Site. The scope of the review is from 2017 to present.

1. What is your general impression of the work conducted at the site since the fifth Five-Year Review period (since December 2017)? No concerns or issues.

2. What is your overall impression of the remedial actions implemented at the site? No concerns or issues.

3. What is your assessment of the current performance of the remedy in place at the Site? I have no basis for assessing the performance of any current remedies at the site.

4. From your perspective, what effects have site operations had on the surrounding community? This site provides ongoing high value jobs and is a great partner with our community.

5. During this review period, are you aware of any community concerns regarding the site or its operation and administration? If so, please provide details. No community concerns I am aware of.

6. Are you aware of any events, incidents, or activities at the site during this review period, such as vandalism, trespassing, or emergency responses from local authorities. If so, please provide details. I am aware of one fire in the summer of 2018. The City was contacted and notified of by ATI (ATI president contacted city manager) during the incident. It was rapidly

contained by ATI and Albany Fire Department. There may have been other medical or law enforcement responses during the review period, but I am not aware of any details or specifics.

7. Do you feel well informed about the site's activities and progress? If not, please indicate how you would like to be informed about the site activities – for example, by e-mail, regular mail, fact sheets, meetings, etc. I feel we are appropriately informed of the site's activities and progress.

8. Do you have any comments, suggestions, or recommendations regarding the site's management operations? The City enjoys a great working relationship with ATI's site management team.

9. Have there been any concerns from your constituents, violations, or other incidents related to the contamination at the Teledyne Wah Chang that require(d) a response from your office. If so, please provide details on concern or response. No.

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

TELEDYNE WAH CHANG SUPERFUND SITE **FIVE-YEAR REVIEW INTERVIEW FORM**		
Site Name: Teledyne Wah Chang Albany Superfund Site		
EPA ID: ORD050955848		
Contact Made By:		
Name: Chan Pongkhamsing	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Name: Dave Nazy	**Title:** Consultant Project Manager	**Organization**: EA Engineering
Individual Contacted:		
Name: Field Staff	**Title:** Environmental Scientist	**Organization:** GSI Water Solutions, Inc.
Contact Address: **Phone: Email:** gsiws.com		
Interview date: 9/23/2022	**Interview time: NA**	
Interview location: NA		
Interview format (circle one): In Person Phone Mail [✓ Email] Other:		

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environment continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the sixth five-year review for the Teledyne Wah Chan Albany Superfund Site. The scope of the review is from 2017 to present.

1. What is your overall impression of the remedial activities at the Site?
   There has been a lot of remedial activities and progress made at the Site in the last couple of years, which is a trend that will likely continue into the future. ATI, EPA, and DEQ have been collaborating in a very effective manner to facilitate this progress.

2. What have been the effects of this Site on the surrounding community, if any?
   ATI has a connection with the community as they are one of the larger employers in the area. ATI employees appear to be interested and vested in reducing their impact to the environment.

3. What is your assessment of the current performance of the remedy in place at the Site?
   Shifting away from strictly a pump and treat remedy at the Site has been beneficial. ATI, EPA, and DEQ have been focused on identifying which remedy(s) are best suited for different areas at the Site.

4. Are you aware of any complaints or inquiries regarding environmental issues or the remedial action from residents since implementation of the cleanup?
   I am not aware of any complaints or inquiries, with the exception of a document inquiry Chan Pongkhamsing brought up during an RPM meeting in summer 2022.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?
   I do feel well informed, but that is also related to my relationship with the Site. One suggestion to EPA is to possibly update their website for the Site, which is likely one of the better ways for the public to access information pertaining to the Site.

6. Do you have any comments, suggestions or recommendations regarding the management or operation of the Site's remedy?
   No, I don't have any comments, suggestions, or recommendations at this time. The Optimization Report and subsequent outcomes from the Optimization Report have been instrumental in reevaluating the Site, identifying current issues, and outlining a path forward.

7. Do you consent to have your name included along with your responses to this questionnaire in the FYR report?
   I would prefer to remain anonymous but welcome GSI Water Solutions to be identified in lieu of my name.

TELEDYNE WAH CHANG SUPERFUND SITE
FIVE-YEAR REVIEW INTERVIEW FORM

Site Name: Teledyne Wah Chang Albany Superfund Site

EPA ID: ORD050955848

Contact Made By:

Name: Chan Pongkhamsing	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Name: Dave Nazy	**Title:** Consultant Project Manager	**Organization**: EA Engineering

Individual Contacted:

Name: Margaret Oscilia, P.E.	**Title:** Senior Project Manager	**Organization:** Western Region Environmental Cleanup and Emergency Response; Oregon Department of Environmental Quality

Contact Address: 165 E. 7th Ave, Eugene, OR 97401
Phone: 503-726-6522
Email: Margaret.Oscilia@deq.orgeong.gov

Interview date: 9/20/2022 **Interview time:** 1430

Interview location: remote workstation

Interview format (circle one): In Person Phone Mail Email [✓ Other: Document]

Interview category: State Agency

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environment continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the sixth five-year review for the Teledyne Wah Chan Albany Superfund Site. The scope of the review is from 2017 to present.

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

   The project continues to make steady and effective progress. The RP and EPA RPM are actively involved and responsive. Regular meetings and progress reviews ensure effectiveness of remediation efforts and closures where appropriate.

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

   Remedies are effective and alternatives are evaluated if not effective. Such as additional remediation taking place in the Acid Sump Area.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

   ODEQ received a request from a member of the press for documents used as institutional or conservation controls for the Teledyne Wah Chang site. Related documents were provided by both ODEQ and EPA. ODEQ also received periodic inquiries about various environmental issues at Teledyne from different members of the public. None were noted as substantial in relation to the selected remedies or cleanup progress.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

   ODEQ has been in constant communication with the RP and EPA with a minimum of monthly remote meetings. In the past five years ODEQ conducted at least annual site visits, with the exception of 2020 due to the Covid 19 restrictions, but also went to the site as appropriate for specific field activities. Recent examples include 1) A general tour of the site ODEQ PM transition; 2) Observed radiation survey work conducted on the Soil Amendment Area; 3) Observed surface soil sampling conducted in the Farm Pond Parcels.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

   The RP and EPA are preparing an ESD to update the remedy to include some updated State and Federal regulatory limits. ODEQ thinks the Site remedies will remain appropriately effective.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

   Yes, ODEQ is comfortable with the status of the institutional controls at the Site.

7. Are you aware of any changes in projected land use(s) at the Site?

   The Soil Amendment Area may change from agricultural use to commercial/industrial use.

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

   The Site currently has a cooperative and effective management team.

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

   Yes

TELEDYNE WAH CHANG SUPERFUND SITE
FIVE-YEAR REVIEW INTERVIEW FORM

Site Name: Teledyne Wah Chang Albany Superfund Site

EPA ID: ORD050955848

Contact Made By:

Name: Chan Pongkhamsing	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Name: Dave Nazy	**Title:** Consultant Project Manager	**Organization**: EA Engineering

Individual Contacted:

Name: Michael Riley	**Title:** Manager, Environmental Operations and Compliance	**Organization:** ATI Specialty Alloys and Components

Contact Address: 1600 NE Old Salem Highway, Albany, OR 97321
Phone: 541-812-7230
Email: michael.riley@atimetals.com

Interview date: **Interview time:**

Interview location:

Interview format (circle one): In Person Phone Mail [✓ Email] Other:

Interview category: Potentially Responsible Party (PRP)

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environment continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the sixth five-year review for the Teledyne Wah Chan Albany Superfund Site. The scope of the review is from 2017 to present.

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

We have made considerable progress in the last two years since initiation of the Optimization program and the change in EPA RPM to Mr. Chan Pongkhamsing. I believe we are heading in a positive direction to achieve cleanup goals and maintain protectiveness of the remedies already in place.

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

Over the past 5 years, I am not aware of any effects on the surrounding community from this Site.

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

The GETS is currently being inspected weekly by ATI staff and maintenance is now performed by GSI field staff. Annual monitoring data is indicating overall positive progress in all areas and contaminant concentrations are generally decreasing.

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

We have had an occasional odor complaint from residents through the years since implementation of the cleanup, but were unrelated to the cleanup issues. Over the past 20 years odor complaint frequency has significantly decreased and are now practically non-existent. To my knowledge we have not had resident complaints tied to the remedial action.

5. Do you feel well-informed regarding the Site's activities and remedial progress? If not, how might EPA convey site-related information in the future?

I feel very well informed and appreciate the responsiveness, transparency and communication from EPA, especially since Mr. Chan Pongkhamsing became our RPM.

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

My only concern has been the challenge of keeping up with the new pace of the remedial progress and projects since Optimization. The current remedial team – ATI, GSI, EPA, ODEQ – are all pulling in the same direction and want to make as much progress as we can, however at times it has strained our resources.

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

I give my consent.

TELEDYNE WAH CHANG SUPERFUND SITE
FIVE-YEAR REVIEW INTERVIEW FORM

Site Name: Teledyne Wah Chang Albany Superfund Site		
EPA ID: ORD050955848		
Contact Made By:		
Name: Chan Pongkhamsing	**Title:** Remedial Project Manager	**Organization:** U.S. EPA
Name: Dave Nazy	**Title:** Consultant Project Manager	**Organization**: EA Engineering
Individual Contacted:		
Name: Tom Sicilia, PG	**Title:** Hanford Hydrogeologist	**Organization:** Oregon Department of Energy
Contact Address: 550 Capitol St. NE, Salem, OR 97301 **Phone:** 503-508-8333 **Email:** tom.sicilia@energy.oregon.gov		
Interview date:	**Interview time:**	
Interview location:		
Interview format (circle one): In Person Phone Mail [✓ Email] Other:		
Interview category: State Agency		

The purpose of the five-year review is to evaluate the implementation and performance of the remedy, and to confirm that human health and the environment continue to be protected by the remedial actions that have been performed at the site. This interview is being conducted as a part of the sixth five-year review for the Teledyne Wah Chan Albany Superfund Site. The scope of the review is from 2017 to present.

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

I have minimal knowledge of the project as a whole, but there seems to be progress being made. I appreciate being included in discussions related to placement of NORM/TENORM in the state. The Oregon Department of Energy, Nuclear Safety and Emergency Preparedness division, is responsible for implementing Oregon's regulations regarding disposal of radioactive waste.

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

I trust that the ROD is protective of site users and that the regulatory agencies are adequately engaged.

3. Are you aware of any complaints or inquiries regarding site-related environmental issues or remedial activities from residents in the past five years?

I am not aware of complaints. Inquiries have included the regulatory status of Soil Amendment Area (SAA) materials, and whether the ATI pathway exemption was inclusive of these materials.

4. Has your office conducted any site-related activities or communications in the past five years? If so, please describe the purpose and results of these activities.

We have conducted a review of the regulatory status of SAA materials, and whether the ATI pathway exemption was inclusive of these materials. Other NORM or TENORM material on the site should have a similar review prior to placement or disposal in the state.

5. Are you aware of any changes to state laws that might affect the protectiveness of the Site's remedy?

The Energy Facility Siting Council is currently undertaking a rulemaking on Division 50. This ruleset is what our division uses to determine whether NORM/TENORM is classified as radioactive waste in the state. Adoption of a new ruleset may have implications for NORM material formerly disposed under a pathway exemption.

6. Are you comfortable with the status of the institutional controls at the Site? If not, what are the associated outstanding issues?

NORM or TENORM material on the site should be reviewed with our agency prior to placement or disposal in the state.

7. Are you aware of any changes in projected land use(s) at the Site?

I understand that proposals to modify the use of the SAA are being considered.

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

Waste classification practice should include review of whether or not the NORM/TENORM is legal to dispose in state.

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

Yes.

APPENDIX D
SITE INSPECTION FORMS

FIVE-YEAR REVIEW SITE VISIT CHECKLIST

I. SITE INFORMATION

Site Name: ATI/Teledyne Wah Chang	**Date of Inspection: 3 October 2022**
Location and Region: Millersburg Oregon	**EPA ID:** ORD050955848
Agency, office, or company leading the five-year review: U.S. Environmental Protection Agency, Region 6	**Weather/temperature:** Sunny, around 75 degrees F

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)

Attachments: ☒ Inspection team roster attached ☒ Site map attached (Figure 2 of report)

II. INTERVIEWS (Check all that apply)

1. **O&M Site Manager** Michael Riley Environmental and Compliance Manager
Name Title Date
Interviewed: ☒ by mail ☐ at office ☐ by phone Phone no. 971-200-8511
Problems, suggestions: ☐ Report attached

2. **O&M Staff** GSI Environmental Scientist
Name Title Date
Interviewed: ☒ by mail ☒ at office ☐ by phone Phone no.
Problems, suggestions: ☐ Report attached

3. **Other interviews** (optional): ☒ Report attached to Five-Year Review Report

See Appendix __

III. ON-SITE DOCUMENTS & RECORDS VERIFIED (Check all that apply)

1. **O&M Documents**

☒ O&M manual (long term monitoring plan)	☒ 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:

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: Dozens of documents, up-to-date

3. **O&M and OSHA Training Records** ☐ Readily available ☐ Up to date ☒ N/A
Remarks: Environmental staff / GSI have up-to-date HAZWOPPER training

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: Extraction wells discharge to POWT after ammonia removal

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

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

7. Ground Water Monitoring Records ☒ Readily available ☐ Up to date ☐ N/A

8. Leachate Extraction Records ☐ Readily available ☐ Up to date ☒ N/A

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: Controlled through badging system, computer logs up-to-date

IV. O&M COSTS

1. O&M Organization

☐ State in-house ☐ Contractor for State ☒ PRP in-house
☐ Contractor for PRP ☐ Other ____________________

2. O&M Cost Records **NOT PROVIDED – A very small percentage of plant costs so not broken out**

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

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

Information not available

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

A. Fencing

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

Remarks: Fences and security in good condition.

B. Other Access Restrictions

1. Signs and other security measures ☐ Location shown on site map ☐ N/A

Remarks: _Access to site secure. Guard gates staffed. Unstaffed gates require key card for entry.

C. Institutional Controls

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
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
No Violations have been reported			

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

Remarks: Deed Restrictions on Farm Ponds area to keep commercial/industrial

D. General

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

Remarks:

2. Land use changes onsite ☐ N/A

Remarks: None noted

3. Land use changes offsite ☐ N/A

Remarks: None noted

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:

VII. LANDFILL COVERS ☐ Applicable ☒ N/A

VIII. VERTICAL BARRIER WALLS ☐ Applicable ☒ N/A

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 located ☐ Needs O&M ☐ N/A

Remarks:______________________________

2. Extraction System Pipelines, Valves, Valve Boxes, and Other Appurtenances

☒ Good condition ☐ Needs O&M

Remarks: ______________________________

3. Spare Parts and Equipment

☒ Readily available ☒ Good condition ☐ Requires upgrade ☐ Needs to be provided

Remarks: Spare parts in stock room

B. Surface Water Collection Structures, Pumps, and Pipelines ☐ Applicable ☒ N/A

C. Treatment System ☒ Applicable ☐ N/A

1. Treatment Train (Check components that apply)

☐ Metals removal ☐ Oil/water separation ☒ Bioremediation Enhanced with Iron

☐ Air stripping ☐ Carbon absorbers

☐ Filters ____
☐ Additive (e.g., chelation agent, flocculent) ______________________________
☐ Others ____
☐ Good condition ☐ Needs O&M
☐ 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: Did not see treatment facility

2. Electrical Enclosures and Panels (Properly rated and functional)
☐ N/A ☒ Good condition ☐ Needs O&M
Remarks: A little corrosion noted at treatment building in FMA (corrosive environment)

3. Tanks, Vaults, Storage Vessels
☒ N/A ☐ Good condition ☐ Proper secondary containment ☐ Needs O&M
Remarks:

4. Discharge Structure and Appurtenances
☒ N/A ☐ Good condition ☐ Needs O&M
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 O&M ☐ N/A
Remarks: In general, wells were functioning and in good condition.

D. Monitored Natural Attenuation ☒ Applicable ☐ N/A

1. Monitoring Wells (Natural attenuation remedy)
☒ Properly secured/locked ☐ Functioning ☒Routinely sampled (semi or annually) ☒Good condition
☐ All required wells located ☐ Needs O&M ☐ N/A
Remarks:

X. OTHER REMEDIES

If there are remedies applied at the site that are 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 to accomplish (i.e., to contain contaminant plume, minimize infiltration and gas emission, etc.).

See Five Year Review Report

B. Adequacy of O&M

Systems appeared well maintained, minor corrosion visible on treatment system 1 electrical panel.

C. Early Indicators of Potential Remedy Failure
None noted
D. Opportunities for Optimization
Describe possible opportunities for optimization in monitoring tasks or the operation of the remedy. See Five Year Review Report

INSPECTION TEAM ROSTER

Name	Organization	Title
Chan Pongkhamsing	EPA	Remedial Project Manager
Charles D. Clabaugh	EPA	Hydrogeologist
Kathleen Peshet	EPA	Hydrogeologist
Michael Riley	ATI	Environmental Manager
Noel Mak	ATI	Facilities Manager
Tory Alexander	ATI	Environmental Specialist
Renee Fowler	GSI	Environmental Scientist
Dave Nazy	EA Engineering	Hydrogeologist

SITE INSPECTION CHRONOLOGY

October 3, 2022

13:30 – Arrive at ATI/Teledyne Wah Chang facility
13:30 - 13:45 – Check in with Security and watch site safety video
13:45 - 14:10 – Meeting with Inspection Team to discuss purpose of visit and review /edit Site Inspection Form.
14:10 - 14:18 – Inspection Team assembled into two ATI vehicles to tour the site.
14:18 - 14:35 – Observe monitoring and extraction wells, storage areas, containments, and overall site conditions in the Recycle Yard, East Perimeter Area, Former Crucible Cleaning Area, and Recycling Area within the Fabrication Area.
14:35 - 14:42 – Observe remediation activities and temporary injection points, monitoring wells and general site conditions in the Acid Sump Area within the Fabrication Area.
14:42 - 14:58 – Observe extraction well house, extraction well control panel, monitoring wells, Truax Creek and general site conditions in the Ammonia Sulfite Storage Area within the Extraction Area.
14:58 - 15:10 – Observe monitoring wells and general site conditions in the NE corner of Northwest Extraction Area.
15:10 - 15:25 – Observe extraction wells, extraction wells control panel, monitoring wells and general site conditions in the Feed Makeup Area within the Extraction Area.
15:25 - 15:42 – Drive to and observe Farm Ponds Area
15:42 - 16:05 – Drive to and observe Murder Creek and solids staging area within the Solids Area
16:05 - 16:20 – Return to ATI offices for de-brief meeting in lobby and to return PPE.
16:25 – Depart ATI/Teledyne Wah Chang facility.

Notes:

All pictures were taken and provided by Michael Riley, ATI Environmental and Compliance Manager.

Photo 1 – Extraction Well FW-4 Well House in the Recycle Yard

Photo 2 – Example of custom flush steel well cover on Well PW-94A in the Former Crucible Cleaning Area

Photo 3 –Flush Completion Monitoring Well Head MW-11 in Fabrication Area Courtyard

Photo 4 – Example of Abandoned Temporary Emulsified Oil/ZVI Substrate and Microbe Injection Point filled with Grout in the Acid Sump Area

Photo 5 – Example of Temporary Emulsified Oil/ZVI Substrate and Microbe Injection Point in the Acid Sump Area

Photo 6 –Above Ground Monitoring Well PW-01A in Ammonia Sulfite Storage Area

Photo 7 – Example of Ammonia Sulfite Storage Area Temporary Extraction Well

Photo 8 – Manhole Cover Over Extraction Well FW-5 in the Ammonia Sulfite Storage Area

Photo 9 – Monitoring Well PW-03A in the Ammonia Sulfite Storage Area

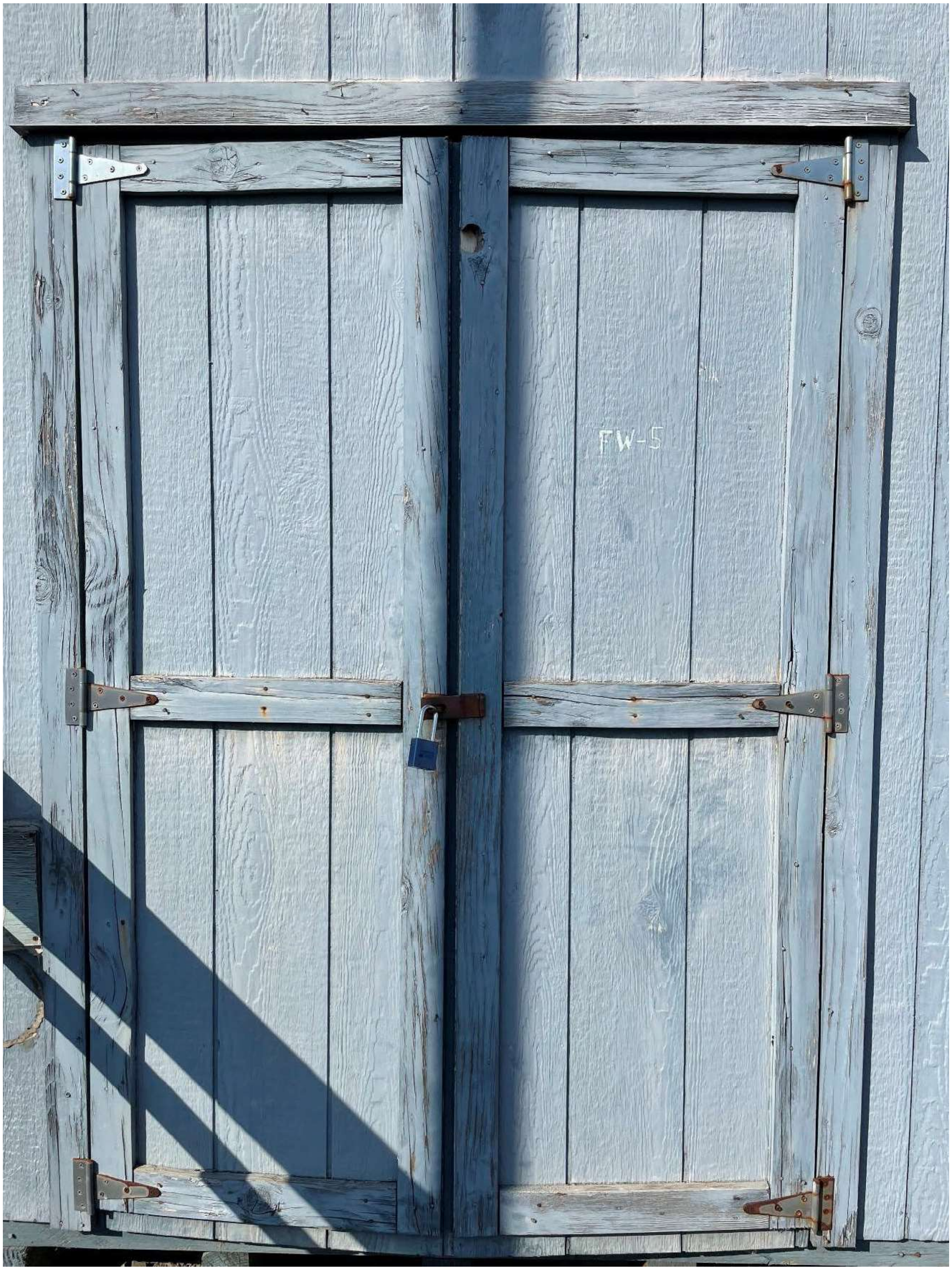


Photo 10 – Outside of Well House for Extraction Well FW-5 in the Ammonia Sulfite Storage Area

Photo 11– Inside of Well House for Extraction Well FW-5 in the Ammonia Sulfite Storage Area

Photo 12 – Monitoring Well PW-21A in the Northwest Extraction Area

Photo 13 – Monitoring Well PW-21A in the Northwest Extraction Area

Photo 14 – Monitoring Well CW-03, Replacement Monitoring Well for PW-21A in the Northwest Extraction Area

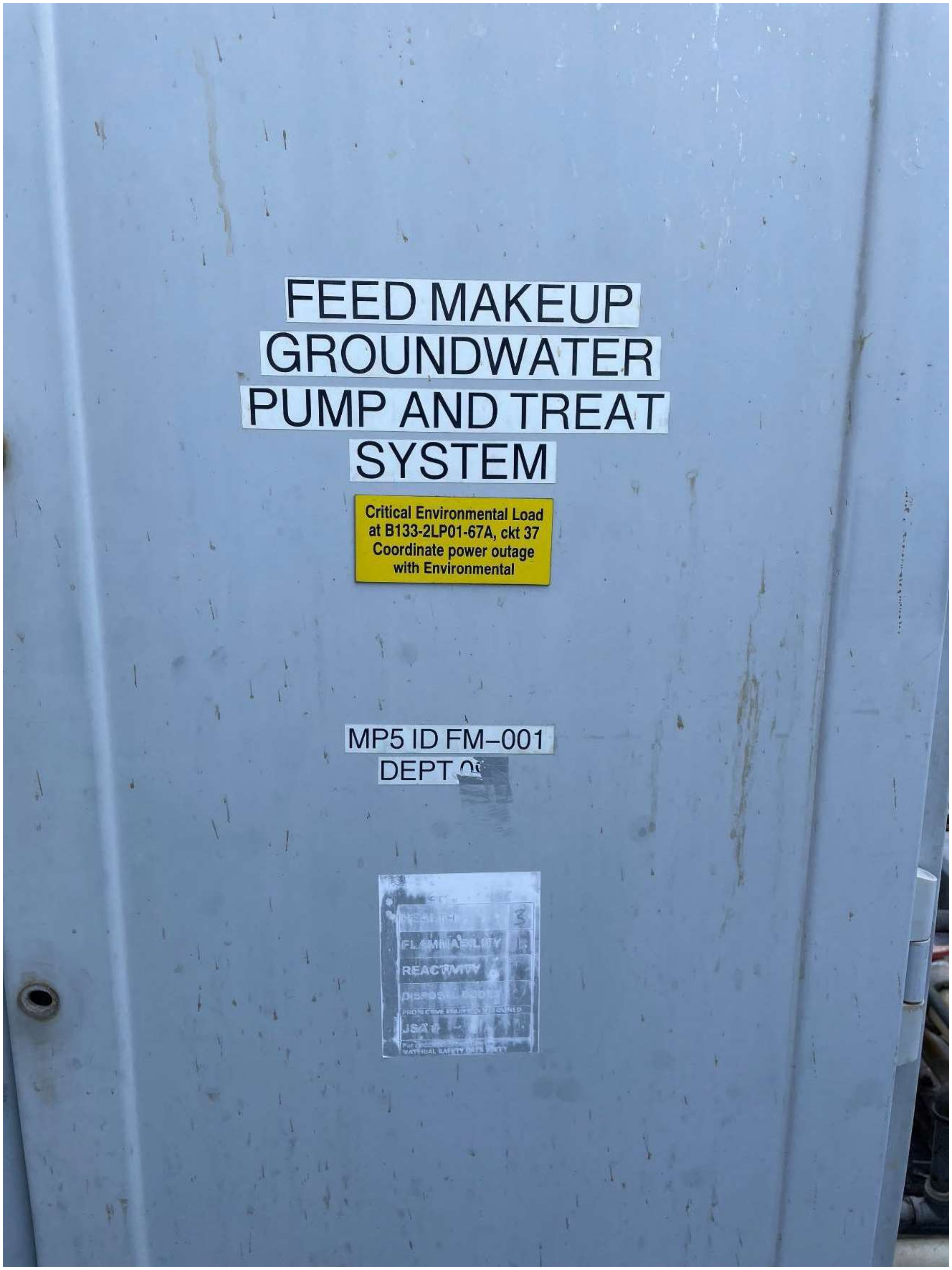


Photo 15 – Door to Control Panel for Extraction Wells EW-1, EW-2, and EW-3 in the Feed Markup Area

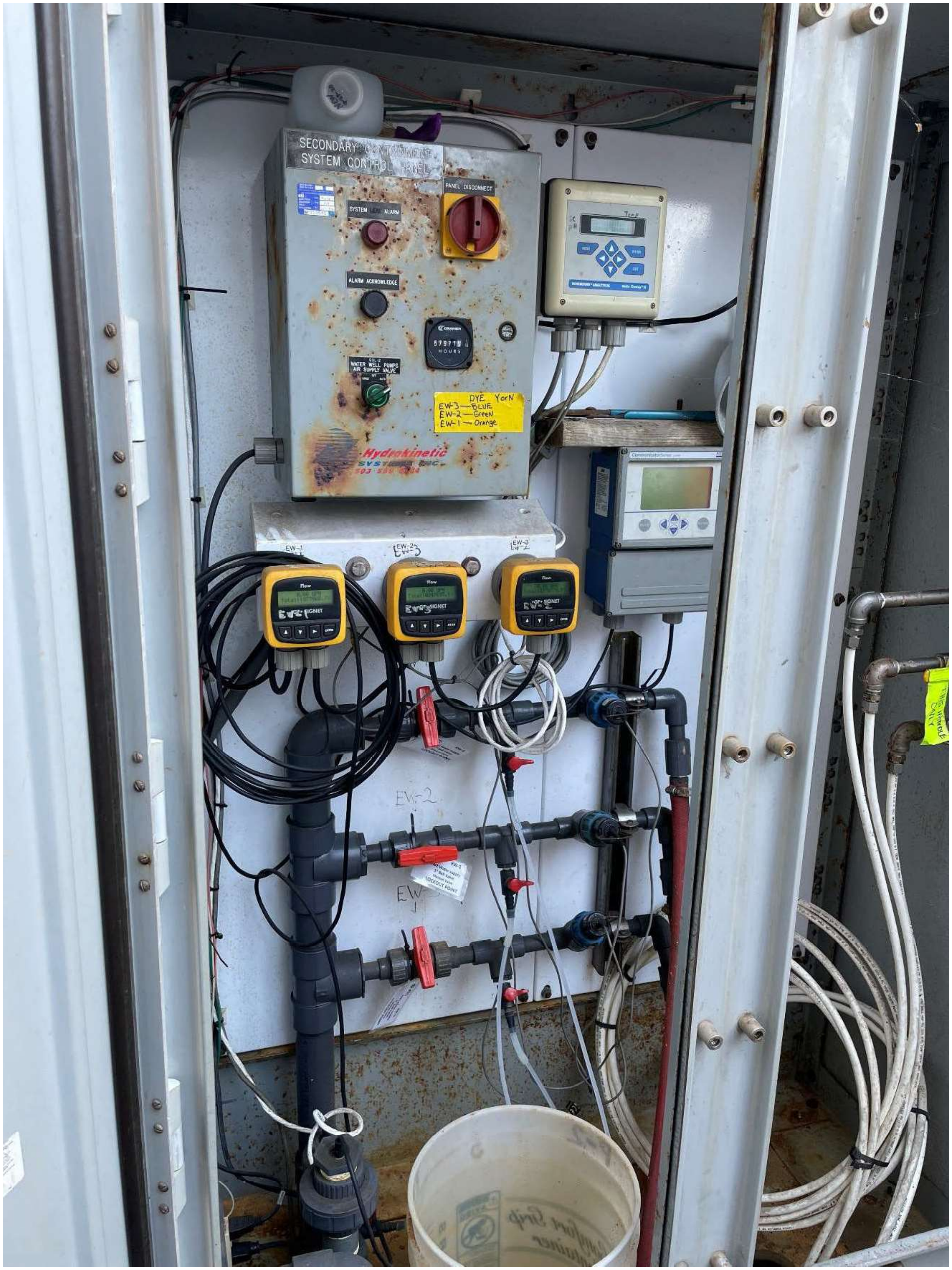


Photo 16 – Control Panel for Extraction Wells EW-1, EW-2, and EW-3 in the Feed Markup Area

Photo 17 – Farm Ponds Site, looking West

Photo 18 – Staging Area used to Characterize Solid Waste within the Solids Area

APPENDIX E
DATA TABLES

Table A-1: Fabrication Area Monitoring Well Concentration for 1,1-Trichloroethane (TCA)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	200	-	—	1.6	6.28	1	0.5	0.74	0.52	3.04	9.39	7.71	8.08	8.88	—	50.9	—	7.87
Acid Sump	FW-3	PW-11	200	-	135	176	43.5	85.4	131	11.3	11.00	66.1	9.78	8.03	3	1.71	—	0.94 J	—	33.9
Acid Sump	FW-3	PW-12	200	-	8,100	1,170	894	1,360	527	616	166	155	640	504	6.8	149	36.2	666	721	805
Acid Sump	FW-3	PW-13	200	-	564	197	113	139	13.5	38.2	24.2	41.7	92.4	68.5	2,080	3,960	—	#####	—	4,860
Acid Sump	FW-3	PW-98A	200	-	—	26.5	73.2	407	1,000	548	1,270	1,340	894	2,600	466	474	335	1,970	792 J	1,730
Acid Sump	FW-3	PW-99A	200	-	—	131	43	26.7	38.3	157	86.9	74.9	70.6	54.7	41.5	13.2	19	25.9	17.5	15.1
Material Recycle	FW-2	PW-42A	200	-	3.2	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Material Recycle	FW-2	PW-85A	200	-	37.3	1.71	0.68	0.61	0.33 J	0.28 J	0.4 J	—	1.2	1.19	1.04	0.87	—	0.43	—	4.24
Material Recycle	FW-2	PW-86A	200	-	2.6	0.57	0.5 U	0.26 J	0.50 J	0.50 U	0.50 U	—	0.800 U	0.400 U	1 U	0.4 U	—	0.8 U	—	0.4 U
Amm-Sulfate Stg	FW-5	PW-01A	200	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Amm-Sulfate Stg	FW-5	PW-03A	200	-	26.6	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.364 J
Amm-Sulfate Stg	FW-5	PW-83A	200	-	10.2	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	MW-01A	200	-	2.4	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	MW-02A	200	-	37	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	MW-03A	200	-	3.7	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	1.65	0.275 J	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	MW-04A	200	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-45A	200	-	6.3	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.45	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-68A	200	-	652	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	1.16	0.4 U	0.4 U	0.400 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-69A	200	-	3,790	9.5	103	95.4	60.5	55.4	96.2	117	281	102	86	2.44	47.2	353	—	278 J
Former CCA	FW-1	PW-71A	200	-	18.3	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-93A	200	-	—	10.1	28.2	28.7	18.8	26.6	46.6	29.1	76.7	29.3	22.8	6.9	6.93	55 J	—	613
Former CCA	FW-1	PW-94A	200	-	—	1,380	1,610	1,830	2,460	2,260	1,430	1,190	1,630	525	748	233	476	262	525	1,470
Former CCA	FW-1	PW-95A	200	-	—	65.2	582	259	373	149	699	153	26	363	805	568	271	324	—	196 J
Former CCA	FW-1	PW-100A	200	-	—	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	1,060	1,080	436	0.823	149	4.1	4 U	4 U	—	4 U
Recycle Yard	FW-4	PW-30A	200	-	1,680	280	200	372	551	184	500	827	509	741	321	370	424	574	472	162
Recycle Yard	FW-4	PW-73B	200	-	1.9	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	200	-	—	1.61	2.15	39	0.74	2.01	0.500 U	1.49	0.995	0.400 U	0.4 U	1.18	—	0.4 U	—	0.59
Acid Sump	FW-3	PW-10	200	-	125	51.4	25.6	39.1	25.6	15.3	23.8	33.2	24.1	15.5	22.5	23.1	—	18.5	—	—
Acid Sump	FW-3	PW-14	200	-	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	0.4 U[4]	—
Acid Sump	FW-3	PW-16A	200	-	2.6	2.89	2.92	0.31 J	0.40 J	0.91	0.27 J	0.18 J	0.400 U	—	0.4 U	0.257 J	0.21 J	0.36 J	0.221 J	0.6
Acid Sump	FW-3	PW-19A	200	-	1 U	1.77	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-80A	200	-	108	5.04	3.66	3.1	10.2	18	5.34	6.16	13.8	4.3	24.5	9.13	—	4.42	—	6.86
Acid Sump	FW-3	PW-81A	200	-	1 U	—	—	—	0.28 J	—	—	—	—	—	—	0.4 U	—	0.4 U	—	0.4 U
Acid Sump	FW-3	PW-82A	200	-	9.4	1.75	1.23	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	0.4 U	0.4 J
Material Recycle	FW-2	PW-87A	200	-	1.018	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Material Recycle	FW-2	PW-88A	200	-	2.6	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.15 J	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Amm-Sulfate Stg	FW-5	PW-20A	200	-	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	200	-	18.2	0.48 J	0.48 J	0.44 J	0.38 J	0.33 J	0.27 J	0.51	0.92	1.09	0.718	0.65	—	0.26 J	—	2.58
Amm-Sulfate Stg	FW-5	PW-89A	200	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.15 J	0.17 J	0.400 U	0.400 U	0.212 J	0.321 J	0.4 U	0.4 U	0.4 U	0.4 U
Amm-Sulfate Stg	FW-5	PW-92A	200	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-31A	200	-	1 U	0.5 U	0.5 U	0.5 U	5.0 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-70AR	200	-	1 U	—	—	—	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-72A	200	-	2.4	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-101A	200	-	—	0.5	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.408	4 U	3.35	—	0.4 U	—	0.4 UJ
Recycle Yard	FW-4	PW-46A	200	-	1 U	0.2 J	0.52	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Recycle Yard	FW-4	PW-74B	200	-	1.1	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Recycle Yard	FW-4	PW-75A	200	-	311	7.26	20.8	10.2	21.7	28.6	62.6	18	65.3	28.9	56	22.9	44.8	59.2	99	85.6
Recycle Yard	FW-4	PW-91A	200	-	391	3.38	3.59	8.73	6.49	0.55	8.45	11.4	15.2	5.63	5.62	1.14	4.08	0.85	1.42	0.4 U
Perimeter Monitoring Wells																				
Acid Sump	FW-3	PW-15AR	200	-	39	—	—	—	0.38 J	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	200	-	14.8	2.1	2.02	0.16 J	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-77A	200	-	50 U	5.25	2.05	0.32 J	0.25 J	0.19 J	1.6	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-78A	200	-	22.8	17.2	12.5	8.55	8.0	6.19	10.2	9.69	16.7	10.4	19.6	19.8	28	21.2	30.5	41.1
Acid Sump	FW-3	PW-79A	200	-	28.9	3.07	2.52	0.21 J	0.35 J	0.5 U	13.9	3.73	16.6	19.1	11.3	10.8	5.95	6.67	7.14	14.3

Notes

E = estimated value above the calibration range
J = estimated value
— = not analyzed
D = diluted
U = not detected above reporting limit
UJ = not detected above reporting limit and estimated

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

The Sixth Five Year Review Covers 2017-2021

Table A-2: Fabrication Area Monitoring Well Concentration for 1,1-Dichloroethene (DCE)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	7	1800 (a)	—	0.65	0.56	1.87	1.25	0.50 U	0.62	4.92	13.0	15.3	13	15.3	—	77	—	21.2
Acid Sump	FW-3	PW-11	7	1800 (a)	118	204	34.4	131	214	4.66	11.30	28.6	7.92	21.6	3.61	2.46	—	0.53 J	—	23.2
Acid Sump	FW-3	PW-12	7	1800 (a)	9,830	266	233	340	196	175	54.8	40	155	120	15.6	39	17.4	185 J	355	373
Acid Sump	FW-3	PW-13	7	1800 (a)	773	520	390	545	95.6	177	157	201	525	379	588	878	—	1,360	—	645
Acid Sump	FW-3	PW-98A	7	1800 (a)	—	110	203	651	1,110	588	1,390	1,340	1,120	2,830	772	830	494	1,610	939 J	1,610
Acid Sump	FW-3	PW-99A	7	1800 (a)	—	303	145	110	132	365 E	375	262	773	516	368	139	174	247	299	271
Material Recycle	FW-2	PW-42A	7	1800 (a)	69.3	23.9	17.5	11.2	9.00	8.12	6.34	4.56	7.81	8.41	11.8	9.78	—	8.3	—	5.17
Material Recycle	FW-2	PW-85A	7	1800 (a)	76.9	6.81	3.71	4.44	6.2	4.05	5.4	—	9.69	10.3	7.42	10.6	—	10.5	—	13.2
Material Recycle	FW-2	PW-86A	7	1800 (a)	169	0.5 U	3.06	0.5 U	0.50 U	0.29 J	0.65	—	1.10	1.04	1.06	1.02	—	0.88	—	0.992
Amm-Sulfate Stg	FW-5	PW-01A	7	1800 (a)	57.7	11.6	15.6	12.7	13.0	13.6	1.48	0.50 U	28.9	29	0.46	1.97	—	13.8	—	8.4
Amm-Sulfate Stg	FW-5	PW-03A	7	1800 (a)	156	0.68	0.42 J	0.45 J	0.36 J	0.24 J	0.60	0.75	2.32	2.66	3.22	3.85	—	3.34	—	5.1
Amm-Sulfate Stg	FW-5	PW-83A	7	1800 (a)	64	2.19	1.49	0.82	0.88	0.80	0.93	0.79	1.38	0.990	0.964	0.91	—	1.42	—	1.01
Former CCA	FW-1	MW-01A	7	1800 (a)	131	36.1	35.6	41.8	25.3	32.80	38.50	38.40	42.7	74	48.3	43.7	52.4	60.4	50.4	60.4
Former CCA	FW-1	MW-02A	7	1800 (a)	455	26.8	0.5 U	12.5	8.38	9.83	9.35	4.14	5.28	12.3	15.5	20.2	—	23.9	—	31
Former CCA	FW-1	MW-03A	7	1800 (a)	9.6	0.5 U	21.9	0.5 U	0.50 U	0.50 U	0.50 U	1.99	0.616	0.462	0.22 J	2.32	—	5.88	—	14.6
Former CCA	FW-1	MW-04A	7	1800 (a)	224	28.1	26	24.4	8.5 J	11.5	12.3	10.8	4.25	11.7	7.96	12.3	—	17.2	—	14
Former CCA	FW-1	PW-45A	7	1800 (a)	164 D	7.42	1.1	3.42	5.15	0.30 J	0.79	3.11	2.46	5.07	4.64	6.09	—	4.15	—	4.3
Former CCA	FW-1	PW-68A	7	1800 (a)	222	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.750	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-69A	7	1800 (a)	247	1.25	10.4	8.48	6.28	5.21	14.5	17.4	30.9	8.08	9.95	7.99	23.8	69.5	—	66.7
Former CCA	FW-1	PW-71A	7	1800 (a)	74.2	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.494	0.400 U	1.01	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-93A	7	1800 (a)	—	9.77	11.8	17.2	7.54	6.71	14.8	14.9	21.4	13.40	14.7	26.7	89.6	46 J	—	87
Former CCA	FW-1	PW-94A	7	1800 (a)	—	71	97.3	90.8	116	110	122	122	154	138	57.8	80.6	44.2 J	42	63.7	147
Former CCA	FW-1	PW-95A	7	1800 (a)	—	4.55	43.9	19.9	28.8	14.1	104	49.5	12.2	39.3	68.2	191	49.9	65.4	—	24.4
Former CCA	FW-1	PW-100A	7	1800 (a)	—	0.37 J	0.31 J	0.5 U	0.50 U	0.50 U	77.3	128	168	2.4	51	1.50 J	4 U	4 U	—	4 U
Recycle Yard	FW-4	PW-30A	7	1800 (a)	117	22.2	14.4	23.1	33.3	13.4	23.4	32.4	20.9	34.0	16.4	20	18.4	25	23.6	8.94
Recycle Yard	FW-4	PW-73B	7	1800 (a)	56.8	1.64	1.52	0.5 U	1.89	1.40	2.39	1.40	2.66	1.26	0.821	1.75	1.43	1.54	1.32	1.75
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	7	1800 (a)	—	0.5 U	0.5 U	3.38	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.325 J	—	0.4 U	—	0.28 J
Acid Sump	FW-3	PW-10	7	1800 (a)	18.6	6.06	2.72	3.76	2.3	2.41	2.79	2.92	1.98	2.25	2.33	2.99	—	2.14	—	
Acid Sump	FW-3	PW-14	7	1800 (a)	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	0.4 U[4]	—
Acid Sump	FW-3	PW-16A	7	1800 (a)	1.7	0.5 U	0.5 U	0.5 U	0.29 J	0.75	0.29 J	0.20 J	0.400 U	—	0.4 U	0.4 U	0.22 J	0.28 J	0.216 J	0.63
Acid Sump	FW-3	PW-19A	7	1800 (a)	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-80A	7	1800 (a)	93.6	2.45	0.57	1.33	8.26	15.5	4.59	4.23	10.1	4.20	19.3	6.65	—	4.26	—	7.55
Acid Sump	FW-3	PW-81A	7	1800 (a)	1 U	—	—	—	7.53	—	—	—	—	25.2	—	0.94	—	3.48	—	1.69
Acid Sump	FW-3	PW-82A	7	1800 (a)	9.3	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	0.4 U	0.84
Material Recycle	FW-2	PW-87A	7	1800 (a)	1.4	0.5 U	0.5 U	0.5 U	0.50 U	0.24 J	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Material Recycle	FW-2	PW-88A	7	1800 (a)	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Amm-Sulfate Stg	FW-5	PW-20A	7	1800 (a)	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	7	1800 (a)	22.9	7.62	5.9	6.45	5.78	3.84	5.43	6.29	8.61	9.87	11.4	14	—	11.4	—	9.54
Amm-Sulfate Stg	FW-5	PW-89A	7	1800 (a)	3.5	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.47 J	0.48 J	0.410	0.60	1.92	1.8	1.73	1.09	0.800	0.847
Amm-Sulfate Stg	FW-5	PW-92A	7	1800 (a)	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-31A	7	1800 (a)	1 U	0.5 U	0.5 U	0.5 U	5.0 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-70AR	7	1800 (a)	1 U	—	—	—	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-72A	7	1800 (a)	2.2	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-101A	7	1800 (a)	—	0.35 J	0.5 U	0.5 U	0.50 U	0.50 U	0.17 J	0.16 J	1.66	0.615	4 U	2.13	—	0.2 J	—	0.4 UJ
Recycle Yard	FW-4	PW-46A	7	1800 (a)	9.2	2.16	0.5 U	0.5 U	0.50 U	0.91	1.30	0.50 U	0.509	0.400 U	1.72	0.674	—	1.09	—	0.946
Recycle Yard	FW-4	PW-74B	7	1800 (a)	5.1	0.82	1.66	1	1.02	0.53	0.99	0.71	0.866	0.550	0.713	0.53	—	0.44	—	0.378 J
Recycle Yard	FW-4	PW-75A	7	1800 (a)	51.4	1.72	2.11	1.61	1.99	3.35	3.53	1.89	4.19	3.97	3.94	3.48	3.97	5.18	7.72	7.44
Recycle Yard	FW-4	PW-91A	7	1800 (a)	70.6	1.74	1.02	1.78	1.97	1.01	1.46	3.32	3.44	4.31	2.5	1.86	1.34	1.17	1.64	1.05
Perimeter Monitoring Wells																				
Acid Sump	FW-3	PW-15AR	7	1800 (a)	5 U	—	—	—	0.2 J	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	7	1800 (a)	6.9	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-77A	7	1800 (a)	90.7	16.3	15.4	18.3	16	9.38	15.7	10.0	17.7	17.9	12.2	9.74	11.7	9.18	6.74	6.63
Acid Sump	FW-3	PW-78A	7	1800 (a)	67	69	77.3	84.1	66.3	77.2	84.0	83.5	82.9	79	73.8	43.6	48.8	37.5	29.4	21.8
Acid Sump	FW-3	PW-79A	7	1800 (a)	16.6	3.66	0.5 U	1.14	2.54	0.50 U	10.5	9.79	12.9	15.2	8.95	6.8	7.3	9.84	13.5	13.3

Notes

E = estimated value above the calibration range
J = estimated value
— = not analyzed
D = diluted
U = not detected above reporting limit
UJ = not detected above reporting limit and estimated
(a) Risked based value based on industrial worker tap water ingestion pathway

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

The Sixth Five Year Review Covers 2017-2021

Table A-3: Fabrication Area Monitoring Well Concentration for Trichloroethene (TCE)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	5	-	—	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.57	—	0.4 U
Acid Sump	FW-3	PW-11	5	-	13.9	4.78 J	2.08	2.44	3.5	0.96	0.80	4.73	0.320 J	0.63	0.2 J	0.4 U	—	0.4 UJ	—	3.62
Acid Sump	FW-3	PW-12	5	-	186	134	128	143	98.8	54.3	33.6	26.5	20.2	19.4	7.23	10.8	6.85	56.3	36.6	35.1
Acid Sump	FW-3	PW-13	5	-	14.1	16.2 J	13.6 J	15.7	2.19	4.98	3.82	5.3	13.8 J	10.1	18.2	24.3	—	47.6	—	22
Acid Sump	FW-3	PW-98A	5	-	—	5 U	5 U	52.1	59.9	27.3	41.1	38.7	32.1	44.6	21.8	20.7	22.7	63.3	62	78.4
Acid Sump	FW-3	PW-99A	5	-	—	72.6	46.7	0.52	0.82	3.65	1.3	5.58	1.93	2.60	1.35 J	0.6 J	0.79	1.26	1.35 J	1.5
Material Recycle	FW-2	PW-42A	5	-	112	1.3	4.21	28	8.47	0.92	46.2	57.3	53.9	80.9	68	166	—	95.7 J	—	72.9
Material Recycle	FW-2	PW-85A	5	-	4.3	1.75	1.09	2.16	7.74	5.09	8.41	—	14.5	35.2	25	48.8	—	32.6	—	41.1
Material Recycle	FW-2	PW-86A	5	-	373	0.32 J	57.7	0.52	0.22 J	4.73	20.1	—	18.9	14.7	13.3	10.2	—	7.88	—	8.57
Amm-Sulfate Stg	FW-5	PW-01A	5	-	5.5	1.42	1.56	1.43	0.94	0.94	1.26	0.64	1.10	1.31	2.13	2.26	—	1.27	—	1.75
Amm-Sulfate Stg	FW-5	PW-03A	5	-	6.4	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.16 J	0.43 J	0.720	1.13	1.94	3.42	—	7.95	—	5.85
Amm-Sulfate Stg	FW-5	PW-83A	5	-	1.8	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	MW-01A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	MW-02A	5	-	2.4	0.33 J	0.5 U	0.2 J	0.17 J	0.25 J	0.22 J	0.50 U	0.400 U	0.239 J	0.2 J	0.4 U	—	0.4 U	—	0.2 J
Former CCA	FW-1	MW-03A	5	-	1 U	0.5 U	0.34 J	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	MW-04A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-45A	5	-	3.5	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-68A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-69A	5	-	11	0.18 J	5 U	0.43 J	0.24 J	0.31 J	0.82	0.73	2.00 U	4.00 U	2 U	0.35 J	0.87	1.04	—	0.936
Former CCA	FW-1	PW-71A	5	-	13.6	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-93A	5	-	—	5 U	0.25 J	0.2 J	0.16 J	0.16 J	0.62	0.49 J	0.386 J	4.00 U	2 U	2.28	5.29	40 UJ	—	4 U
Former CCA	FW-1	PW-94A	5	-	—	25 U	25 U	1.58 J	4.29 J	2.72 J	2.56	3.06	4.00 U	2.49	4 U	1.5 J	4 U	4 U	0.68	4 U
Former CCA	FW-1	PW-95A	5	-	—	0.51	25 U	0.65	0.86	0.58	2.84	1.12	0.320 J	0.638	2.88	4.5	2.2 J	2.5 J	—	1.07
Former CCA	FW-1	PW-100A	5	-	—	0.5 U	0.5 U	0.5 U	0.73	0.50 U	8.61	10.9	8.54	1.39	2.8 J	2 U	4 U	4 U	—	4 U
Recycle Yard	FW-4	PW-30A	5	-	5	5 U	5 U	0.95	1.21	0.43 J	0.96	1.77	2.00 U	1.88 J	0.7 J	2 U	2 U	1.05 J	1 J	0.344 J
Recycle Yard	FW-4	PW-73B	5	-	31	1.53	1.63	0.5 U	2.14	1.62	2.85	1.55	3.17	1.37	1.13	1.91	1.49	1.66	1.48	1.82
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	5	-	—	0.5 U	0.5 U	1.99	0.5 U	0.5 U	0.500 U	0.5 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Acid Sump	FW-3	PW-10	5	-	6	1.63	1.89	2.04	1.04	0.97	1.14	1.38	1.14	1.38	1.32	1.24	—	1.31 J	—	
Acid Sump	FW-3	PW-14	5	-	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	0.4 U[4]	—
Acid Sump	FW-3	PW-16A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.18 J	0.5 U	0.5 U	0.400 U	—	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-19A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-80A	5	-	19.7	0.28 J	0.5 U	0.32 J	1.14	1.96	0.77	0.81	1.64	0.810	2.77	1.38	—	1.18	—	1.92
Acid Sump	FW-3	PW-81A	5	-	1 U	—	—	—	1.41	—	—	—	—	—	—	0.850	—	2.19	—	1.4
Acid Sump	FW-3	PW-82A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	0.4 U	0.4 U
Material Recycle	FW-2	PW-87A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Material Recycle	FW-2	PW-88A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.42 J	2.56	1.89	0.760	2.34	0.4 U	0.61	0.4 U	0.4 U	0.4 U
Amm-Sulfate Stg	FW-5	PW-20A	5	-	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	5	-	1.2	8.38	2.96	6.51	4.81	3.64	7.19	24.7	31.6	46.5	53.5	78.9	—	41.8	—	49.3
Amm-Sulfate Stg	FW-5	PW-89A	5	-	20.3	1.57	1.29	0.78	0.34 J	1.64	9.22	10.4	5.71	9.00	21.4	19.8	19.7	13.1	8.91	11
Amm-Sulfate Stg	FW-5	PW-92A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-31A	5	-	1 U	0.5 U	0.5 U	0.5 U	5.0 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-70AR	5	-	1 U	—	—	—	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-72A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-101A	5	-	—	0.17 J	0.5 U	0.44 J	0.28 J	0.71	0.74	0.43 J	0.526	0.458	4.2	1.63	—	0.34 J	—	0.4 UJ
Recycle Yard	FW-4	PW-46A	5	-	5.2	1.19	0.5 U	0.5 U	0.50 U	0.62	0.88	0.50 U	0.339 J	0.400 U	1.29	0.54	—	0.75	—	0.782
Recycle Yard	FW-4	PW-74B	5	-	3.7	0.36 J	0.81	0.5	0.53	0.29 J	0.52	0.39 J	0.410	0.350 J	0.375 J	0.32 J	—	0.26 J	—	0.4 U
Recycle Yard	FW-4	PW-75A	5	-	6.3	0.5 U	0.5 U	0.5 U	0.50 U	0.17 J	0.20 J	0.50 U	0.400 U	0.400 U	0.2 J	0.4 U	0.2 J	0.2 J	0.28 J	0.295 J
Recycle Yard	FW-4	PW-91A	5	-	4.3	0.27 J	0.65	0.21 J	0.27 J	0.96	0.34 J	0.15 J	0.207 J	0.400 U	0.327 J	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Perimeter Monitoring Wells																				
Acid Sump	FW-3	PW-15AR	5	-	5 U	—	—	—	0.5 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	5	-	1 U	0.35 J	0.27 J	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-77A	5	-	50 U	1.91	1.96	1.84	1.83	1.12	1.73	1.03	1.42	1.37	1.08	1.05	1.04	1.07 J	0.78	0.747
Acid Sump	FW-3	PW-78A	5	-	2 U	2	2.33	2.29	1.96	2.27	2.46	2.15	2.10	2.12	2.21	1.41	1.27	1.22 J	0.97	0.733
Acid Sump	FW-3	PW-79A	5	-	1.4	0.91	0.5 U	0.19 J	0.44 J	0.5 U	1.11	2.33	1.84	1.88	1.29	1.09	1.24	1.68	2.49	2.91

Notes

E = estimated value above the calibration range

J = estimated value

— = not analyzed

D = diluted

U = not detected above reporting limit

UJ = not detected above reporting limit and estimated

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

The Sixth Five Year Review Covers 2017-2021

Table A-4: Fabrication Area Monitoring Well Concentration for Tetrachloroethene (PCE)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	5	-	—	0.5 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.34 J	—	0.4 U
Acid Sump	FW-3	PW-11	5	-	3.3	5 U	1.32	0.94	0.88	0.55	0.66	1.97	0.392 J	0.43	0.25 J	0.4 U	—	0.4 UJ	—	0.689
Acid Sump	FW-3	PW-12	5	-	34	25 U	25 U	6.67	4.22	3.83	1.4	1.08	2.66	2.60 J	0.4 U	0.841	0.33 J	4.58	4.97	5.55
Acid Sump	FW-3	PW-13	5	-	2.8	25 U	25 U	3.16 J	0.54	1.1	0.91	1.21	20.0 U	8.00 U	8 U	8 U	—	6.8 J	—	4.22 J
Acid Sump	FW-3	PW-98A	5	-	—	5 U	5 U	2.66	4.5	2.08	5.82	7.37	4.70	14.2	2.85	2.24 J	2.8 J	12.7	6.5	11.8
Acid Sump	FW-3	PW-99A	5	-	—	1.83 J	5 U	0.18 J	0.26 J	1.05	0.54	1.97	0.786	4.00 U	2 U	1 U	0.39 J	0.68 J	2 U	0.656
Material Recycle	FW-2	PW-42A	5	-	2.5	0.5 U	0.5 U	0.25 J	0.50 U	0.50 U	0.50 U	0.50 U	1.020	1.860	1.25	2.74	—	1.21	—	0.4 U
Material Recycle	FW-2	PW-85A	5	-	1 U	0.65	0.33 J	0.46 J	0.35 J	0.24 J	0.43 J	—	0.341 J	0.76	0.655	1.34	—	0.43	—	0.418
Material Recycle	FW-2	PW-86A	5	-	2.8	0.5 U	1.46	0.5 U	0.50 U	0.17 J	0.55	—	0.582 J	0.469	1 U	0.23 J	—	0.8 U	—	0.4 U
Amm-Sulfate Stg	FW-5	PW-01A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.41 J	0.35 J	0.400 U	0.400 U	0.84	0.65	—	0.29 J	—	0.67
Amm-Sulfate Stg	FW-5	PW-03A	5	-	1.1	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.38 J	—	0.4 UJ
Amm-Sulfate Stg	FW-5	PW-83A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	MW-01A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	MW-02A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	MW-03A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	MW-04A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-45A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-68A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-69A	5	-	9	0.48 J	4 J	3.61	2.13	2.77	7.47	6.48	10.8	2.07 J	5.95	1.38	5.63	7.41	—	4.88
Former CCA	FW-1	PW-71A	5	-	2.2	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.400 U	0.40 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-93A	5	-	—	5 U	0.32 J	0.35 J	0.22 J	0.44 J	2.18	0.63	0.702	2.49 J	1.05 J	5.25	3.29	40 UJ	—	3.04 J
Former CCA	FW-1	PW-94A	5	-	—	25 U	25 U	1.31 J	5.7	1.66 J	2.29 J	2.2 J	4.00 U	2.24	4 U	2.7	4 U	4 U	0.88	2.9 J
Former CCA	FW-1	PW-95A	5	-	—	3.27	25 U	0.68	1.06	0.65	2.11	0.84	0.257 J	0.639	1.68	3.7 J	4 U	4 U	—	1 U
Former CCA	FW-1	PW-100A	5	-	—	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	6.77	9.4	10.1	0.982	4.20	1.6 J	4 U	4 U	—	4 U
Recycle Yard	FW-4	PW-30A	5	-	1	5 U	5 U	0.31 J	0.33 J	0.16 J	0.37 J	0.75	2.00 U	2.00 U	1 U	2 U	2 U	2 UJ	2 U	0.4 U
Recycle Yard	FW-4	PW-73B		-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	5	-	—	0.5 U	0.5 U	1.68	0.5 U	0.21 J	0.500 U	0.16 J	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Acid Sump	FW-3	PW-10	5	-	2.1	1.91	0.79	1.75	1.2	0.74	1.16	1.2	1.14	1.06	1.16	1.2	—	1.25	—	—
Acid Sump	FW-3	PW-14	5	-	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	0.4 U[4]	—
Acid Sump	FW-3	PW-16A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.5 U	0.5 U	0.400 U	—	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-19A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-80A	5	-	3.2	0.5 U	0.5 U	0.5 U	0.45 J	0.34 J	0.35 J	0.36 J	0.719	0.38 J	0.861	0.558	—	0.45	—	0.77
Acid Sump	FW-3	PW-81A	5	-	1 U	—	—	—	0.40 J	—	—	—	—	—	—	0.4 U	—	0.4 U	—	0.4 U
Acid Sump	FW-3	PW-82A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	0.4 U	0.4 U
Material Recycle	FW-2	PW-87A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Material Recycle	FW-2	PW-88A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Amm-Sulfate Stg	FW-5	PW-20A	5	-	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	5	-	1 U	0.29 J	0.4 J	0.32 J	0.27 J	0.5 U	0.26 J	0.54	0.537	0.89	1.03	1.73	—	0.43	—	0.236 J
Amm-Sulfate Stg	FW-5	PW-89A	5	-	1.1	0.23 J	0.2 J	0.16 J	0.20 J	0.19 J	0.4 J	0.48 J	0.380 J	0.749	0.652	0.666	0.73	0.65	0.38 J	0.457
Amm-Sulfate Stg	FW-5	PW-92A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-31A	5	-	1 U	0.5 U	0.5 U	0.5 U	5.0 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-70AR	5	-	1 U	—	—	—	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-72A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-101A	5	-	—	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.4 U	4 U	0.4 U	—	0.4 U	—	0.4 UJ
Recycle Yard	FW-4	PW-46A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Recycle Yard	FW-4	PW-74B	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Recycle Yard	FW-4	PW-75A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Recycle Yard	FW-4	PW-91A	5	-	1 U	0.5 U	0.54	0.5 U	0.50 U	1.36	0.15 J	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Perimeter Monitoring Wells																				
Acid Sump	FW-3	FW-3	5	-	5 U	—	—	0.5 U	—	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-77A	5	-	50 U	0.26 J	0.23 J	0.19 J	0.21 J	0.5 U	0.2 J	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.309 J	0.4 U	0.4 U
Acid Sump	FW-3	PW-78A	5	-	2 U	0.52	0.75	0.75	0.61	0.8	0.80	0.70	0.825	0.72	0.613	0.56	0.59	0.63	0.39 J	0.334 J
Acid Sump	FW-3	PW-79A	5	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.5 U	0.34 J	0.58	0.798	0.68	0.58	0.363 J	0.53	0.58	0.65	0.687

Notes

E = estimated value above the calibration range

J = estimated value

— = not analyzed

D = diluted

U = not detected above reporting limit

UJ = not detected above reporting limit and estimated

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

▨ indicates limit greater than ROD Standard

The Sixth Five Year Review Covers 2017-2021

Table A-5: Fabrication Area Monitoring Well Concentration for Vinyl Chloride (VC)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	2	-	—	0.5 U	0.5 U	0.46 J	0.50 U	0.50 U	0.50 U	0.16 J	0.530	0.730	0.44	0.76	—	4.93	—	2.99
Acid Sump	FW-3	PW-11	2	-	1.2	2.54 J	0.5 U	1.66	3.93	0.50 U	0.34 J	0.48 J	0.400 U	0.21 J	0.4 U	0.4 U	—	0.4 UJ	—	1.6
Acid Sump	FW-3	PW-12	2	-	29	25.4	24.3 J	36.1	22.6	15.3	3.79	3.52	14.6	11.8	2.36	3.35	4.86	19.6	26.8	41.7
Acid Sump	FW-3	PW-13	2	-	11.1	25 U	25 U	5 U	1.53	0.59	0.93	1.06 J	20.0 U	8.00 U	4.4 J	5.1 J	—	8.8	—	5.54 J
Acid Sump	FW-3	PW-98A	2	-	—	5 U	5 U	13	52.1	64	109	114	110	196	93.6	99.5	53.8	61.2	56.8	71.1
Acid Sump	FW-3	PW-99A	2	-	—	5.63	10.9	0.42 J	0.72	1.78	2.11	2.93	2.02	2.40 J	1.6 J	0.6 J	1.06	1.06	1.05 J	1.61
Material Recycle	FW-2	PW-42A	2	-	4.9	2.45	1.68	1.27	1.42	2.97	3.74	4.77	5.08	3.72	4.58 J	4.85	—	9.14	—	9.39
Material Recycle	FW-2	PW-85A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	—	0.400 U	0.300 J	0.4 UJ	0.24 J	—	0.4 U	—	0.88
Material Recycle	FW-2	PW-86A	2	-	45.8	0.5 U	3.21	0.5 U	0.50 U	0.94	2.5	—	6.88	5.49	4.80	5.36	—	4.02	—	6.42
Amm-Sulfate Stg	FW-5	PW-01A	2	-	28.4	8.51	8.21	6	5.85	5.21	0.66	0.50 U	6.95	9.16	0.4 U	0.73	—	6.19	—	1.49
Amm-Sulfate Stg	FW-5	PW-03A	2	-	4.2	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.390 J	0.335 J	0.372 J	0.283 J	—	0.4 U	—	0.271 J
Amm-Sulfate Stg	FW-5	PW-83A	2	-	4.7	1.14	0.77	0.43 J	0.53	0.50 U	0.26 J	0.46 J	0.430	0.510	0.433	0.42	—	0.48	—	0.48
Former CCA	FW-1	MW-01A	2	-	36.3	10.5	5.3	13.6	8.6	7.78	5.94	9.28	12.2	21.2	9.72	13.4	12.1	14.4	12.5	12.5
Former CCA	FW-1	MW-02A	2	-	166	46.8	0.5 U	47.5	42.3	17.7	21.5	28.8	35.8	24.3	26.6	27.1	—	25.4	—	26.4
Former CCA	FW-1	MW-03A	2	-	1.1	0.5 U	25.8	0.5 U	0.50 U	0.50 U	0.50 U	0.45 J	0.400 U	0.400	0.4 U	0.555	—	1.05	—	3.57
Former CCA	FW-1	MW-04A	2	-	29.3	7.57	8.71	8.6	3.26 J	3.49	5.52	3.8	1.69	4.57	2.87	5.27	—	6.98	—	6.22
Former CCA	FW-1	PW-45A	2	-	29	3.62	0.5 U	0.9	10.0	0.50 U	0.79	9.74	4.02	20.4	0.86	11.7	—	1.68	—	9.1
Former CCA	FW-1	PW-68A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-69A	2	-	4	0.28 J	1.77 J	1.42	1.03	1	1.75	2.26	5.14	4.00 U	2.2	1.39	8.89	6.59	—	12.8
Former CCA	FW-1	PW-71A	2	-	3.2	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.41	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-93A	2	-	—	5.07	2.49	4.1	2.51	2.52	3.45	5.51	2.88	16.8	3.7	15.4	40.5	41	—	22.8
Former CCA	FW-1	PW-94A	2	-	—	25 U	25 U	2.23 J	1.93 J	2.54 J	11.4	4.91	11.6	4.78	4.6	24.8	11.7	11.2	10.2	20.3
Former CCA	FW-1	PW-95A	2	-	—	1.43	25 U	1.04	1.41	0.95	0.76	0.38 J	0.235 J	2.62	0.9 J	6.1	3.2 J	2.8 J	—	1.89
Former CCA	FW-1	PW-100A	2	-	—	4.12	0.97	0.67	14.2	4.43	14	21.2	37.0	30.5	23.8	4.4	3.5 J	4.6	—	5.66
Recycle Yard	FW-4	PW-30A	2	-	1 U	5 U	5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	2.00 U	2.00 U	1 U	2 U	2 U	2 U	2 U	0.201 J
Recycle Yard	FW-4	PW-73B	2	-	8.3	1.44	1.64	0.5 U	1.65	1.20	2.08	1.36	2.46	1.30	0.725	1.49	1.08	1.28	0.850	1.44
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	2	-	—	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Acid Sump	FW-3	PW-10	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400	0.4 U	0.4 U	—	0.4 U	—	—
Acid Sump	FW-3	PW-14	2	-	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	0.4 U[4]	—
Acid Sump	FW-3	PW-16A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U		0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-19A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-80A	2	-	1.2	0.5 U	0.5 U	0.5 U	1.77	1.9	0.83	0.71	2.35	1.21	2.05	0.4 U	—	0.4 U	—	0.4 U
Acid Sump	FW-3	PW-81A	2	-	1 U	—	—	—	0.41 J	—	—	—	—	—	—	0.37 J	—	0.33 J	—	0.28 J
Acid Sump	FW-3	PW-82A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	0.4 U	0.4 U
Material Recycle	FW-2	PW-87A	2	-	1 U	0.5 U	0.29 J	0.29 J	0.31 J	0.37 J	0.27 J	0.16 J	0.400 U	0.400 U	0.4 U	0.4 U	—	0.22 J	—	0.214 J
Material Recycle	FW-2	PW-88A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.26 J	0.400 U	0.400 U	0.4 UJ	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Amm-Sulfate Stg	FW-5	PW-20A	2	-	1 U	—	—	—	0.5 U	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.260 J	0.4 UJ	0.31 J	—	0.21 J	—	0.73
Amm-Sulfate Stg	FW-5	PW-89A	2	-	1.2	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.331 J	0.375 J	0.38 J	0.21 J	0.4 U	0.4 U
Amm-Sulfate Stg	FW-5	PW-92A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-31A	2	-	1 U	0.5 U	0.5 U	0.5 U	5.00 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-70AR	2	-	1 U	—	—	—	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-72A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-101A	2	-	—	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.26 J	0.52 J	1.83	0.400 U	4.3	0.8	—	0.6	—	0.548 J
Recycle Yard	FW-4	PW-46A	2	-	1 U	0.62	0.5 U	0.5 U	0.50 U	0.50 U	0.36 J	0.50 U	0.400 U	0.400 U	0.575	0.4 U	—	0.39 J	—	0.337 J
Recycle Yard	FW-4	PW-74B	2	-	1 U	0.31 J	0.75	0.44 J	0.34 J	0.38 J	0.51	0.35 J	0.529	0.420	0.358 J	0.34 J	—	0.29 J	—	0.213 J
Recycle Yard	FW-4	PW-75A	2	-	1.8	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Recycle Yard	FW-4	PW-91A	2	-	3	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.22 J	0.400 U	0.470	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Perimeter Monitoring Wells																				
Acid Sump	FW-3	PW--15AR	2	-	5 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-77A	2	-	50 U	0.5 U	0.37 J	0.2 J	0.60	0.50 U	0.50 U	0.50 U	0.400 U	3.66	0.4 U	0.38 J	0.4 U	0.4 UJ	0.4 U	0.4 U
Acid Sump	FW-3	PW-78A	2	-	2 U	0.2 J	0.5 U	0.26 J	0.28 J	0.22 J	0.20 J	0.25 J	0.253 J	0.230 J	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-79A	2	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.35 J	0.68	0.429

Notes

E = estimated value above the calibration range

J = estimated value

— = not analyzed

D = diluted

U = not detected above reporting limit

UJ = not detected above reporting limit and estimated

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

🟫 indicates limit greater than ROD Standard

The Sixth Five Year Review Covers 2017-2021

Table A-6: Fabrication Area Monitoring Well Concentration for 1,1-Dichloroethane (DCA)

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	3700	-	—	0.55	0.53	1.43	0.81	0.19 J	0.41 J	0.96	2.86	2.47	2.02	2.34	—	29	—	12.6
Acid Sump	FW-3	PW-11	3700	-	54.3	52.9	16.3	31.8	86.3	5.57	10.30	26.1	4.09	7.87	2	1.67	—	0.84 J	—	6.37
Acid Sump	FW-3	PW-12	3700	-	901	335	236	426	199	173	36.8	26.9	124	99.7	6.07	30.6	11.5	240	350	380
Acid Sump	FW-3	PW-13	3700	-	1660	2400	1970	3030	308	1010	568	715	2670	1710	2,300	3,190	—	5,310	—	2,480
Acid Sump	FW-3	PW-98A	3700	-	—	18.8	52.2	111	311	308	621	552	515	1,170	326	399	224	432	257	335
Acid Sump	FW-3	PW-99A	3700	-	—	54.8	46.9	15.9	32.5	120 E	34.9	58.2	68.2	76.2	37.4	17.2	27.8	52.9	43.8	60.8
Material Recycle	FW-2	PW-42A	3700	-	21.8	1.91	1.61	1.26	1.40	1.17	1.04	1.42	28.100	46.800	63.4	48.4	—	24.7	—	9.8
Material Recycle	FW-2	PW-85A	3700	-	17.4	3.59	2.27	2.34	1.66	1.31	1.95	—	3.96	10.4	6.72	8.18	—	5.40	—	11.00
Material Recycle	FW-2	PW-86A	3700	-	243	0.17 J	0.89	0.5 U	0.50 U	0.28 J	0.50 U	—	0.764 J	1.160	2	2.0	—	2.1	—	2.8
Amm-Sulfate Stg	FW-5	PW-01A	3700	-	24.3	9.17	10.1	9.14	7.61	7.38	0.75	0.50 U	5.440	7.290	0.3 J	0.8	—	3.7	—	1.4
Amm-Sulfate Stg	FW-5	PW-03A	3700	-	49.9	0.26 J	0.18 J	0.17 J	0.50 U	0.50 U	0.21 J	0.28 J	0.580	0.798	1.2	1.9	—	2.2	—	2.360
Amm-Sulfate Stg	FW-5	PW-83A	3700	-	11.4	0.87	0.5	0.24 J	0.30 J	0.38 J	0.48 J	0.47 J	0.870	0.580	0.6	0.5	—	0.6	—	0.6
Former CCA	FW-1	MW-01A	3700	-	58.2	14	13.5	15.2	8.20	10.40	12.60	12.00	10.300	19.400	12.0	10.1	11.6	11.3	10.8	12.3
Former CCA	FW-1	MW-02A	3700	-	154	1.87	0.5 U	1.53	1.32	1.03	1.21	1.46	1.460	6.860	7.5	8.7	—	4.0	—	3.5
Former CCA	FW-1	MW-03A	3700	-	2.806	0.5 U	1.54	0.5 U	0.50 U	0.50 U	0.50 U	1.2	0.355 J	0.276 J	0.4 U	1.0	—	0.8	—	2.2
Former CCA	FW-1	MW-04A	3700	-	75	2.16	1.6	1.81	0.65 J	0.69	0.79	0.76	0.400 U	0.673	0.5	0.7	—	0.9	—	0.8
Former CCA	FW-1	PW-45A	3700	-	128 D	0.62	0.5 U	0.35 J	1.29	0.50 U	0.50 U	1.80	0.856	4.060	1.19	2.8	—	1.0	—	1.3
Former CCA	FW-1	PW-68A	3700	-	53.1	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.461	0.4 U	0.4 U	0.400 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-69A	3700	-	648	11.3	38.3	38	31.5	38.3	84.7	112	143	28.5	48	45.1	151.0	460	—	252
Former CCA	FW-1	PW-71A	3700	-	51.4	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.27 J	0.25 J	3.250	0.400 U	8.2	0.7	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-93A	3700	-	—	83.4	58	83.1	59.2	49.7	105	94	81.3	112	59.6	928.0	192	668	—	1150
Former CCA	FW-1	PW-94A	3700	-	—	118	121	166	187	130	599	522	358	469	220	231	562	547	395	1,120
Former CCA	FW-1	PW-95A	3700	-	—	40.3	79.8	45.8	63.7	36.4	799	275	66.1	155	564	1830	334	210	—	44.7
Former CCA	FW-1	PW-100A	3700	-	—	3.18	2.54	2.2	0.99	1.06	1,680	2,040	1970	56.7	333	62.6	15.3	19 UJ	—	19.4
Recycle Yard	FW-4	PW-30A	3700	-	34	5.51	4.23 J	7.05	10.6	3.51	7.08	10.3	6.23	11.2	5.42	8.06	8	9.8	14.6	11
Recycle Yard	FW-4	PW-73B	3700	-	41.6	1.23	1.25	0.5 U	1.40	1.15	1.97	0.93	1.730	0.890	0.8	1.3	1.1	1.22	0.9	1.29
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	3700	-	—	0.35 J	0.21 J	76.4	0.37 J	0.47 J	0.960	0.98	0.685	1.120	1.0	1.9	—	1.34	—	1.03
Acid Sump	FW-3	PW-10	3700	-	327	81.3	60.9	77.5	26.7	24.9	37.3	50.7	27.7	31.5	34.3	34.5	—	33.6	—	
Acid Sump	FW-3	PW-14	3700	-	2.2	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	0.4 U5	—
Acid Sump	FW-3	PW-16A	3700	-	1 U	0.28 J	0.24 J	0.34 J	0.36 J	0.87	0.42 J	0.37 J	0.217 J	—	0.4 U	0.395 J	0.27 J	0.37 J	0.303 J	0.51
Acid Sump	FW-3	PW-19A	3700	-	1.7	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-80A	3700	-	15.6	3.84	2.39	2.95	14.7	21.9	9.58	11.8	20.3	10.8	30.5	13.1	—	5	—	6.71
Acid Sump	FW-3	PW-81A	3700	-	1 U	—	—	—	4.43	—	—	—	—	—	—	0.4	—	1.39	—	0.38 J
Acid Sump	FW-3	PW-82A	3700	-	1.8	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	0.4 U	0.4 U
Material Recycle	FW-2	PW-87A	3700	-	1.5	0.17 J	0.16 J	0.5 U	0.15 J	0.26 J	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Material Recycle	FW-2	PW-88A	3700	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.2 J	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Amm-Sulfate Stg	FW-5	PW-20A	3700	-	1 U	—	—	—	0.50 U	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	3700	-	6.5	2.02	2.2	2.25	1.76	1.15	1.41	1.47	4.34	13	12.1	11.10	—	4.96	—	9.15
Amm-Sulfate Stg	FW-5	PW-89A	3700	-	5.7	0.62	0.5	0.27 J	0.50 U	0.62	1.19	1.25	1.810	3.070	6.05	7.3	5.9	4.3	3.1	3.95
Amm-Sulfate Stg	FW-5	PW-92A	3700	-	1 U	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-31A	3700	-	1 U	0.5 U	0.5 U	0.5 U	5.0 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-70AR	3700	-	1 U	—	—	—	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.4 U	—	0.4 U
Former CCA	FW-1	PW-72A	3700	-	3.1	0.5 U	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Former CCA	FW-1	PW-101A	3700	-	—	0.42 J	0.51	1.85	0.51	0.67	2.85	2.89 J	13.700	6.03	19	30.8	—	0.5	—	0.2 J
Recycle Yard	FW-4	PW-46A	3700	-	9.5	1.66	0.55	0.36 J	0.50 U	0.68	0.93	0.50 U	0.396 J	0.400 U	1.3	0.5	—	0.7	—	0.7
Recycle Yard	FW-4	PW-74B	3700	-	3.2	0.88	2.18	1.18	1.14	0.64	1.16	0.65	0.812	0.640	0.8	0.6	—	0.4	—	0.4 J
Recycle Yard	FW-4	PW-75A	3700	-	54.6	1.17	2.98	2.53	3.48	2.17	5.13	2.22	8.06	5.7	5	3.46	5.0	7.5	9.81	10.8
Recycle Yard	FW-4	PW-91A	3700	-	63.2	2.44	2.44	4.73	5.86	1.8	3.4	4.73	5.67	3.57	2.74	0.816	3.07	1.64	2.71	0.624
Perimeter Monitoring Wells																				
Acid Sump	FW-3	PW-15AR	3700	-	5	—	—	—	0.76	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	3700	-	2.3	0.33 J	0.5 U	0.5 U	0.50 U	0.50 U	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U
Acid Sump	FW-3	PW-77A	3700	-	189	83.8	46.4	70.2	55.5	20.3	36.9	36.50	37.800	40.400	8.9	11.9	8.9	6.8	4.5	4.8
Acid Sump	FW-3	PW-78A	3700	-	118	62	59.3	65.1	51.2	58	58.8	59.7	58.9	51	50.7	30.4	40.6	35.7	32.4	27.2
Acid Sump	FW-3	PW-79A	3700	-	12.3	1.52	0.5 U	0.59	1.23	0.5 U	14.4	6.77	13.3	21.3	11.6	11.7	9.05	12.4	13.1	15.1

Notes

E = estimated value above the calibration range

J = estimated value

— = not analyzed

D = diluted

U = not detected above reporting limit

UJ = not detected above reporting limit and estimated

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

The Sixth Five Year Review Covers 2017-2021

Table A-7: Fabrication Area Monitoring Well Concentration for Ammonium

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	250	-	—	—	—	—	0.25	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-11	250	-	7.5	—	—	—	4.85	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-12	250	-	2	—	—	—	0.325	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-13	250	-	8.75	—	—	—	2.93	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-98A	250	-	—	—	—	—	0.041 J	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-99A	250	-	—	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-42A	250	-	0.125 U	—	—	—	0.121	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-85A	250	-	0.438	—	—	18.3	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-86A	250	-	0.875	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-01A	250	-	4,413	735	229	224	176	189	2,400	1,400	723	189	1,205	1,350	—	733	—	710
Amm-Sulfate Stg	FW-5	PW-03A	250	-	274	86.4	70.0	69.9	67.0	59.6	116	188	166	204	235	218	—	248	—	225
Amm-Sulfate Stg	FW-5	PW-83A	250	-	42.63	11.5	14.1	—	21.3	14.0	28.1	33.8	33.0	35.8	50.0	41.3	—	26.5	—	41.5
Former CCA	FW-1	MW-01A	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-02A	250	-	0.25 U	—	—	—	0.049 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-03A	250	-	0.125 U	—	—	—	0.079 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-04A	250	-	0.175	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-45A	250	-	0.25	—	—	—	0.175	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-68A	250	-	0.375	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-69A	250	-	0.75	—	—	—	1.11	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-71A	250	-	0.375	—	—	—	0.675	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-93A	250	-	—	—	—	—	0.675	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-94A	250	-	—	—	—	—	1.15	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-95A	250	-	—	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-100A	250	-	—	—	—	—	0.263	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-30A	250	-	0.125 U	—	—	—	0.064	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-73B	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	250	-	—	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-10	250	-	1.75	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-14	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-16A	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-19A	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-80A	250	-	2.68	—	—	—	0.575	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-81A	250	-	0.125 U	—	—	—	0.119	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-82A	250	-	81.5	—	—	—	25.4	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-87A	250	-	0.588	—	—	—	1.08	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-88A	250	-	6.53	—	—	—	3.64	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-20A	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	250	-	0.175	0.041 J	0.063 U	0.027 J	0.093 U	0.063 U	0.048 J	0.15	0.02 U	0.02 U	0.025 U	0.099	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-89A	250	-	107	78.1	40.0	31.5	0.093	25.3	16.9	8.9	40.8	18.8	10.8	4.4	5.9	9.2 J	11.23	12.0
Amm-Sulfate Stg	FW-5	PW-92A	250	-	8.78	5.01	4.24	4.49	4.31	4.39	4.73	2.38	3.85	3.45	3.53	4.81	—	—	—	—
Former CCA	FW-1	PW-31A	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-70AR	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-72A	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-101A	250	-	—	—	—	—	0.238	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-46A	250	-	0.375	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-74B	250	-	0.125 U	—	—	—	0.188	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-75A	250	-	0.625	—	—	—	0.03 J	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-91A	250	-	1.13	—	—	—	0.838	—	—	—	—	—	—	—	—	—	—	1.04
Perimeter Monitoring Wells																				
Acid Sump	FW-3	PW-15AR	250	-	0.125 U	—	—	—	0.030 J	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-77A	250	-	0.463	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-78A	250	-	0.125 U	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-79A	250	-	0.25	—	—	—	0.063 U	—	—	—	—	—	—	—	—	—	—	—

Notes

E = estimated value above the calibration range

J = estimated value

— = not analyzed

D = diluted

U = not detected above reporting limit

UJ = not detected above reporting limit and estimated

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

The Sixth Five Year Review Covers 2017-2021

Table A-8: Fabrication Area Monitoring Well Concentration for Fluoride

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	2	-	—	2.96	5.25	5.09	5.94	6.84	6.41	6.19	4.86	5.33	4.46	5.54	—	5.69	—	6.39
Acid Sump	FW-3	PW-11	2	-	2.44	1.43	2.99	2.51	2.4	2.68	2.54	2.18	2.3	2.32	2.07	2.06	—	2.04	—	1.25
Acid Sump	FW-3	PW-12	2	-	0.7	1.77	2.8	2.97	3.04	3.13	2.45	2.45	2.33	2.96	1.53	2.06	1.67	2.13	2.06	2.3
Acid Sump	FW-3	PW-13	2	-	43.2	27.6	25.9	31.2	17.7	17.6	16.8	17	39	28.1	31.3	26	—	38.2	—	22.8
Acid Sump	FW-3	PW-98A	2	-	—	9.87	8.84	13.7	16.8	17.4	15.9	17.6	14.9	65 J	14.8	15.2	13.9	21	12.3	23.6
Acid Sump	FW-3	PW-99A	2	-	—	9.86	12.8	12.8	12.9	9.56	10	10.1	9.58	11.3	12.2	11.3	11.1	9.78	10.2	10.9
Material Recycle	FW-2	PW-42A	2	-	0.16	—	—	—	0.13 J	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-85A	2	-	1	—	—	—	0.65 J	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-86A	2	-	0.1 U	—	—	—	1.4	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-01A	2	-	20 U	—	—	—	0.78 U	—	—	—	—	—	—	—	—	—	—	2.51 J
Amm-Sulfate Stg	FW-5	PW-03A	2	-	1.44	—	—	—	1.2	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-83A	2	-	0.16	—	—	—	0.622 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-01A	2	-	0.12	—	—	—	0.12 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-02A	2	-	0.17	—	—	—	0.43 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-03A	2	-	0.16	—	—	—	0.18 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-04A	2	-	0.18	—	—	—	0.18 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-45A	2	-	0.1 U	—	—	—	0.094 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-68A	2	-	0.15	—	—	—	0.19 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-69A	2	-	11	—	—	—	8.89	—	—	—	—	10.2	9.98	12.9	9.04	11.5	—	12.2
Former CCA	FW-1	PW-71A	2	-	1.1	—	—	—	1.8	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-93A	2	-	—	—	—	—	3.99	—	—	—	3.56	2.78 J	—	1.54	1.48	3.6	—	4.08
Former CCA	FW-1	PW-94A	2	-	—	—	—	—	7.04	—	—	—	7.1	6.26	—	9.84	12.1	13.3	13.4	12.2
Former CCA	FW-1	PW-95A	2	-	—	—	—	—	9.84	—	—	—	—	4.52 J	—	10.1	7.63	7.43	—	5.94
Former CCA	FW-1	PW-100A	2	-	—	—	—	—	0.11 U	—	—	—	—	1.0 U	—	1 U	1 U	1 U	—	1 U
Recycle Yard	FW-4	PW-30A	2	-	0.38	—	—	—	0.27 J	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-73B	2	-	0.15	—	—	—	0.32 J	—	—	—	—	—	—	—	—	—	—	—
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	2	-	—	4.3	8.47	42.8	9.8	11.7	6.23	8.96	9.45	7.06	8.79	8.73	—	9.7	—	10.6
Acid Sump	FW-3	PW-10	2	-	50	20.1	25.8	42.1	26.7	19.2	22.8	21	20.1	22	22.9 J	20.7	—	24.4	—	—
Acid Sump	FW-3	PW-14	2	-	2.06	—	—	—	0.86 J	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-16A	2	-	0.1 U	0.213 J	0.066 J	0.081 J	0.24 J	0.099 U	0.073 J	0.061 J	1.0 U		1 U	1 U	1 U	1 U	1 U	1 U
Acid Sump	FW-3	PW-19A	2	-	0.1	0.539 J	0.119 J	0.146 J	0.28 J	0.205 U	1.21	0.057 J	1.0 U	1.0 U	1 U	1 U	1 U	1 U	1 U	1 U
Acid Sump	FW-3	PW-80A	2	-	0.17	0.273 J	0.143 J	0.186 J	0.35 J	0.561 J	0.28 J	0.13 J	1.0 U	1.0 U	1 U	1 U	—	—	—	—
Acid Sump	FW-3	PW-81A	2	-	0.1 U	—	—	—	0.065 J	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-82A	2	-	0.42	0.51 J	0.429 J	0.678 J	0.982 J	0.626 J	0.65 J	0.62 J	1.0 U	1.0 U	1 U	1 U	—	0.8 J	0.785 J	0.729 J
Material Recycle	FW-2	PW-87A	2	-	0.27	—	—	—	0.32 J	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-88A	2	-	0.4	—	—	—	0.55 J	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-20A	2	-	0.27	—	—	—	0.29 J	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	2	-	0.83	—	—	—	0.64 J	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-89A	2	-	17	9.9	13.5	14.5	13.6	11.2	17.2	16.1	17	18.2	17.3	15.6	15.6	16.4	15.5	15.3
Amm-Sulfate Stg	FW-5	PW-92A	2	-	0.23	—	—	—	0.54 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-31A	2	-	0.13	—	—	—	0.046 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-70AR	2	-	0.1 U	—	—	—	0.093 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-72A	2	-	5.62	—	—	—	2.64	—	—	—	—	—	—	—	—	—	—	2.17
Former CCA	FW-1	PW-101A	2	-	—	—	—	—	1.88	—	—	—	—	—	—	—	—	1 U	—	1.62
Recycle Yard	FW-4	PW-46A	2	-	0.29	—	—	—	0.19 J	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-74B	2	-	0.17	—	—	—	0.29 J	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-75A	2	-	0.8	—	—	—	1.12	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-91A	2	-	0.6	—	—	—	1.15	—	—	—	—	—	—	—	—	—	—	1.49
Perimeter Monitoring Wells																				
Acid Sump	FW-3	PW-15AR	2	-	0.1 U	—	—	—	0.32 J	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	2	-	0.35	0.374 J	0.286 J	0.357 J	0.47 J	0.324 U	0.67 J	0.25 J	1.0 U	1.0 U	1 U	1 U	1 U	1 U	1 U	1 U
Acid Sump	FW-3	PW-77A	2	-	0.64	0.464 J	0.287 J	0.311 J	0.45 J	0.426 U	0.35 J	0.26 J	1.0 U	1.0 U	1 U	1 U	1 U	1 U	1 U	1 U
Acid Sump	FW-3	PW-78A	2	-	0.19	0.288 J	0.273 J	0.33 J	0.45 U	0.678 J	0.37 J	0.27 J	1.0 U	1.0 U	1 U	1 U	0.548 J	0.7 J	0.631 J	0.637 J
Acid Sump	FW-3	PW-79A	2	-	0.96	0.236 J	0.127 J	0.153 J	0.29 J	0.166 U	1.06	0.077 J	1.15	2.0	1.7	2	1.53	1.3	1.05	1.12

Notes

E = estimated value above the calibration range
J = estimated value
— = not analyzed
D = diluted
U = not detected above reporting limit
UJ = not detected above reporting limit and estimated

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

The Sixth Five Year Review Covers 2017-2021

Table A-9: Fabrication Area Monitoring Well Concentration for Nitrate

Contaminant Source	Extraction Well	Well ID	ROD Standard (MCL)	ROD Standard (1E-06 RBC)	Baseline 2000	Spring 2014	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Hot Spot Monitoring Wells																				
Acid Sump	FW-3	E-11	10	-	—	0.1 U	0.031 J	0.004 J	0.085 J	2.17	0.33	0.10 U	6.93	0.250 U	14.1	0.250 U	—	0.250 U	—	0.25 U
Acid Sump	FW-3	PW-11	10	-	10.6	4.69	5.43	1.51	3.59	4.52	2	7.08	1.18	1.04	0.912	2.05	—	2.59 J	—	10.5
Acid Sump	FW-3	PW-12	10	-	0.1 U	0.1 U	0.006 J	0.1 U	0.33 U	0.28	0.48	0.34	0.322	0.25 U	1.33	0.336	0.755	0.426	0.42	0.379
Acid Sump	FW-3	PW-13	10	-	97.5	60.5	45.8	57.7	0.85	9.53	3.39	5.67	20.0	6.28	9.79	11.2	—	12.8	—	0.603
Acid Sump	FW-3	PW-98A	10	-	—	1.16	5.41	21.7	24.3 J	9.29	13.9	10.6	8.10	18.3	3.51	5.20	3.31	17.1	7.07	12.8
Acid Sump	FW-3	PW-99A	10	-	—	13.2	6.66	0.34	2.57	6.38	1.51	1.33	1.10	0.250 U	1.65	0.823	2.7	0.856	0.25 U	0.25 U
Material Recycle	FW-2	PW-42A	10	-	0.1 U	—	—	—	0.09 U	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-85A	10	-	1.02	—	—	—	3.06	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-86A	10	-	0.1 U	—	—	—	0.85	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-01A	10	-	20 U	—	—	—	1.03 U	—	—	—	—	—	—	—	—	—	—	275 J
Amm-Sulfate Stg	FW-5	PW-03A	10	-	13.1	—	—	—	19.9	—	—	—	—	17.5	—	71.5	—	52.5 J	—	23.2
Amm-Sulfate Stg	FW-5	PW-83A	10	-	3.41	—	—	—	0.632	—	—	—	—	—	—	—	—	—	—	1.02 J
Former CCA	FW-1	MW-01A	10	-	0.1 U	—	—	—	0.26	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-02A	10	-	0.1 U	—	—	—	0.09 J	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	MW-03A	10	-	0.1 U	—	—	—	0.1 U	—	—	—	—	—	—	—	—	0.276	—	0.25 U
Former CCA	FW-1	MW-04A	10	-	1.22	—	—	—	0.1 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-45A	10	-	0.1 U	—	—	—	0.17 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-68A	10	-	2.33	—	—	—	1.45	—	—	—	—	—	—	—	1.48	2	0.945	0.572
Former CCA	FW-1	PW-69A	10	-	0.1 U	—	0.007 J	0.1 U	0.09 U	0.1 U	0.1 U	0.1 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	—	0.25 U
Former CCA	FW-1	PW-71A	10	-	0.12	—	—	—	0.12 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-93A	10	-	—	—	0.014 J	0.004 J	0.1 U	0.037 J	0.1 U	0.1 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	—	0.25 U
Former CCA	FW-1	PW-94A	10	-	—	—	0.004 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.25 U	0.25 U
Former CCA	FW-1	PW-95A	10	-	—	—	0.487	0.588	0.29 U	0.33	0.57	0.57	1.13	0.250 U	0.600	0.250 U	0.525	0.694	—	1.01
Former CCA	FW-1	PW-100A	10	-	—	—	0.033 J	0.029 J	0.1 U	0.1 U	0.1 U	0.1 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	0.250 U	—	0.25 U
Recycle Yard	FW-4	PW-30A	10	-	0.66	—	—	—	0.83	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-73B	10	-	0.1 U	—	—	—	0.11 U	—	—	—	—	—	—	—	—	—	—	—
Non Hot Spot Monitoring Wells																				
Acid Sump	FW-3	FW-6	10	-	—	1.48	1.59	0.895 J	1.31	1.16	0.12	0.58	0.250 U	0.250 U	0.250 U	0.250 U	—	0.340	—	0.369
Acid Sump	FW-3	PW-10	10	-	0.1 U	0.205	0.126	0.926	0.36 U	0.507	0.25	0.38	0.442	0.250 U	0.250 U	0.250 U	—	0.250 U	—	—
Acid Sump	FW-3	PW-14	10	-	0.1 U	—	—	—	2.78	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-16A	10	-	0.1 U	1.2	1.87	1.5	1.34	1.84	0.93	0.78	0.867	—	1.38	0.894	1.2	0.784	0.988	0.764
Acid Sump	FW-3	PW-19A	10	-	1.63	2.4	2.71	2.96	2.82	1.52	1.92	3.64	2.84	2.11	2.77	4.03	3.07	3.5	2.81	2.89
Acid Sump	FW-3	PW-80A	10	-	4.22	1.11	0.252	0.735	0.97	0.769	0.8	0.48	0.42	0.25 U	1.31 J	0.841	—	—	—	—
Acid Sump	FW-3	PW-81A	10	-	0.1 U	—	—	—	0.086 J	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-82A	10	-	9.25	2.61	2.59	3.83	3.72	3.48	2.86	2.45	2.93	1.65	3.75	5.59	—	3.85 J	4	3.66
Material Recycle	FW-2	PW-87A	10	-	0.1 U	—	—	—	0.1 U	—	—	—	—	—	—	—	—	—	—	—
Material Recycle	FW-2	PW-88A	10	-	0.1 U	—	—	—	0.1 U	—	—	—	—	—	—	—	—	—	—	0.25 U
Amm-Sulfate Stg	FW-5	PW-20A	10	-	10.1	—	—	—	4.6	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-84AR	10	-	0.65	—	—	—	1.35	—	—	—	—	—	—	—	—	—	—	—
Amm-Sulfate Stg	FW-5	PW-89A	10	-	177	116	74.3	77	140	59.6 J	8.38	8.5	21.2 J	4.49	4.78	1.55	3.11	6.33 J	24.6	10.7
Amm-Sulfate Stg	FW-5	PW-92A	10	-	1.43	—	—	—	0.1 U	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-31A	10	-	4.66	—	—	—	13.2	—	—	—	—	10.7	—	13.1	—	10.7	—	10.7
Former CCA	FW-1	PW-70AR	10	-	0.1 U	—	—	—	0.634	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-72A	10	-	0.1 U	—	—	—	0.57	—	—	—	—	—	—	—	—	—	—	—
Former CCA	FW-1	PW-101A	10	-	—	—	0.012 J	0.1 U	0.1 U	0.1 U	—	—	—	—	—	—	—	0.25 U	—	0.25 U
Recycle Yard	FW-4	PW-46A	10	-	0.1 U	—	—	—	0.26 U	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-74B	10	-	0.23	—	—	—	0.13 U	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-75A	10	-	0.1 U	—	—	—	0.65	—	—	—	—	—	—	—	—	—	—	—
Recycle Yard	FW-4	PW-91A	10	-	0.1 U	—	—	—	0.1 U	—	—	—	—	—	—	—	—	—	—	—
Perimeter Monitoring Wells																				
Acid Sump	FW-3	PW-15AR	10	-	0.1 U	—	—	—	0.66	—	—	—	—	—	—	—	—	—	—	—
Acid Sump	FW-3	PW-76A	10	-	0.62	0.408	0.547	0.265	0.41 U	0.64	0.31	0.31	0.276	0.344	0.561	0.351	0.275	0.341	0.345	0.377
Acid Sump	FW-3	PW-77A	10	-	0.1 U	0.402	0.274	0.312	0.27 U	0.461 U	0.24	0.34	0.325	0.250 U	0.250 U	0.380	0.307	0.250 U	0.178 J	0.25 U
Acid Sump	FW-3	PW-78A	10	-	—	0.411	0.315	0.507	0.46 U	0.319	0.49	0.42	0.561	5.21	5.77	3.65	2.06	1.47	1.66	1.6
Acid Sump	FW-3	PW-79A	10	-	7.54	0.312	0.029 J	0.022 J	0.16 U	0.078 J	2.31	1.56	2.51	2.29	2.84	2.63	1.85	1.32	2.06	1.82

Notes

E = estimated value above the calibration range

J = estimated value

— = not analyzed

D = diluted

U = not detected above reporting limit

UJ = not detected above reporting limit and estimated

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Initial samples were collected in fall 2016 for EI-5, I-2, and I-3.

[4] PW-14 was sampled as part of the Acid Sump investigation in 2021.

Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2021).

The Sixth Five Year Review Covers 2017-2021

Table A-10: Fabrication Groundwater Levels

Well Information			Spring			Fall		
Location	Well	TOC Elev (ft amsl)	Date	DTW (ft bgs)	GW Elev (ft amsl)	Date	DTW (ft bgs)	GW Elev (ft amsl)
Acid Sump Pump	E-11	208.23	-	-	-	9/2/21	6.64	201.59
Acid Sump Pump	EI-5	208.70	-	-	-	9/2/21	7.48	201.22
Acid Sump Pump	FW-3	206.66	5/18/21	6.94	199.72	9/2/21	7.11	199.55
Acid Sump Pump	FW-5	201.86	NM[2]	NM[2]	NM[2]	9/1/21	0.00	201.86
Acid Sump Pump	FW-6	207.51	-	-	-	9/1/21	11.46	196.05
Acid Sump Pump	I-2	207.35	-	-	-	9/2/21	5.92	201.43
Acid Sump Pump	I-3	208.41	-	-	-	9/2/21	7.64	200.77
Acid Sump Pump	PW-10	211.53	-	-	-	NM	NM	NM
Acid Sump Pump	PW-11	208.53	-	-	-	NM	NM	NM
Acid Sump Pump	PW-12	209.97	5/18/21	9.42	200.55	9/2/21	9.44	200.53
Acid Sump Pump	PW-13	207.78	-	-	-	9/2/21	6.58	201.20
Acid Sump Pump	PW-14	209.52	5/20/21	7.30	202.22	9/2/21	7.65	201.87
Acid Sump Pump	PW-15AR	206.50	-	-	-	9/1/21	20.22	186.28
Acid Sump Pump	PW-16A	209.97	5/4/21	18.03	191.94	9/1/21	18.21	191.76
Acid Sump Pump	PW-19A	210.43	5/4/21	15.28	195.15	9/1/21	15.83	194.60
Acid Sump Pump	PW-32A	212.56	-	-	-	9/1/21	9.79	202.77
Acid Sump Pump	PW-33A	212.40	-	-	-	9/1/21	8.68	203.72
Acid Sump Pump	PW-34A	210.73	-	-	-	9/1/21	10.65	200.08
Acid Sump Pump	PW-76A	207.94	5/4/21	16.62	191.32	NM	NM	NM
Acid Sump Pump	PW-77A	209.03	5/6/21	18.59	190.44	NM	NM	NM
Acid Sump Pump	PW-78A	208.96	5/6/21	19.08	189.88	NM	NM	NM
Acid Sump Pump	PW-79A	198.28	5/6/21	7.89	190.39	9/1/21	8.11	190.17
Acid Sump Pump	PW-80A	211.03	-	-	-	9/1/21	13.70	197.33
Acid Sump Pump	PW-81A	208.73	-	-	-	9/1/21	6.71	202.02
Acid Sump Pump	PW-82A	208.64	5/18/21	9.05	199.59	9/1/21	8.11	200.53
Acid Sump Pump	PW-98A	209.15	5/18/21	8.28	200.87	9/2/21	8.46	200.69
Acid Sump Pump	PW-99A	207.44	5/18/21	5.49	201.95	9/2/21	6.35	201.09
Amm-Sulfate	PW-01A	211.44	-	-	-	9/1/21	15.28	196.16
Amm-Sulfate	PW-03A	210.50	-	-	-	9/1/21	16.47	194.03
Amm-Sulfate	PW-83A	210.28	-	-	-	9/1/21	14.29	195.99
Amm-Sulfate	PW-84AR	209.70	-	-	-	9/1/21	11.29	198.41
Amm-Sulfate	PW-89A	202.40	5/18/21	11.01	191.39	9/1/21	10.47	191.93
Amm-Sulfate	PW-92A	208.77	-	-	-	9/1/21	11.39	197.38
Amm-Sulfate	PW-93A	209.95	-	-	-	9/2/21	6.34	203.61
Amm-Sulfate	PW-94A	210.03	5/20/21	6.48	203.55	9/2/21	6.63	203.40
Amm-Sulfate	PW-95A	210.81	-	-	-	9/2/21	7.04	203.77
FCCA	FW-1	210.26	5/20/21	6.62	203.64	9/2/21	6.74	203.52
FCCA	FW-7	201.60	-	-	-	9/2/21	17.61	183.99
FCCA	MW-01A	205.20	5/7/21	11.72	193.48	9/2/21	9.82	195.38
FCCA	MW-02A	204.83	-	-	-	9/2/21	11.29	193.54
FCCA	MW-03A	207.59	-	-	-	9/2/21	7.37	200.22
FCCA	MW-04A	204.62	-	-	-	9/2/21	10.69	193.93
FCCA	MW-05A	213.98	-	-	-	9/2/21	10.92	203.06
FCCA	MW-06A	211.64	-	-	-	9/2/21	17.00	194.64
FCCA	MW-07A	200.49	-	-	-	9/2/21	9.55	190.94
FCCA	MW-08A	201.23	-	-	-	9/2/21	9.23	192.00
FCCA	MW-09A	210.00	-	-	-	9/2/21	13.36	196.64
FCCA	MW-10A	212.49	-	-	-	9/2/21	16.64	195.85
FCCA	MW-11A	211.02	-	-	-	9/2/21	18.60	192.42
FCCA	PW-31A	214.71	-	-	-	9/1/21	11.15	203.56
FCCA	PW-45A	211.69	-	-	-	9/1/21	12.95	198.74
FCCA	PW-68A	211.63	5/20/21	9.10	202.53	9/1/21	9.44	202.19
FCCA	PW-69A	209.70	-	-	-	9/2/21	8.69	201.01
FCCA	PW-70AR	210.57	-	-	-	9/2/21	8.12	202.45
FCCA	PW-71A	210.06	-	-	-	9/1/21	7.45	202.61
FCCA	PW-72A	210.13	5/19/21	5.75	204.38	9/1/21	5.91	204.22
FCCA	PW-100A	210.34	-	-	-	9/2/21	7.69	202.65
FCCA	PW-101A	210.67	-	-	-	9/2/21	6.49	204.18
Material Recycle Area	FW-2	208.35	5/19/21	10.44	197.91	9/1/21	10.60	197.75
Material Recycle Area	PW-20A	210.42	-	-	-	9/1/21	17.61	192.81
Material Recycle Area	PW-42A	209.98	-	-	-	9/1/21	9.82	200.16
Material Recycle Area	PW-85A	212.85	-	-	-	9/1/21	14.89	197.96
Material Recycle Area	PW-86A	208.91	-	-	-	9/1/21	10.69	198.22
Material Recycle Area	PW-87A	211.49	-	-	-	9/1/21	10.92	200.57
Material Recycle Area	PW-88A	211.89	5/6/21	17.07	194.82	9/1/21	17.00	194.89
Material Recycle Area	PZ-01A	210.83	-	-	-	9/1/21	10.01	200.82
Recycle Yard	FW-4	195.37	5/19/21	3.61	191.76	9/2/21	3.67	191.70
Recycle Yard	PW-30A	199.75	5/19/21	5.27	194.48	9/2/21	5.43	194.32
Recycle Yard	PW-46A	209.61	-	-	-	9/1/21	14.35	195.26
Recycle Yard	PW-73A	210.86	-	-	-	9/1/21	4.55	206.31
Recycle Yard	PW-73B	211.23	5/19/21	13.22	198.01	9/1/21	12.67	198.56
Recycle Yard	PW-74A	209.81	-	-	-	9/1/21	8.51	201.30
Recycle Yard	PW-74B	209.64	-	-	-	9/1/21	16.45	193.19
Recycle Yard	PW-75A	197.57	5/19/21	7.26	190.31	9/2/21	7.67	189.90
Recycle Yard	PW-91A	198.19	5/7/21	7.03	191.16	9/1/21	7.61	190.58

Notes

[1] Unable to gain access because the wellhead would not open.

[2] Not measured; well was pumping.

[3] Water levels were measured prior to the annual monitoring event in August. Additional water level measurements were collected in September to coincide with the Fabrication and Extraction Areas fall monitoring event. Only the September water levels are reported here.

-- = not collected as indicated in the 2021 Monitoring Schedule.

DTW = depth to water

ft amsl = feet above mean sea level

ft bgs = feet below ground surface

GW Elev = groundwater elevation

NM = not measured

TOC Elev = top of casing elevation

Table A-11: Fabrication Area Metal Groundwater Concentrations

Well	Analyte	Unit	Cleanup Level	Baseline 2000	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
Fabrication Area														
FW-7	Arsenic	mg/L	0.01	—	—	—	—	—	—	—	—	0.0025	—	0.00295
MW-02A	Arsenic	mg/L	0.01	—	—	—	—	0.022	—	0.0200	—	0.0204	—	0.0211
MW-03A	Arsenic	mg/L	0.01	—	—	—	—	0.01	—	0.0111	—	0.0086	—	0.0125
PW-69A	Arsenic	mg/L	0.01	—	—	—	—	0.02	—	0.0221	—	0.0199	—	0.0217
PW-72A	Arsenic	mg/L	0.01	—	—	—	—	—	—	—	—	0.001 U	0.001 U	0.001 U
PW-93A	Arsenic	mg/L	0.01	—	—	—	—	0.024	—	0.0250	—	0.0265	—	0.0259
PW-94A	Arsenic	mg/L	0.01	—	—	—	—	0.012	—	0.0254	—	0.0481	0.039	0.0413

Notes

8-year rolling table. Refer to past annual reports for a full record of historical concentrations.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2015).

Table B-1: Extraction Area - Feed Makeup Area Groundwater Data 2014 to 2021

Hot Spot (HS) Non Hot Spot (NHS) Perimeter (P), or Recovery	Station	Parameter	Units	ROD Standard	Baseline July 2000	Fall 2014[1]	Spring 2015	Spring 2016[2]	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
P	PW-21A	AMMONIUM	MG/L	250	—	70.7	—	13.8	57.1	26.1	98.3	56.1	114	27.5	126	83.8	140	54.1	154
P	PW-22A	AMMONIUM	MG/L	250	252	160	196.25	145	59.2	123	108	117	107	120	118	—	97.3	—	105.6
P	PW-23A	AMMONIUM	MG/L	250	81.5	38.6	47.38	41.6	38.3	38.3	39.0	52.8	38.4	35.9	36.0	37.5	34.4	42.9	44.6
P	PW-24A	AMMONIUM	MG/L	250	265	60.5	120.13	187.5	84.1	52.6	161	158	184	120	164	—	101	—	119.75
NHS	PW-27A	AMMONIUM	MG/L	250		7.58	11.39	22.5	25.5	18.3	18.6	19.5	10.7	15.8	12.2	—	26.6	—	37
HS	PW-28A	AMMONIUM	MG/L	250	450	262	292.5	145	210	221	139	173	6.01	117	139	113	190	77.3 J	128
HS	PW-50A	AMMONIUM	MG/L	250	161	3.77	23.75	44.4	26	7.24	13.2	10.1	63.3	11.8	55.1	—	53	—	69.3
HS	PW-51A	AMMONIUM	MG/L	250	195	88.4	126.25	157.5	141	125	102	119	109	148	126	—	103	—	125
HS	PW-52A	AMMONIUM	MG/L	250	367	128	152.5	145	149	140	112	114	178	122	183	—	110	—	134
Recovery	EW-1	AMMONIUM	MG/L	250	316	51.4	65.75	62.5	63.5	75.1	42.0	54.3	61.5	54.1	77.1	—	55.5	—	73.3
Recovery	EW-2	AMMONIUM	MG/L	250	410	66.7	73.38	69.9	84.3	64.1	70.1	49.0	50.3	50.9	61.8	49.8	46.3	46	52.9
Recovery	EW-3	AMMONIUM	MG/L	250	87.6	31	55.9	33.4	46.8	26.6	34.4	38.3	32.8	36.1	34.1	—	34.3	—	44.8
P	PW-21A	ARSENIC	MG/L	0.01		0.01 U	—	0.0002 J	0.0001 J	0.0002 J	0.0005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U
P	PW-22A	ARSENIC	MG/L	0.01	0.0105	0.0055 J	0.0046	0.0048	0.0091	0.0044	0.0041	0.0042	0.0044	0.0037	0.0044	—	0.0044	—	0.0041
P	PW-23A	ARSENIC	MG/L	0.01	0.124	0.0152	0.0327	0.0085	0.007	0.0065	0.0058	0.0049	0.0049	0.0045	0.0057	0.005	0.0043	0.0045	0.0055
P	PW-24A	ARSENIC	MG/L	0.01		0.01 U	0.0008	0.0007	0.0006	0.0003 J	0.0005 J	0.001 U	0.001 U	0.001 U	0.001 U	—	0.001 U	—	0.001 U
NHS	PW-27A	ARSENIC	MG/L	0.01		0.01 U	0.0004 J	0.0005 J	0.0009	0.0003 J	0.0004 J	0.001 U	0.001 U	0.001 U	0.001 U	—	0.001 U	—	0.001 U
HS	PW-28A	ARSENIC	MG/L	0.01	0.239	0.0008 J	0.001 J	0.05 U	0.025 U	0.0009 J	0.0006 J	0.0015	0.0027 J	0.01 U	0.0024	—	0.005 UJ	—	0.0034
HS	PW-50A	ARSENIC	MG/L	0.01	0.107	0.05 U	0.05 J	0.05 U	0.05 U	0.0005 J	0.0008 J	0.0027	0.009	0.0027 J	0.0036	0.0023	0.005 UJ	0.0012	0.0024
HS	PW-51A	ARSENIC	MG/L	0.01	0.044	0.05 U	0.0012	0.0004 J	0.0006	0.0011	0.0037	0.0015	0.0021	0.0009 J	0.0057	—	0.0011	—	0.0016
HS	PW-52A	ARSENIC	MG/L	0.01	0.099	0.05 U	0.0175 J	0.05 U	0.025 U	0.01 U	0.025 U	0.0055	0.0089	0.01 U	0.0063	—	0.0021	—	0.0059
Recovery	EW-1	ARSENIC	MG/L	0.01	0.202	0.05 U	0.05 U	0.05 U	0.05 U	0.01 U	0.0007 J	0.0049	0.0031 J	0.005 U	0.0023	—	0.0013	—	0.00338
Recovery	EW-2	ARSENIC	MG/L	0.01	0.203	0.05 U	0.05 U	0.0045 J	0.025 U	0.005 U	0.0025 U	0.0044	0.0033	0.005 U	0.0034	0.0019	0.0012	0.0011	0.00276
Recovery	EW-3	ARSENIC	MG/L	0.01	0.056	0.01 U	0.0012 J	0.05 U	0.025 U	0.0005 J	0.0003 J	0.0012	0.005 U	0.005 U	0.001 U	—	0.001 U	—	0.0005 J
	PW-96A	ARSENIC	MG/L	0.01	—	—	—	0.0174	—	—	—	—	—	0.0138	—	—	0.0139	—	0.0152
P	PW-21A	CADMIUM	MG/L	0.005		0.01 U	—	0.005 U	0.0005 U	0.0005 U	0.0005	8E-05 J	8E-05 J	0.0002 U	0.0002 U	—	0.0002 U	0.0002 U	0.0001 J
P	PW-22A	CADMIUM	MG/L	0.005	0.00025 U	0.01 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	—	0.0002 U	—	0.0002 U
P	PW-23A	CADMIUM	MG/L	0.005	0.00025 U	0.01 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0005 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U	0.0002 U
P	PW-24A	CADMIUM	MG/L	0.005		0.01 U	0.0005 U	0.0005 U	0.0002 J	0.0005 U	0.0005 U	4E-05 J	5E-05 J	0.0002 U	0.0002 U	—	0.0002 U	—	0.0002 U
NHS	PW-27A	CADMIUM	MG/L	0.005		0.01 U	0.001 U	0.0001 J	0.0002 J	4E-05 J	0.0005 U	7E-05 J	7E-05 J	0.0001 J	5E-05 J	—	0.0002 U	—	0.0002 U
HS	PW-28A	CADMIUM	MG/L	0.005	0.0361	0.196	0.0655	0.05 U	0.05 U	0.0009 J	0.005 U	0.0059	0.0273	0.0049	0.0037	0.003	0.0036	0.0019	0.0025
HS	PW-50A	CADMIUM	MG/L	0.005	0.025	0.0017 J	0.0114 J	0.05 U	0.025 U	0.0447	0.0583	0.0253	0.0057	0.0134	0.002	—	0.0029	—	0.0025
HS	PW-51A	CADMIUM	MG/L	0.005	0.0127	0.01 U	0.0001 J	0.0007	0.0011	0.0012	0.0007 J	0.0011	0.0012	0.0009 J	0.0013	—	0.0011	—	0.001
HS	PW-52A	CADMIUM	MG/L	0.005	0.0171	0.0469	3.07	0.05 U	0.0088 J	0.0067	0.0039 J	0.0056	0.0063	0.0051	0.0032	—	0.003	—	0.0023
Recovery	EW-1	CADMIUM	MG/L	0.005	0.0229	0.0109	0.0146	0.05 U	0.05 U	0.0084 J	0.0088	0.0098	0.0086	0.0065	0.0046	—	0.0047	—	0.0044
Recovery	EW-2	CADMIUM	MG/L	0.005	0.0465	0.271	0.108	0.911	0.0815	0.0546	0.0346	0.0216	0.0177	0.0113	0.0056	0.0049	0.0054	0.0036	0.0044
Recovery	EW-3	CADMIUM	MG/L	0.005	0.026	0.0069 J	0.0266	0.05 U	0.025 U	0.0018 J	0.0022	0.0015	0.0016	0.0024	0.0007	—	0.0013	—	0.0006
P	PW-21A	FLUORIDE	MG/L	4		1.78	—	0.46 J	1.82	0.52 J	2.16	1.54	2.66	1 U	2.79	1.57	2.77	0.743 J	2.09
P	PW-22A	FLUORIDE	MG/L	4	10 U	3.53	2.97	2.59	2.71	2.94	2.01	3.32	3.0	3.53	5.02	—	3.27	—	3.2
P	PW-23A	FLUORIDE	MG/L	4	13.6	24.4	26.1	22.8	23.4	23.6	25	23	25.2 J	24.7	27	23.8	23.1	21.8	22.7
P	PW-24A	FLUORIDE	MG/L	4	4.6	0.605 J	0.66 J	0.79 J	0.727 J	0.84 J	0.51 J	1.0 U	1.0 U	1 U	1 U	—	0.665 J	—	0.504 J
NHS	PW-27A	FLUORIDE	MG/L	4		0.0437 J	0.0555 U	0.43 J	0.0934 J	0.11 U	1.0 U	1.0 U	1.0 U	1 U	1 U	—	1 U	—	1 U
HS	PW-28A	FLUORIDE	MG/L	4	12.9	0.118 J	0.158 J	2.89	3.41	4.13 J	10.4	100 U	1.05	1 U	10 U	20 U	11.3 J	20 U	5.4 J
HS	PW-50A	FLUORIDE	MG/L	4	12.4	0.775 J	1.31	2.48 J	1.8	1.57 J	1.26	1.08	6.03	1.32	6.08	—	8.84	—	10.3
HS	PW-51A	FLUORIDE	MG/L	4	148	0.413 J	0.752 J	1.09 J	1.19	1.26 J	1.08	1.0	1.0	1.14	5 U	—	1.23	—	5 U
HS	PW-52A	FLUORIDE	MG/L	4	30.2	3.34	1.73	9 J	11.5	11.9 J	9.84	17.8	1.0 U	1 U	20.8	—	14.3	—	23.4
Recovery	EW-1	FLUORIDE	MG/L	4	40.8	2.99	3.28	9.76 J	13.3	12.4 J	9.94	1.0 U	11.2	9.01	15.2	—	14.4	—	13.4
Recovery	EW-2	FLUORIDE	MG/L	4	12.7	0.199 J	0.431 J	4.54 J	6.34	3.62 J	2.99	1.0 U	1.98	1 U	10 U	20 U	8.38	20 U	8.7 J
Recovery	EW-3	FLUORIDE	MG/L	4	31.3	5.35	6.66	3.99 J	23.1	3.68 J	11.4	6.16	15.2	16.4	13.3	—	17.7	—	18.6
P	PW-21A	RADIUM 226	pCi/L	5[2]		1.2	—	0.67	1.2	1.2	2.2	0.13	1.4	0.36	1.8	0.72	1.8	0.46 J	1.1
P	PW-22A	RADIUM 226	pCi/L	5[2]	0.2	0.39	0.3	0.19	0.41	0.12 J	0.13 U	0.17	0.13 J	0.2	0.25	—	0.03 UJ	—	0.11
P	PW-23A	RADIUM 226	pCi/L	5[3]	13	0.31	0.5	0.02	-0.02	0.06 J	0.04 U	0.13	0.15 J	0.06	0.32	0.33	0.24 UJ	0.01 J	-0.01 J
P	PW-24A	RADIUM 226	pCi/L	5[3]		0.04	0.2	0.06	0.07	0.05 J	0.13 U	0.13	0.13 J	0.09	0.23	—	0.09 UJ	—	0.3 J
NHS	PW-27A	RADIUM 226	pCi/L	5[3]		0.62	0.3	0.08	0.1	0.2 J	0.03 U	0.13	0.13 J	0.13	0.21	—	0.13 UJ	—	0.06
HS	PW-28A	RADIUM 226	pCi/L	5[3]	69	25	35.3	8.4	11	8.3	17	19	0.53	14	15	10	12	6.3 J	7.9
HS	PW-50A	RADIUM 226	pCi/L	5[3]		0.67	2.1	1.3	0.74	0.44	0.5	2	1	0.4 J	0.91	—	0.87 J	—	0.42
HS	PW-51A	RADIUM 226	pCi/L	5[3]	0.5	0.34	0.4	0.22	0.12	0.2	0.62	0.2	0.38	0.27 J	0.72	—	0.13 UJ	—	0.2
HS	PW-52A	RADIUM 226	pCi/L	5[3]	12	1.7	3.3	0.38	0.25	0.29	0.25	0.27	0.35	0.3 J	0.52	—	0.25 UJ	—	0.21
Recovery	EW-1	RADIUM 226	pCi/L	5[3]	51	1.1	1.8	0.58	0.52	1.1	0.71	0.92	0.67	0.6	0.48	—	0.8 J	—	0.81
Recovery	EW-2	RADIUM 226	pCi/L	5[3]	68	14	10.6	6.3	7.7	7.6	10	4.7	3.3	3.8	6.4	3	4.6	2	1.7
Recovery	EW-3	RADIUM 226	pCi/L	5[3]	6.2	0.48	2.2	0.18	0.09	0.18	0.43	0.06	0.05	0.21	0.2	—	-0.03 UJ	—	0.12
P	PW-21A	RADIUM 228	pCi/L	5[3]		1.2	—	1.4	3.1	1.5	3.6	0.65	4.1	0.3	1.8	1.7	5.7 J	-0.06 J	1.9 J
P	PW-22A	RADIUM 228	pCi/L	5[3]	1.4	0.45	0.7 U	0.39	0.22	0.11	-0.09 U	0.64	1.5	-0.21	0.68	—	0.34 UJ	—	1.6 J
P	PW-23A	RADIUM 228	pCi/L	5[3]	2.6	-0.3	1.4	0.45	0.34	0.08	0.23 U	0.17	1.5	-0.17	0.06	0.54	0.55 UJ	-1.3 J	0.76 J
P	PW-24A	RADIUM 228	pCi/L	5[3]		1.4	0.7 U	-0.94	0.24	-0.2	-0.3 U	1.4	-0.79	0.37	1.2	—	0.4 UJ	—	0.71 J
NHS	PW-27A	RADIUM 228	pCi/L	5[3]		1.4	1.5	1.4	0.45	0.05	-0.21 U	0.65	1.2	0.23	0.5	—	0.3 UJ	—	1.6 J
HS	PW-28A	RADIUM 228	pCi/L	5[3]	140	54	42.6	13	23	15	19	27	1.4	29	31	38	32 J	16 J	17 J
HS	PW-50A	RADIUM 228	pCi/L	5[3]		4.7	6	3.3	4.2	2.4	2.5	7.4	9.3	4.1	4.6	—	14 J	—	9.6 J
HS	PW-51A	RADIUM 228	pCi/L	5[3]		0.77	1.5	0.42	-0.3	0.49	0.7 U	1.2	0.33	1	3.2	—	1.7 UJ	—	0.51 J
HS	PW-52A	RADIUM 228	pCi/L	5[3]	9.3	0.71	4.2	-0.02	3.2	1.9	1.6	3.7	5.1	3.2	5	—	3.9	—	4.4 J
Recovery	EW-1	RADIUM 228	pCi/L	5[3]	14	4.5	4	1.8	2.9	2.7	1.3	3.9	7.1	4.2	5.3	—	5.7	—	8.6
Recovery	EW-2	RADIUM 228	pCi/L	5[3]	150	31	17	16	23	18	14	15	19	16	18	20	9.3	11	6.7
Recovery	EW-3	RADIUM 228	pCi/L	5[3]	0	1.6	3.2	1	0.5	0.55	0.63 U	0.39	0.1	-0.05	0.29	—	0.82 UJ	—	0.53 J
P	PW-22A	Pentachlorophenol	µg/L	1	—	—	—	4.75 U	—	—	—	—	—	—	—	—	0.2 U	—	0.202 U
P	PW-23A	Pentachlorophenol	µg/L	1	—	—	—	4.77 U	—	—	—	—	—	—	—	0.202 U	0.113 J	0.194 U	0.194 U
P	PW-50A	Pentachlorophenol	µg/L	1	—	—	—	30.4	—	—	—	—	17.5	—	11.3	—	13 UJ	—	24.7
P	PW-21A	MIBK	µg/L	-		—	—	0.5 U	—	—	—	—	—	—	—	10 U	10 U	10 U	10 U
P	PW-22A	MIBK	µg/L	-		—	—	0.5 U	—	0.5 U	—	—	—	—	—	—	10 U	—	10 U

NOTES

[1] The fall 2014 monitoring event was conducted in February 2015.

[2] Radium exceeds if total of R226+R228 exceeds 5 pCi/L.

🟧 = detected value exceeds ROD Standard.

▨ = detection limit greater than ROD Standard

[4] Historical analytical data for 2002 through 2004 are presented in previous progress summaries for the Extraction Area.

[5] Historical data for PW-28B is presented in the Attachment A of previous progress summaries for the Extraction Area.

U = Constituent not detected above method detection limit.
J = Estimated concentration below the analysis reporting limit.
E = Estimated value above calibration range.
pCi/L = picocuries per liter.
TDS = total dissolved solids.
mg/L = milligrams per liter

Source of Data through 2015 (GSI 2016e)
Source of Data through 2016 (GSI 20167a)

Table B-2: Extraction Area CVOCs

Well	Unit	Cleanup Level	Baseline 2000	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
TCE													
E-11	µg/L	5	—	0.50 U	0.50 U	0.400 U	0.400 U	0.4 U	0.4 U	—	0.57	—	0.4 U
PW-25A	µg/L	5	6.5	—	—	—	—	—	—	—	—	—	—
PW-26A	µg/L	5	8.1	0.61	0.68	—	—	—	—	—	—	—	—
PW-29A	µg/L	5	—	0.50 U	0.34 J	—	—	—	—	—	—	—	—
PW-47A	µg/L	5	38.4	0.93	1.21	—	—	—	—	—	—	—	—
PW-48A	µg/L	5	1 U	—	—	—	—	—	—	—	—	—	—
PW-49A	µg/L	5	8.4	—	—	—	—	—	—	—	—	—	—
PW-57A	µg/L	5	32.8	—	1.11	—	—	—	—	—	—	—	—
PW-96A	µg/L	5	—	0.61	0.50 U	—	—	3.04	3.02	—	0.4 U	—	1.21
PW-97A	µg/L	5	—	0.49 J	0.50 U	—	—	—	—	—	—	—	—
TCA													
E-11	µg/L	200	—	0.52	3.04	9.39	7.71	8.08	8.88	—	50.9	—	7.87
EI-5	µg/L	5	—	24	10 U	3.0 J	100 U	20 U	10 U	—	40 U	—	40 U
EI-5	µg/L	200	—	4,040	40.2	766	90.2 J	144	10 U	—	40 U	—	40 U
PW-25A	µg/L	200	4.1	—	—	—	—	—	—	—	—	—	—
PW-26A	µg/L	200	2.1	0.50 U	2.65	—	—	—	—	—	—	—	—
PW-29A	µg/L	200	—	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-47A	µg/L	200	68	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-48A	µg/L	200	1 U	—	—	—	—	—	—	—	—	—	—
PW-49A	µg/L	200	1 U	—	—	—	—	—	—	—	—	—	—
PW-57A	µg/L	200	42.1	—	0.50 U	—	—	—	—	—	—	—	—
PW-96A	µg/L	200	—	1.85	0.50 U	—	—	10.2	9.39	—	0.4 U	—	8.78
PW-97A	µg/L	200	—	0.36 J	0.50 U	—	—	—	—	—	—	—	—
DCA													
E-11	µg/L	3,700	—	0.41 J	0.96	2.86	2.47	2.02	2.34	—	29	—	12.6
EI-5	µg/L	3,700	—	2950	731	572	169	148	22.8	—	352	—	34.4 J
PW-25A	µg/L	1,280	6.5	—	—	—	—	—	—	—	—	—	—
PW-26A	µg/L	1,280	1.4	0.15 J	10.4	—	—	—	—	—	—	—	—
PW-29A	µg/L	1,280	—	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-47A	µg/L	1,280	41.2	1.50	1.62	—	—	—	—	—	—	—	—
PW-48A	µg/L	1,280	1 U	—	—	—	—	—	—	—	—	—	—
PW-49A	µg/L	1,280	1 U	—	—	—	—	—	—	—	—	—	—
PW-57A	µg/L	1,280	22.8	—	1.02	—	—	—	—	—	—	—	—
PW-96A	µg/L	1,280	—	15.2	0.24 J	—	—	22.7	28	—	4.45	—	28.6
PW-97A	µg/L	1,280	—	2.49	0.43 J	—	—	—	—	—	—	—	—
PCE													
PW-25A	µg/L	5	3	—	—	—	—	—	—	—	—	—	—
PW-26A	µg/L	5	1 U	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-29A	µg/L	5	—	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-47A	µg/L	5	5.5	0.15 J	0.30 J	—	—	—	—	—	—	—	—
PW-48A	µg/L	5	1 U	—	—	—	—	—	—	—	—	—	—
PW-49A	µg/L	5	1 U	—	—	—	—	—	—	—	—	—	—
PW-57A	µg/L	5	3.9	—	0.50 U	—	—	—	—	—	—	—	—
PW-96A	µg/L	5	—	0.50 U	0.50 U	—	—	0.4 U	0.4 U	—	0.4 U	—	0.4 U
PW-97A	µg/L	5	—	0.50 U	0.50 U	—	—	—	—	—	—	—	—
DCE													
PW-25A	µg/L	7	2.6	—	—	—	—	—	—	—	—	—	—
PW-26A	µg/L	7	1 U	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-29A	µg/L	7	—	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-47A	µg/L	7	11.7	0.20 J	0.19 J	—	—	—	—	—	—	—	—
PW-48A	µg/L	7	1 U	—	—	—	—	—	—	—	—	—	—
PW-49A	µg/L	7	1 U	—	—	—	—	—	—	—	—	—	—
PW-57A	µg/L	7	8.1	—	0.50 U	—	—	—	—	—	—	—	—
PW-96A	µg/L	7	—	0.33 J	0.50 U	—	—	1.15	0.77	—	0.4 U	—	0.963
PW-97A	µg/L	7	—	0.22 J	0.50 U	—	—	—	—	—	—	—	—
VC													
EW-5	µg/L	2	2 U	—	—	—	—	—	—	—	—	—	—
PW-21A	µg/L	2	—	—	—	—	—	—	—	0.4 U	0.4 U	0.4 U	0.4 U
PW-22A	µg/L	2	—	17.9	—	23.5	16.1	—	—	—	17	—	16.6
PW-25A	µg/L	2	1 U	—	—	—	—	—	—	—	—	—	—
PW-26A	µg/L	2	1 U	0.50 U	1.18	—	—	—	—	—	—	—	—
PW-29A	µg/L	2	—	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-47A	µg/L	2	1 U	0.50 U	0.50 U	—	—	—	—	—	—	—	—
PW-48A	µg/L	2	1 U	—	—	—	—	—	—	—	—	—	—
PW-49A	µg/L	2	1 U	—	—	—	—	—	—	—	—	—	—
PW-57A	µg/L	2	1 U	—	0.45 J	—	—	—	—	—	—	—	—
PW-96A	µg/L	2	—	5.58	0.50 U	—	—	2.98	4.37	—	1.38	—	3.6
PW-97A	µg/L	2	—	0.23 J	0.50 U	—	—	—	—	—	—	—	—
Nitrate													
EW-1	mg/L	250	316	75.1	42.0	54.3	61.5	54.1	77.1	—	55.5	—	73.3
EW-2	mg/L	250	410	64.1	70.1	49.0	50.3	50.9	61.8	49.8	46.3	46	52.9
EW-3	mg/L	250	87.6	26.6	34.4	38.3	32.8	36.1	34.1	—	34.3	—	44.8
PW-21A	mg/L	250	—	26.1	98.3	56.1	114	27.5	126	83.8	140	54.1	154
PW-22A	mg/L	250	252	123	108	117	107	120	118	—	97.3	—	105.6
PW-23A	mg/L	250	81.5	38.3	39.0	52.8	38.4	35.9	36.0	37.5	34.4	42.9	44.6
PW-24A	mg/L	250	265	52.6	161	158	184	120	164	—	101	—	119.75
PW-27A	mg/L	250	—	18.3	18.6	19.5	10.7	15.8	12.2	—	26.6	—	37
PW-28A	mg/L	250	450	221	139	173	6.01	117	139	113	190	77.3 J	128
PW-50A	mg/L	250	161	7.24	13.2	10.1	63.3	11.8	55.1	—	53	—	69.3
PW-51A	mg/L	250	195	125	102	119	109	148	126	—	103	—	125
PW-52A	mg/L	250	367	140	112	114	178	122	183	—	110	—	134
Fluoride													
EW-1	mg/L	4	40.8	12.4 J	9.94	1.0 U	11.2	9.01	15.2	—	14.4	—	13.4
EW-2	mg/L	4	12.7	3.62 J	2.99	1.0 U	1.98	1 U	10 U	20 U	8.38	20 U	8.7 J
EW-3	mg/L	4	31.3	3.68 J	11.4	6.16	15.2	16.4	13.3	—	17.7	—	18.6
PW-21A	mg/L	4	—	0.52 J	2.16	1.54	2.66	1 U	2.79	1.57	2.77	0.743 J	2.09
PW-22A	mg/L	4	10 U	2.94	2.01	3.32	3.0	3.53	5.02	—	3.27	—	3.2
PW-23A	mg/L	4	13.6	23.6	25	23	25.2 J	24.7	27	23.8	23.1	21.8	22.7
PW-24A	mg/L	4	4.6	0.84 J	0.51 J	1.0 U	1.0 U	1 U	1 U	—	0.665 J	—	0.504 J
PW-27A	mg/L	4	—	0.11 U	1.0 U	1.0 U	1.0 U	1 U	1 U	—	1 U	—	1 U
PW-28A	mg/L	4	12.9	4.13 J	10.4	100 U	1.05	1 U	10 U	20 U	11.3 J	20 U	5.4 J
PW-50A	mg/L	4	12.4	1.57 J	1.26	1.08	6.03	1.32	6.08	—	8.84	—	10.3
PW-51A	mg/L	4	148	1.26 J	1.08	1.0	1.0	1.14	5 U	—	1.23	—	5 U
PW-52A	mg/L	4	30.2	11.9 J	9.84	17.8	1.0 U	1 U	20.8	—	14.3	—	23.4

Notes

— = not analyzed

J = estimated value

mg/L = milligram per liter

U = not detected above reporting limit

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action Table B-4 for more details (GSI, 2015).

Table B-3: Groundwater Levels of the Extraction Area

Well Information		Spring			Fall		
Well	**TOC Elev** (ft amsl)	**Date**	**DTW** (ft bgs)	**GW Elev** (ft amsl)	**Date**	**DTW** (ft bgs)	**GW Elev** (ft amsl)
EW-4	210.00	-	-	-	9/2/21	21.61	188.39
EW-5	208.92	-	-	-	9/2/21	22.10	186.82
EW-6	208.70	-	-	-	9/2/21	21.13	187.57
PW-25A	211.88	-	-	-	9/1/21	23.87	188.01
PW-26A	213.18	-	-	-	9/1/21	25.30	187.88
PW-29A	214.22	-	-	-	9/2/21	21.95	192.27
PW-47A	210.79	-	-	-	9/1/21	25.81	184.98
PW-48A	214.50	-	-	-	9/2/21	18.79	195.71
PW-49A	216.98	-	-	-	9/1/21	30.20	186.78
PW-52A	210.36	-	-	-	9/1/21	15.73	194.63
PW-57A	210.87	-	-	-	9/1/21	25.18	185.69
PW-96A	210.54	-	-	-	9/1/21	22.81	187.73
PW-97A	210.24	-	-	-	9/1/21	24.81	185.43

Notes

[1] Unable to gain access because the wellhead would not open.

[2] Not measured; well was pumping.

[3] Water levels were measured prior to the annual monitoring event in August. Additional water level measurements were collected in September to coincide with the Fabrication and Extraction Areas fall monitoring event. Only the September water levels are reported here.

-- = not collected as indicated in the 2021 Monitoring Schedule.
DTW = depth to water
ft amsl = feet above mean sea level
ft bgs = feet below ground surface
GW Elev = groundwater elevation
NM = not measured
TOC Elev = top of casing elevation

Table C-1: Solids Area Groundwater Data 2014 to 2021

Station	Parameter	Cleanup Level	Units	Baseline 2000	Spring 2016^{1}	Fall 2016	Spring 2017	Fall 2017	Spring 2018	Fall 2018	Spring 2019	Fall 2019	Spring 2020	Fall 2020	Spring 2021	Fall 2021
PW-18B	Arsenic	0.01	mg/L	—	0.0001 J	—	—	—	—	—	—	—	—	0.001 U	—	0.001 U
PWB-1	Arsenic	0.01	mg/L	—	0.0101	—	—	—	—	0.011	—	0.0114	—	0.0101	—	0.00979
PWB-2	Arsenic	0.01	mg/L	—	0.0142	—	—	—	—	0.016	—	0.0133	—	0.0121	—	0.0113
PWD-1	Arsenic	0.01	mg/L	—	0.0028	—	—	—	—	—	—	—	—	0.003	—	0.00307
PWE-1	Arsenic	0.01	mg/L	—	0.0103	—	—	—	—	0.011	—	0.0102	—	0.0091	—	0.0089
PWF-1	Cyanide	0.2	mg/L	—	0.275	—	—	—	—	0.224	—	0.251	—	0.246	—	0.0950 J
PWF-2	Cyanide	0.2	mg/L	—	0.323	—	—	—	—	0.096	—	0.393	—	0.302	—	0.407
PW-07	Radium-226	5 ^{2}	pCi/L	—	0.21	—	—	0.18	—	0.32	—	0.3	—	—	—	—
PW-07	Radium-228	5 ^{2}	pCi/L	—	0.69	—	—	-0.11	—	-0.21	—	0.25	—	—	—	—
PWB-3	Radium-226	5 ^{2}	pCi/L	—	1.5	—	—	—	—	11	—	0.65	—	0.49	—	0.4
PWB-3	Radium-228	5 ^{2}	pCi/L	—	5.5	—	—	—	—	3.3	—	3.5	—	2.2	—	5.1

Notes:

[1] The spring 2016 event was a sitewide groundwater and surface water sampling event.

[3] Solids Area sampled annually in August.

[3] Radium exceeds cleanup level if total of radium-226 and radium-228 exceeds 5 pCi/L.

6-year rolling table. Refer to past annual reports for a full record of historical concentrations.

mg/L = milligrams per liter

pCi/L = picoCuries per liter

U = The analyte was not detected above the reported sample quantification limit

J = The analyte was detected above the method detection limit and below the method reporting limit, and is considered an estimated value.

🟧 = detected value exceeds ROD Standard.

▨ = detection limit greater than ROD Standard

Table C-2: Solids Area Groundwater Levels

Well Information		Spring			Fall		
Well	**TOC Elev** (ft amsl)	**Date**	**DTW** (ft bgs)	**GW Elev** (ft amsl)	**Date**	**DTW** (ft bgs)	**GW Elev** (ft amsl)
PW-09	200.13	8/17/21	dry	-	9/1/21	21.43	178.70
PW-17B	184.14	8/18/21	10.82	173.32	9/1/21	10.85	173.29
PW-18B	188.24	8/18/21	21.08	167.16	9/1/21	21.04	167.20
PWA-1	192.82	8/18/21	15.58	177.24	9/1/21	15.63	177.19
PWA-2	193.04	8/18/21	14.65	178.39	9/1/21	14.68	178.36
PWB-1	182.90	8/17/21	4.42	178.48	9/1/21	4.46	178.44
PWB-2	182.94	8/17/21	4.52	178.42	9/1/21	4.49	178.45
PWB-3	182.86	8/17/21	4.35	178.51	9/1/21	4.34	178.52
PWC-1	202.69	-	-	-	9/1/21	15.93	186.76
PWC-2	202.65	-	-	-	9/1/21	15.96	186.69
PWD-1	192.51	8/17/21	22.55	169.96	9/1/21	22.55	169.96
PWD-2	192.49	8/17/21	19.02	173.47	9/1/21	19.01	173.48
PWE-1	190.50	8/17/21	11.94	178.56	9/1/21	12.07	178.43
PWE-2	190.53	8/17/21	11.76	178.77	9/1/21	11.80	178.73
PWF-1	204.76	8/17/21	19.28	185.48	9/1/21	19.31	185.45
PWF-2	204.68	8/17/21	19.20	185.48	9/1/21	19.22	185.46

Notes

[1] Unable to gain access because the wellhead would not open.

[2] Not measured; well was pumping.

[3] Water levels were measured prior to the annual monitoring event in August. Additional water level measurements were collected in September to coincide with the Fabrication and Extraction Areas fall monitoring event. Only the September water levels are reported here.

-- = not collected as indicated in the 2021 Monitoring Schedule.

DTW = depth to water

ft amsl = feet above mean sea level

ft bgs = feet below ground surface

GW Elev = groundwater elevation

NM = not measured

TOC Elev = top of casing elevation

Table D-1: Farm Ponds Restoration Analysis Data Table

COC	Well	Cleanup Level	Year and Season							Current Phase Status
			2017	2018	2019		2020	2021 Spring	2022 Winter	
			Spring	Spring	Winter	Spring	Spring	Spring	Winter	
Chlorinated Volatile Organic Compounds										
PCE	PW-40A	5 ug/L	--	--	--	--	--	--	--	COMPLETE
	PW-40S		0.15 J	0.2 U	--	0.28 J	--	--	--	COMPLETE
	PW-104S		4.69	3.01	9.78	4.05	5	2.4	--	RMP
TCE	PW-40A	5 ug/L	--	--	--	--	--	--	--	COMPLETE
	PW-40S		0.43 J	0.483	--	0.36 J	--	--	--	COMPLETE
	PW-104S		10.9	7.6	13.3	9.95	9.2	6.41	--	RMP
1,1-DCE	PW-40S	7 ug/L	0.5 U	0.2 U	0.4 U	--	--	--	--	COMPLETE
VC	PW-40A	2 ug/L	--	--	--	--	--	--	--	COMPLETE
	PW-40S		0.5 U	0.472	--	0.4 U	--	--	--	COMPLETE
1,1,2-TCA	PW-40A	3 ug/L	--	--	--		--	--	--	COMPLETE
	PW-40S		0.5 U	0.25 U	--	0.25 U	--	--	--	COMPLETE
	PW-104S		8.76	8.96	9.66	8.27	7.44	5.99	--	RMP
1,1,2,2-TCA	PW-40A	0.175 ug/L	--	--	--	--	--	--	--	COMPLETE
	PW-40S		0.5 U**	0.25 U**	0.25 U**	--	--	--	--	COMPLETE
1,2-DCA	PW-40A	5 ug/L	--	--	--	--	--	--	--	COMPLETE
	PW-40S		0.28 J	0.453	0.2 U	--	--	--	--	COMPLETE
	PW-104S		5.86	6.74	5.56	6.35	6.95	6.68	--	RMP
Metals										
Arsenic (Total)	PW-44S	10 ug/L	--	--	--	--	--	--	4.45	COMPLETE
Beryllium (Total)	PW-40A PW-40S PW-43S	4 ug/L	--	--	--	--	--	--	0.100 U	COMPLETE
			--	--	--	--	--	--	0.100 U	COMPLETE
			--	--	--	--	--	--	0.100 U	COMPLETE
Chromium (Total)	PW-43S	100 ug/L	--	--	--	--	--	--	5.61	COMPLETE

Notes
ug/L = micrograms per liter
COC = Constituent of Concern
U = Constituent not detected above the method reporting limit of "U"
J = Estimated concentration
-- = No sample collected
BOLD BLACK = COC detected in groundwater
BOLD RED = Constituent detected above the cleanup level

TCE = Trichloroethene
PCE = Tetrachloroethene
VC = Vinyl Chloride
1,1,2-TCA = 1,1,2-Trichloroethane
1,1,2,2-TCA = 1,1,2,2-Tetrachloroethane
1,2-DCA = 1,2-Dichloroethane
1,1-DCE = 1,1-Dichloroethene

** Indicates that the method reporting limit exceeds the cleanup level

Quantitative Evaluation:
Remediation Monitoring Phase

Quantitative Evaluation:
Attainment Monitoring Phase

Quantitative Evaluation: Restoration Complete

DATA COLLECTED DURING THE RMP THAT ARE USED TO EVALUATE COC CONCENTRATION TRENDS DURING THE AMP

Semi-Quantitative Evaluation

Table D-2: Farm Ponds CVOC Analytical Results for 2021

Well	1,1,2,2- PCA (µg/L)	1,1,1-TCA (µg/L)	1,1,2-TCA (µg/L)	1,1-DCA (µg/L)	1,2-DCA (µg/L)	PCE (µg/L)	TCE (µg/L)	1,1-DCE (µg/L)	cis-1,2- DCE (µg/L)	VC (µg/L)
Cleanup Level	0.175	200	3	810	5	5	5	7	70	2
PW-104S	0.500 U	0.400 U	5.99	11.5	6.68	2.40	6.41	0.637	45.0	0.400 U
PW-105S	0.500 U	0.400 U	0.500 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
PW-106S	0.500 U	0.400 U	0.500 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
PW-107S	0.500 U	0.400 U	0.500 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U
PW-108A	0.500 U	0.400 U	0.500 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U	0.400 U

Notes

[1] All analytical samples were collected on 6/15/2021.

Bold text denotes that the concentration meets or exceeds the cleanup level. µg/L = microgram per liter

CVOC = chlorinated volatile organic compound DCA = dichloroethane

DCE = dichloroethene PCA = tetrachloroethane PCE = tetrachloroethene TCA = trichloroethane TCE = trichloroethene

U = analyte not detected above method reporting limit

VC = vinyl chloride

Table E-1: Surface Water Analytical Results in 2021

	TCA (µg/L)		DCA (µg/L)		PCE (µg/L)		TCE (µg/L)		DCE (µg/L)		VC (µg/L)		Ammonium (mg/L)		Fluoride (mg/L)		Nitrate (mg/L)	
Cleanup Level[1]	18,000		none		840		21,900		11,600		none		FBV[2]		none		none	
Sample Location	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall	Spring	Fall
Murder Creek																		
MC-U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	--	--	1 U	1 U	0.706	0.25 U
MC-M	7.43	5.85	2.7	1.39	0.4 U	0.4 U	0.4 U	0.4 U	1.08	0.812	0.4 U	0.4 U	--	--	1.53	1.31	3.61	0.488
MC-D	1.34	3.68	0.491	0.846	0.4 U	0.4 U	0.4 U	0.4 U	0.24 J	0.312 J	0.4 U	0.4 U	--	--	0.568 J	1.56	1.15	1.52
Truax Creek																		
TC-U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.0725	0.195	--	--	--	--
TC-D	0.31 J	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.34 J	0.4 U	0.21 J	0.4 U	0.4325	0.0625	--	--	--	--

Notes

[1] Cleanup level is based on the DEQ's AWQC for aquatic receptors (Table 30; https://www.oregon.gov/deq/wq/Pages/WQ-Standards-Ammonia.aspx).

[2] Ammonia standard is dependent on pH and temperature. For example, the standard would be 25 mg/L for a pH of 7.0 units at 15 degrees Celsius.

🟧 indicates that the concentration meets or exceeds the cleanup standard. Refer to Quality Assurance Project Plan for Sitewide Remedial Action, Table B-4, for more details (GSI, 2015).

-- = not analyzed
µg/L = microgram per liter
AWQC = ambient water quality criteria
DCA = 1,1-dichloroethane
DCE = 1,1-dichloroethene
DEQ = Oregon Department of Environmental Quality
FBV = function-based value; see Table 30(b) in the DEQ's AWQC for aquatic receptors for more details. Values calculated using the Ammonia Freshwater Criteria Calculator.
J = estimated value
MC = Murder Creek
mg/L = milligram per liter
PCE = tetrachloroethene
TC = Truax Creek
TCA = 1,1,1-trichloroethane
TCE = trichloroethene
U = not detected above reporting limit
UJ = estimated nondetect
VC = vinyl chloride

Table F-1: Supplemental Monitoring in 2021

Constituent	Well	Unit	Cleanup Level	Fall 20211
Extraction Area				
Antimony	EW-1	mg/L	0.006	0.001 U
	EW-2	mg/L	0.006	0.001 U
	EW-3	mg/L	0.006	0.001 U
	PW-28A	mg/L	0.006	0.001 U
Arsenic	EW-6	mg/L	0.01	0.0181
	PW-47A	mg/L	0.01	0.00108
	PW-48A	mg/L	0.01	0.00761
	PW-97A	mg/L	0.01	0.0125
Fluoride	EW-4	mg/L	4	4.03
	EW-5	mg/L	4	3.57
	PW-26A	mg/L	4	5.53
	PW-102A	mg/L	4	11.7
Radium 228	PW-102A	pCi/L	5[1]	2.1 J
	PW-103A	pCi/L	5[1]	46
Fabrication Area				
Arsenic	MW-07A	mg/L	0.01	0.0432
	MW-08A	mg/L	0.01	0.0335
	MW-10A	mg/L	0.01	0.000553 J
	PW-11	mg/L	0.01	0.000633 J
	PW-12	mg/L	0.01	0.00122
	PW-13	mg/L	0.01	0.00284
	PW-30A	mg/L	0.01	0.000611 J
	PW-31A	mg/L	0.01	0.000557 J
Arsenic	PW-45A	mg/L	0.01	0.00105
	PW-46A	mg/L	0.01	0.00165
	PW-71A	mg/L	0.01	0.0194
	PW-74A	mg/L	0.01	0.0348
Cadmium	FW-5	mg/L	0.005	0.00124
	PW-01A	mg/L	0.005	0.0148
	PW-12	mg/L	0.005	0.0002 U
Chromium	PW-11	mg/L	0.1	0.001 U
	PW-12	mg/L	0.1	0.000566 J
	PW-13	mg/L	0.1	0.000658 J
	PW-46A	mg/L	0.1	0.001 U
Copper	PW-01A	mg/L	1	1.870

Notes

1 Radium exceeds cleanup level if total of radium-226 and radium-228 exceeds 5 pCi/L.

µg/L = micrograms per liter DCE = 1,1-dichloroethene

J = estimated value

mg/L = milligrams per liter NV = not validated

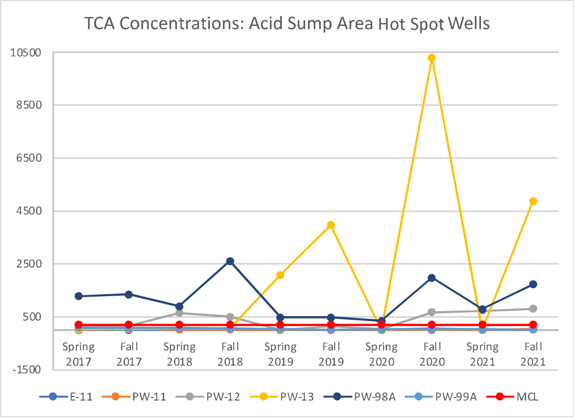
pCi/L = picocuries per liter TCA = 1,1,1-trichloroethane TCE = trichloroethene

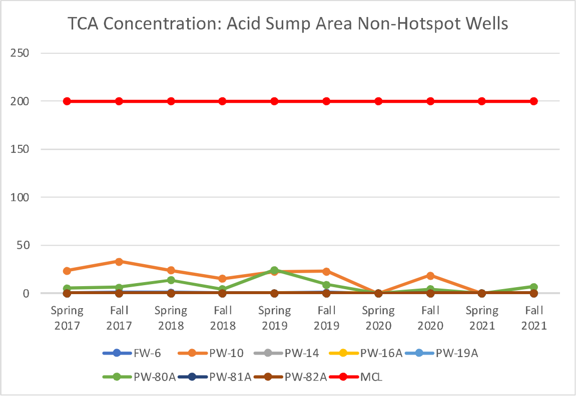
U = not detected above reporting limit

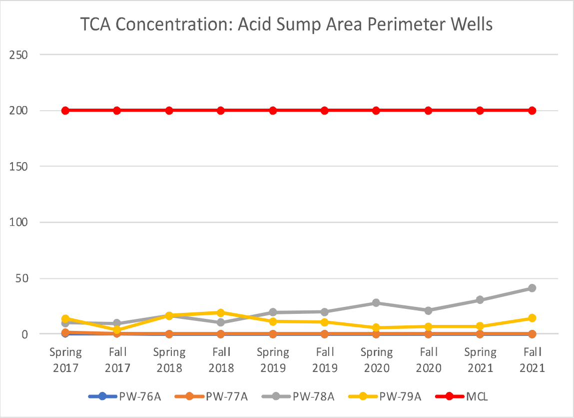
APPENDIX F
TREND CHARTS

Figure F-1a. Fabrication Area: Acid Sump Area

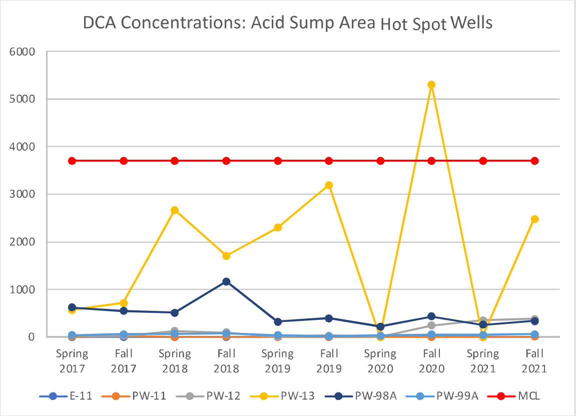
1,1,-Trichloroethane (TCA) Concentrations

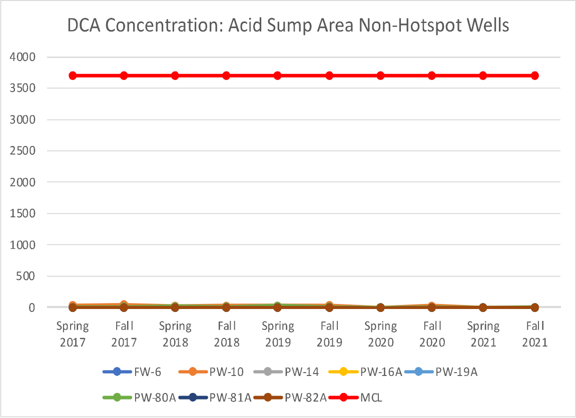


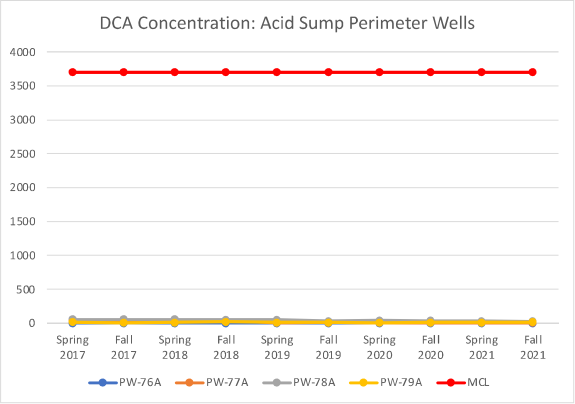




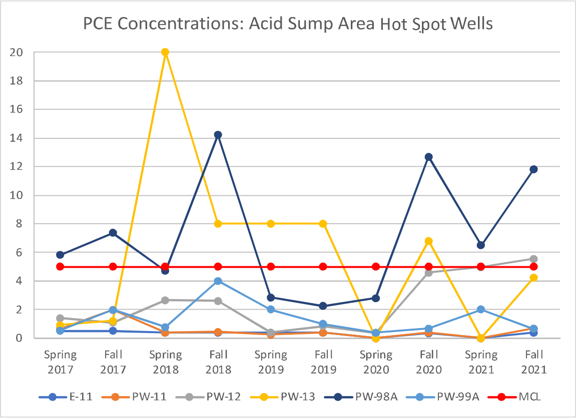
1,1,-Dichloroethane (DCA) Concentrations

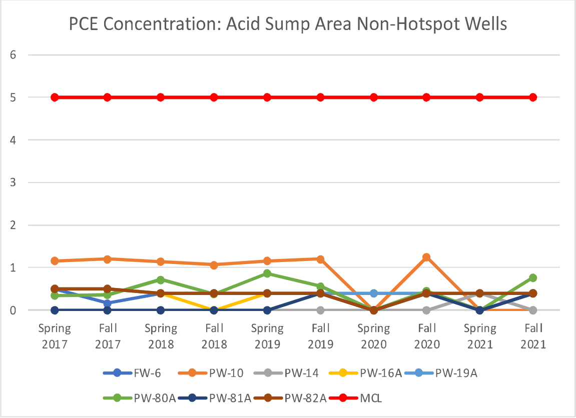






Tetrachloroethene (PCE) Concentrations





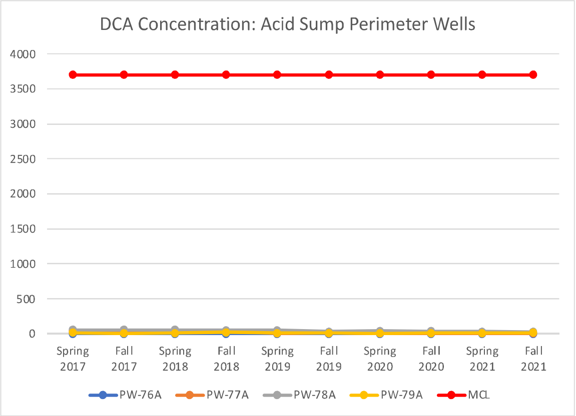
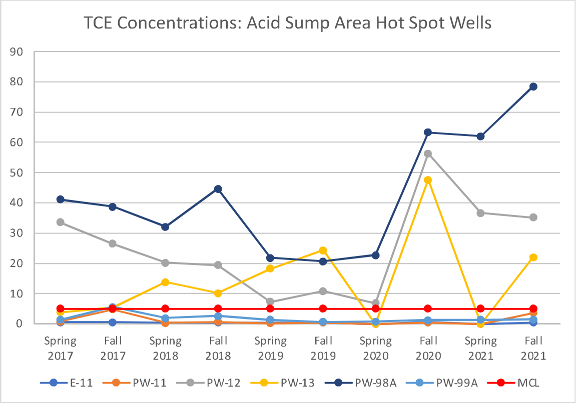
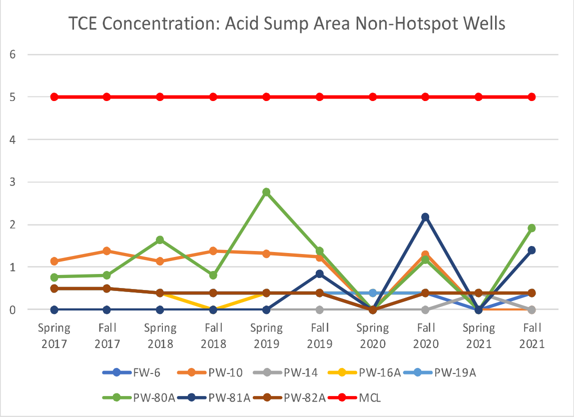
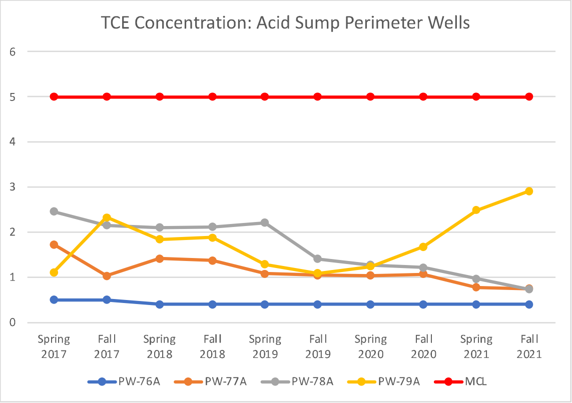


Figure F-1b. Fabrication Area: Acid Sump Area

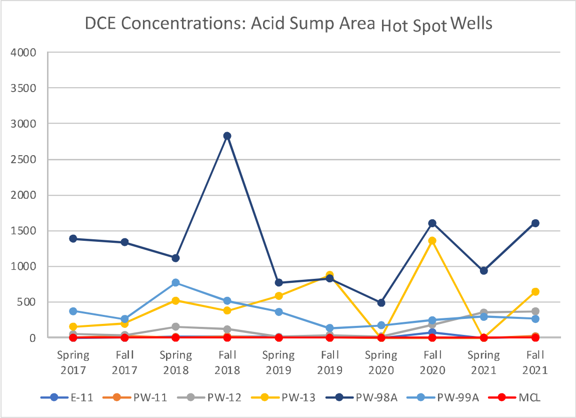
Trichloroethene (TCE) Concentrations

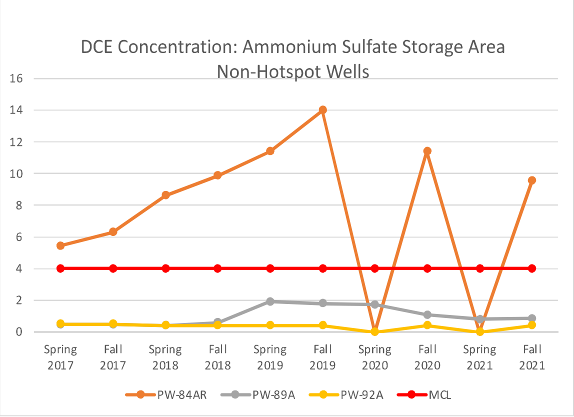


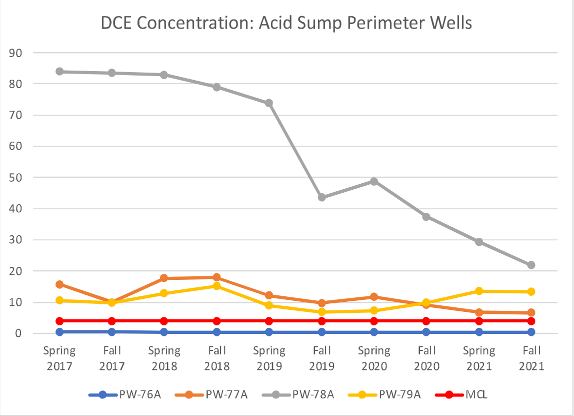




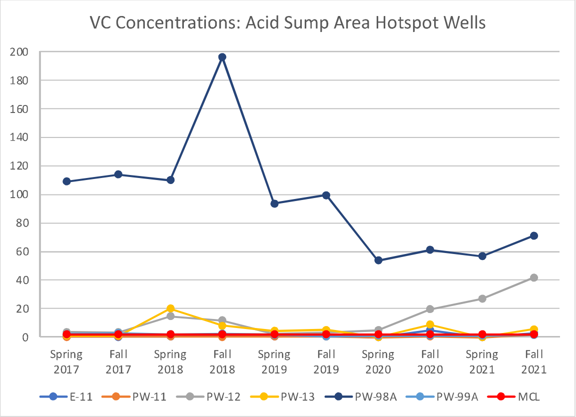
1,1,-Dichloroethene (DCE) Concentrations

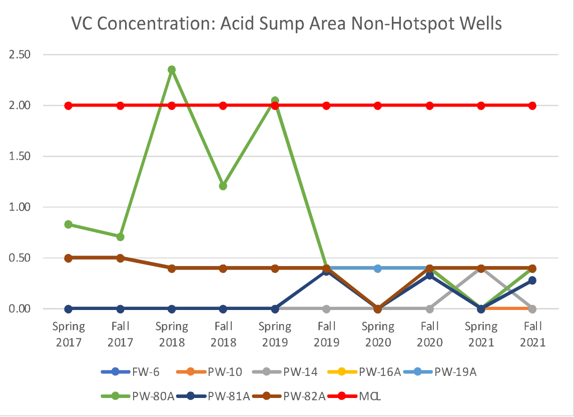






Vinyl Chloride (VC) Concentrations





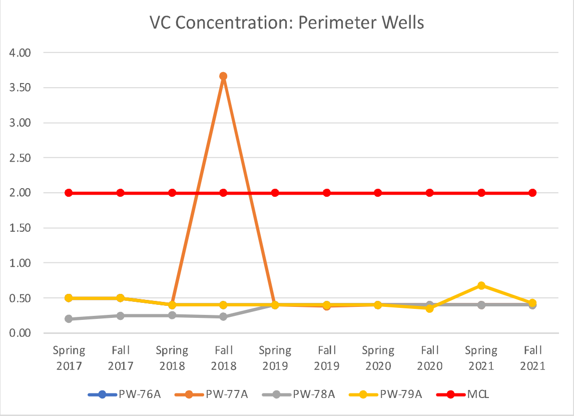
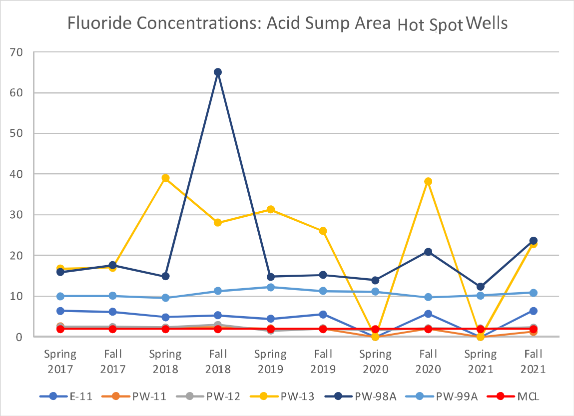
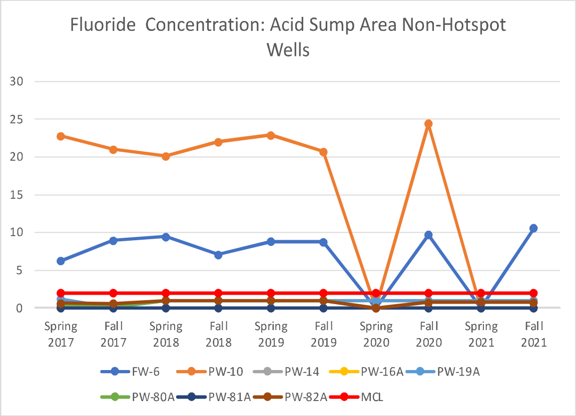
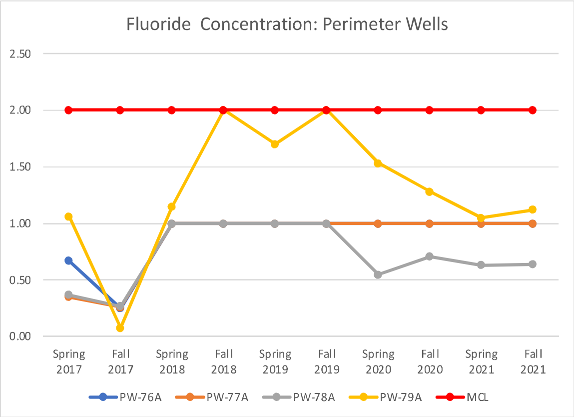


Figure F-1c. Fabrication Area: Acid Sump Area

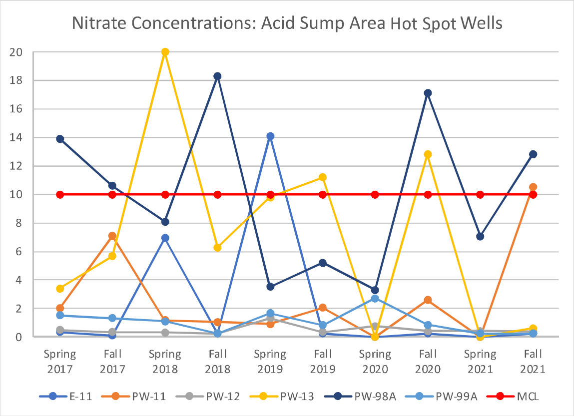
Fluoride Concentration

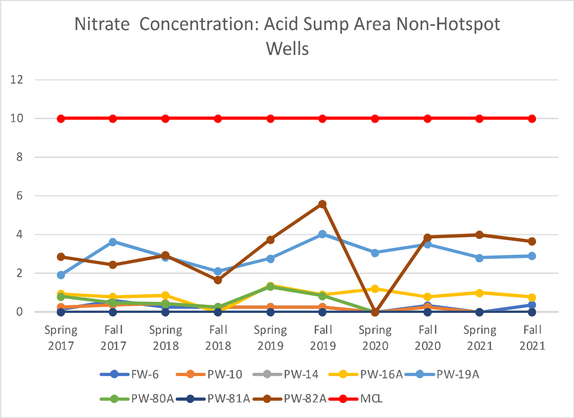

Fluoride Concentrations: Acid Sump Area Hot Spot Wells


Fluoride Concentration: Acid Sump Area Non-Hotspot Wells


Fluoride Concentration: Perimeter Wells

Nitrate Concentration


Nitrate Concentrations: Acid Sump Area Hot Spot Wells


Nitrate Concentration: Acid Sump Area Non-Hotspot Wells

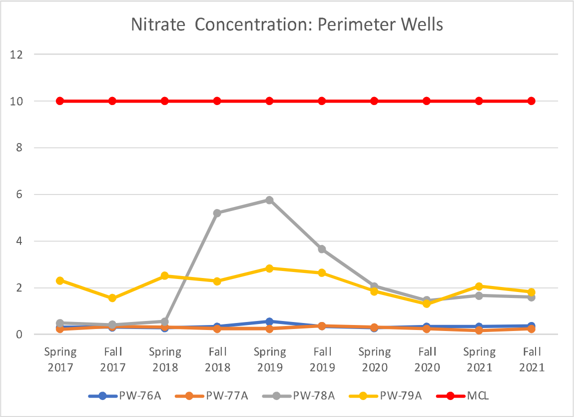
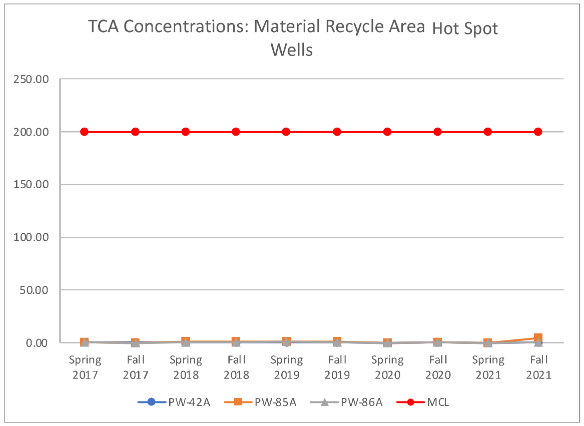
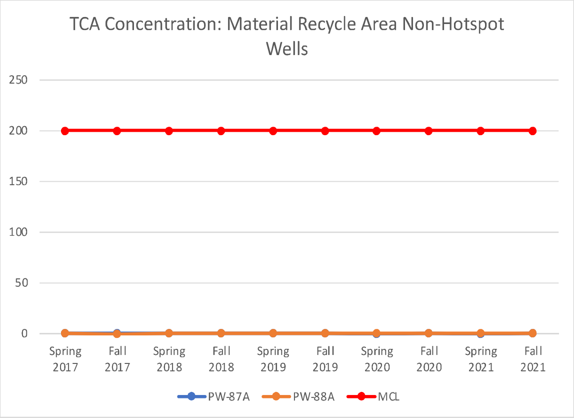

Nitrate Concentration: Perimeter Wells

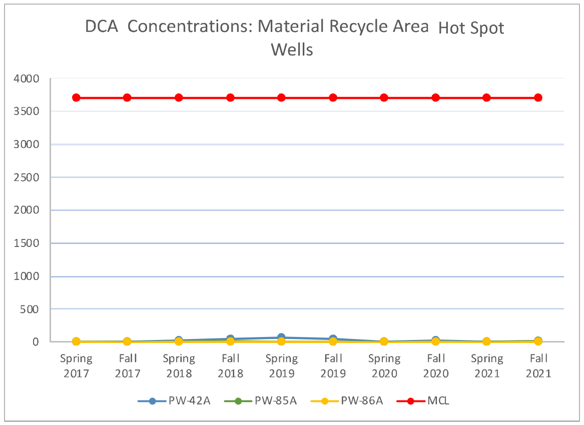
Figure F-2a. Fabrication Area: Material Recycle Area

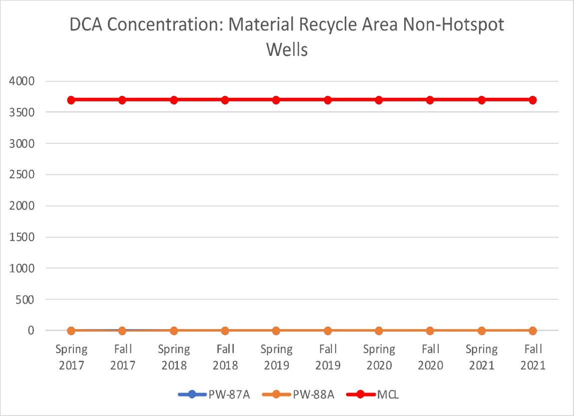
1,1,-Trichloroethane (TCA) Concentrations



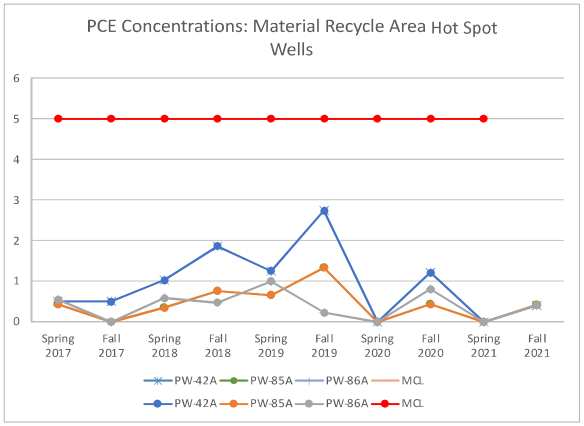


1,1,-Dichloroethane (DCA) Concentrations





Tetrachloroethene (PCE) Concentrations



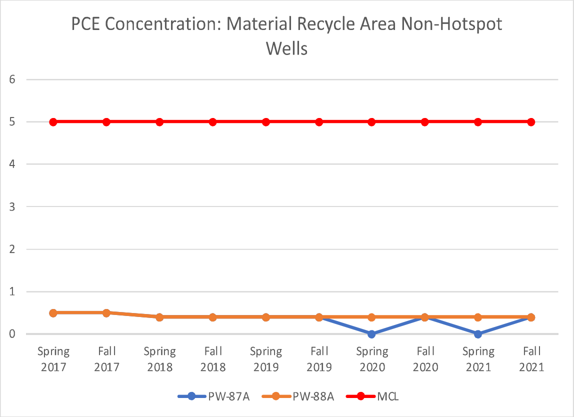
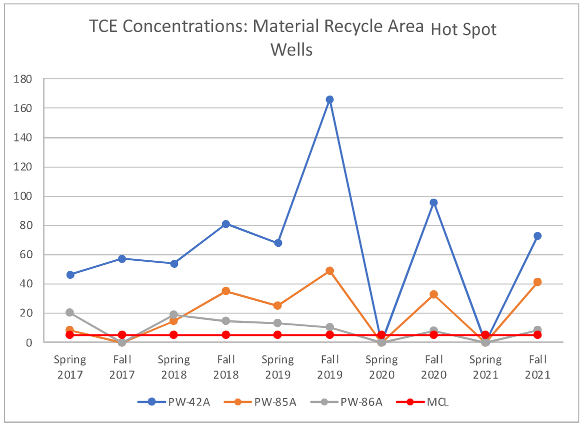
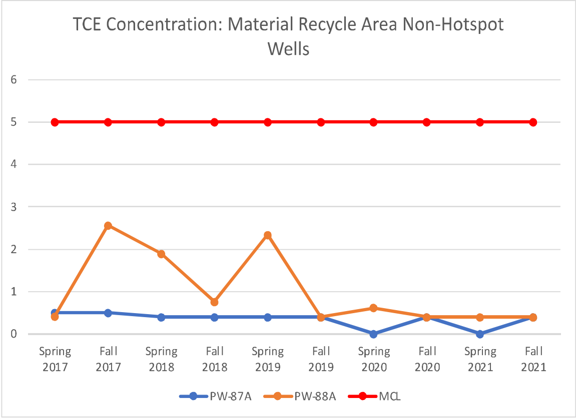


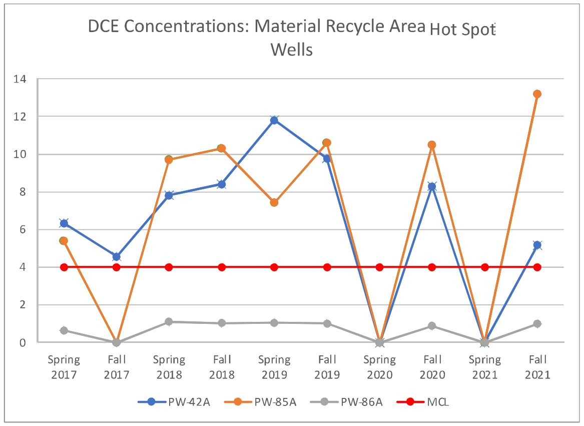
Figure F-2b. Fabrication Area: Material Recycle Area

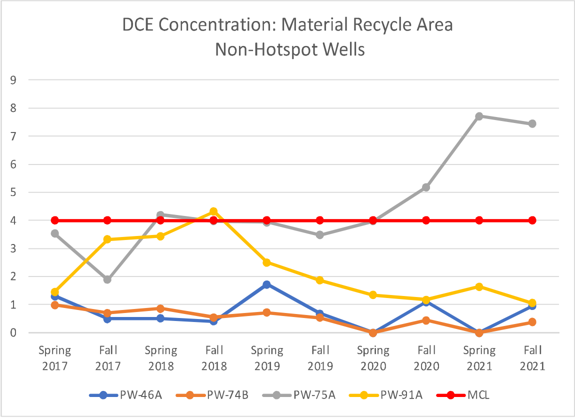
Trichloroethene (TCE) Concentrations



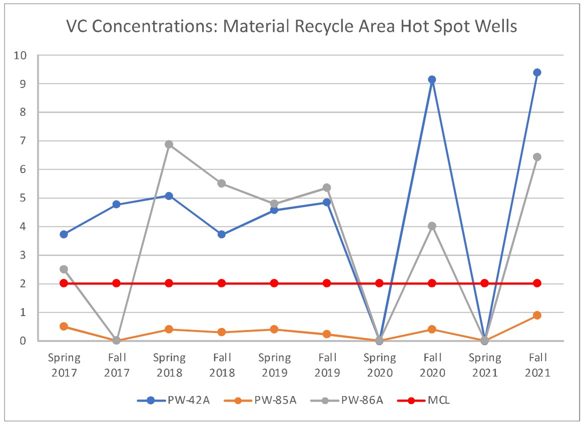


1,1,-Dichloroethene (DCE) Concentrations





Vinyl Chloride (VC) Concentrations



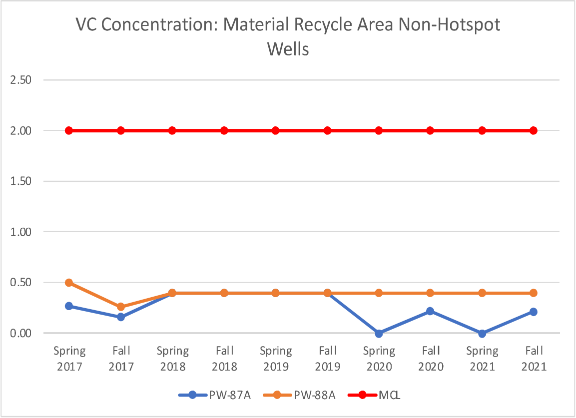
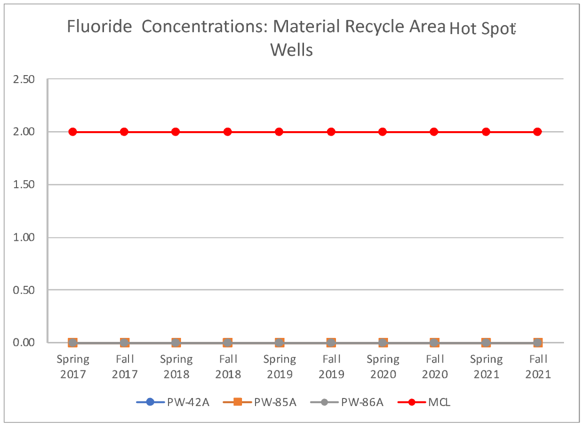
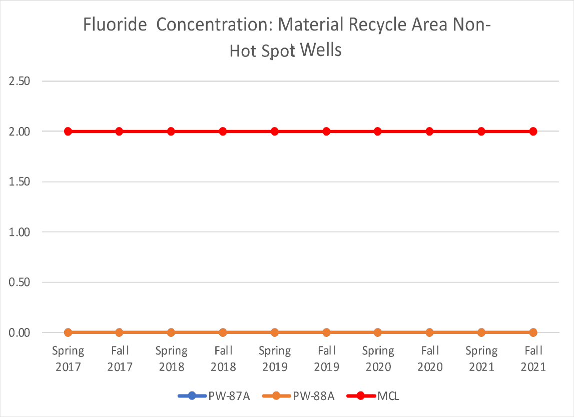


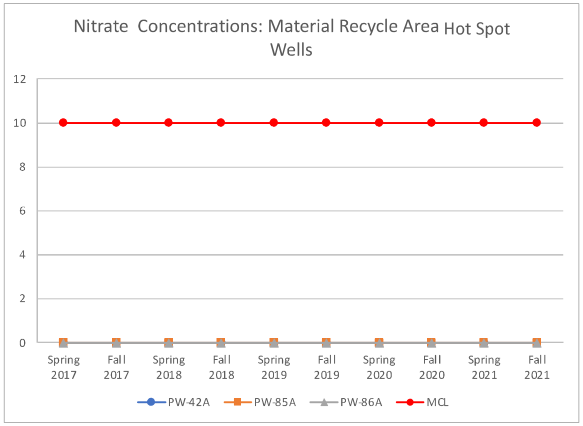
Figure F-2c. Fabrication Area: Material Recycle Area

Fluoride Concentration





Nitrate Concentration



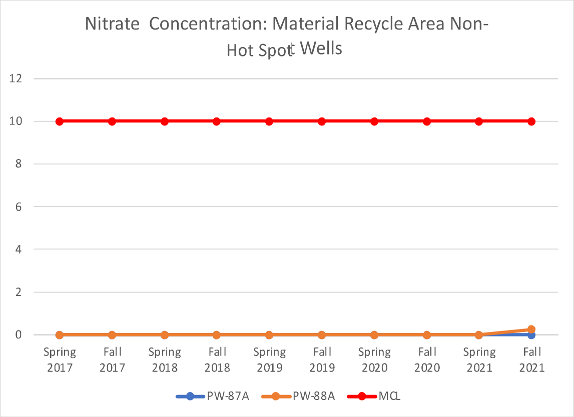
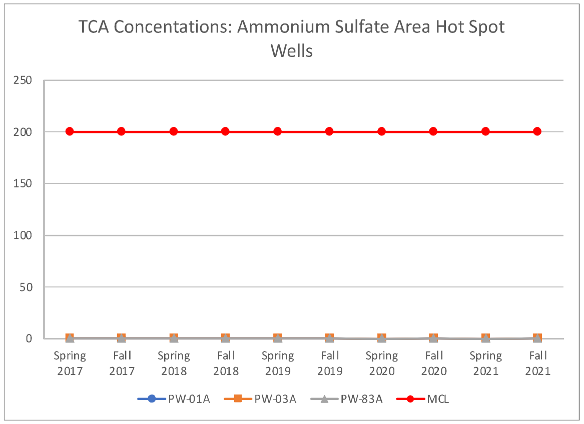
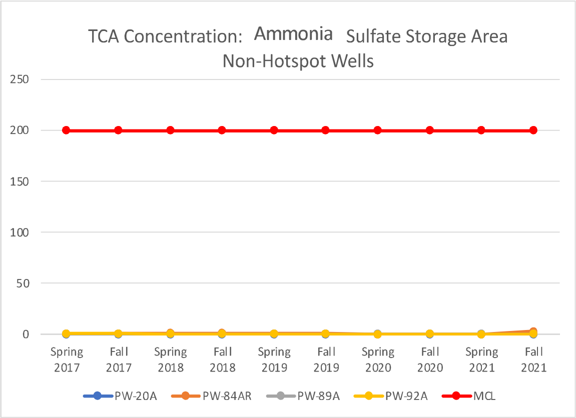


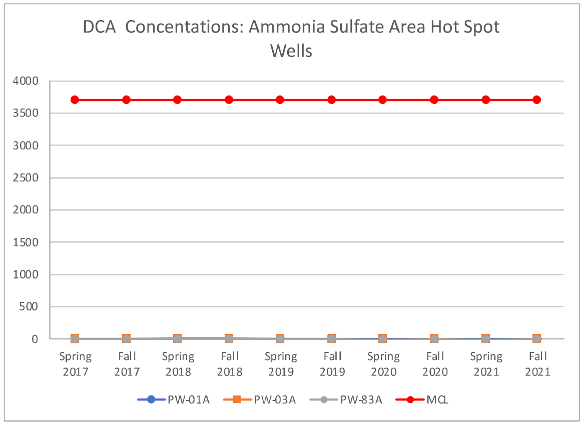
Figure F-3a. Fabrication Area: Ammonia Sulfate Storage Area

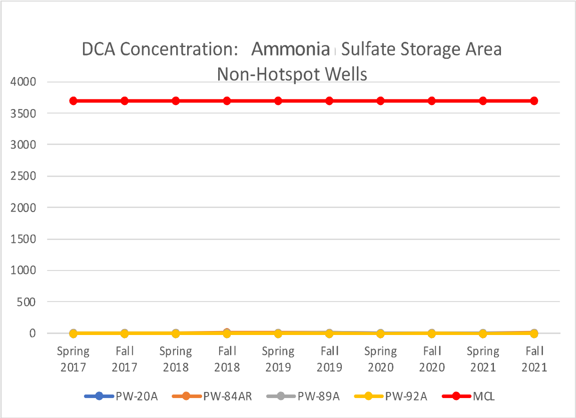
1,1,-Trichloroethane (TCA) Concentrations


TCA Concentations: Ammonium Sulfate Area Hot Spot Wells

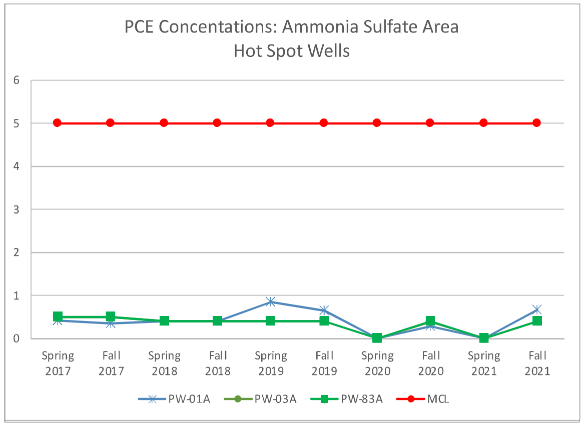

TCA Concentration: Ammonia Sulfate Storage Area Non-Hotspot Wells

1,1,-Dichloroethane (DCA) Concentrations


DCA Concentations: Ammonia Sulfate Area Hot Spot Wells


DCA Concentration: Ammonia Sulfate Storage Area Non-Hotspot Wells

Tetrachloroethene (PCE) Concentrations


PCE Concentations: Ammonia Sulfate Area Hot Spot Wells

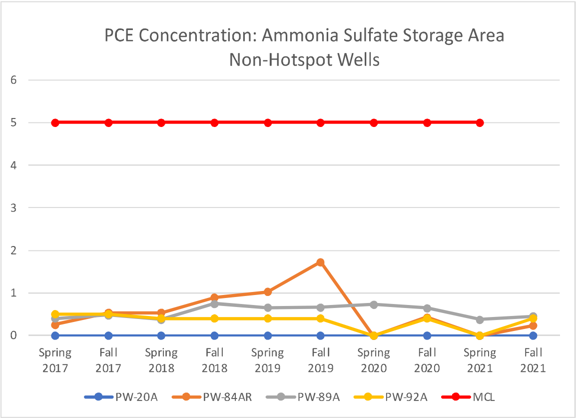
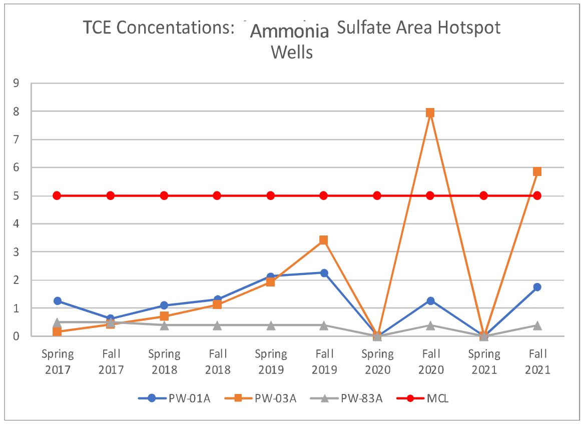
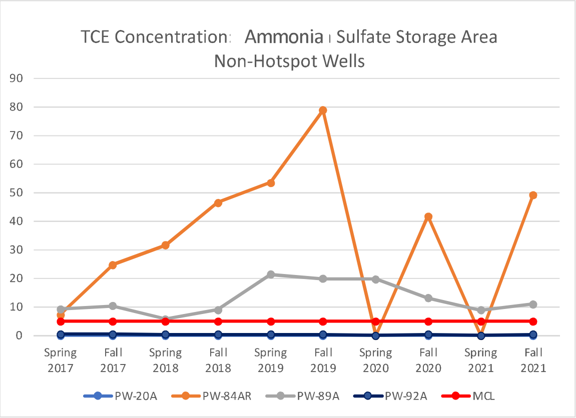

PCE Concentration: Ammonia Sulfate Storage Area Non-Hotspot Wells

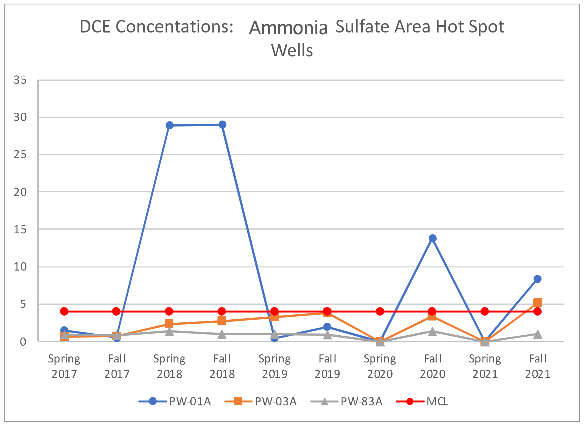
Figure F-3b. Fabrication Area: Ammonia Sulfate Storage Area

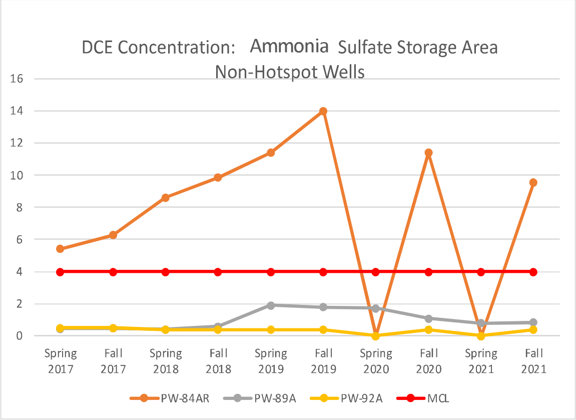
Trichloroethene (TCE) Concentrations



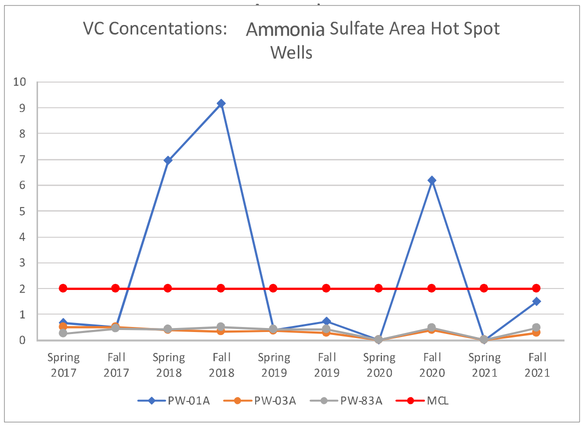


1,1,-Dichloroethene (DCE) Concentrations





Vinyl Chloride (VC) Concentrations



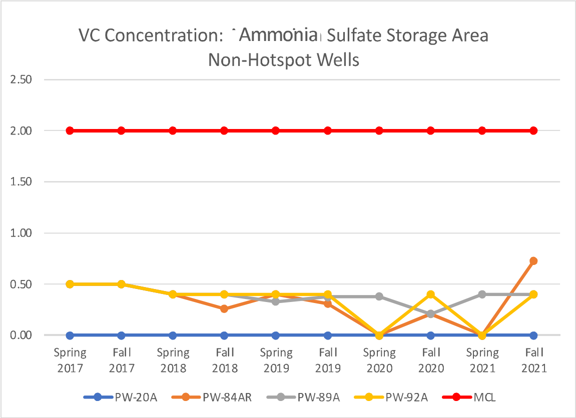
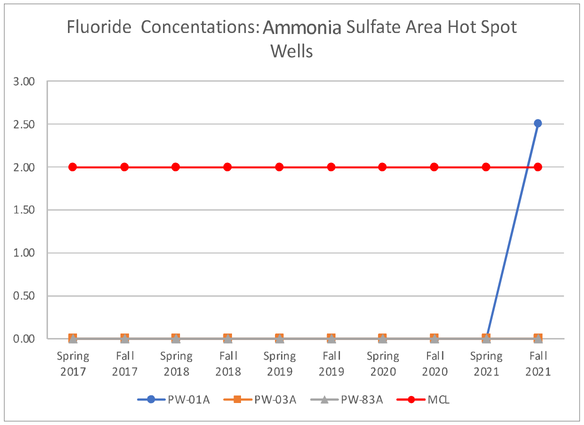
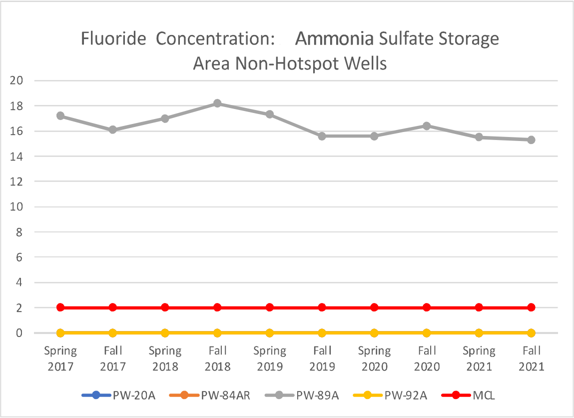


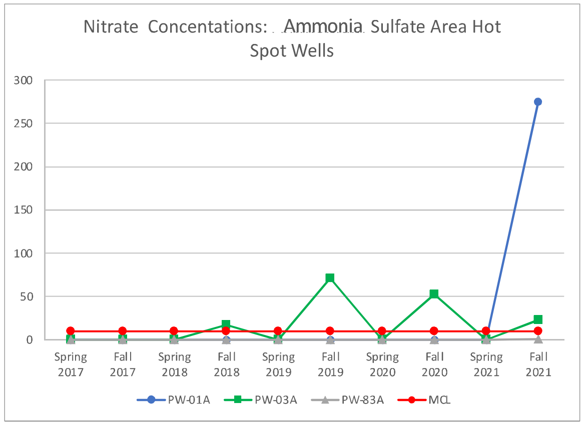
Figure F-3c. Fabrication Area: Ammonia Sulfate Storage Area

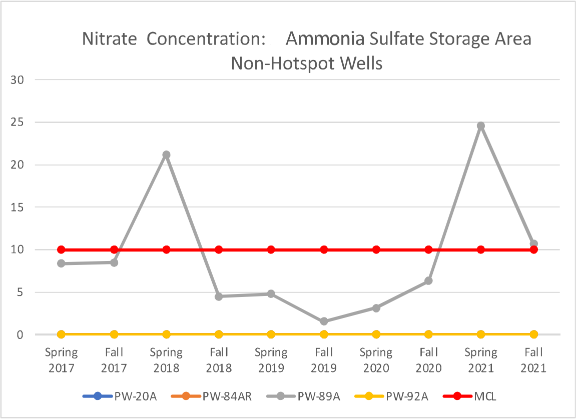
Fluoride Concentration



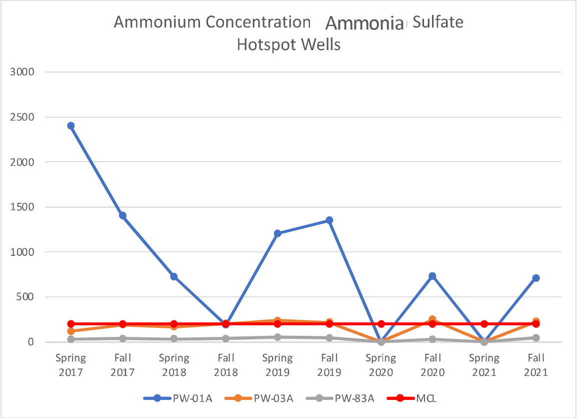


Nitrate Concentration





Ammonium Concentration



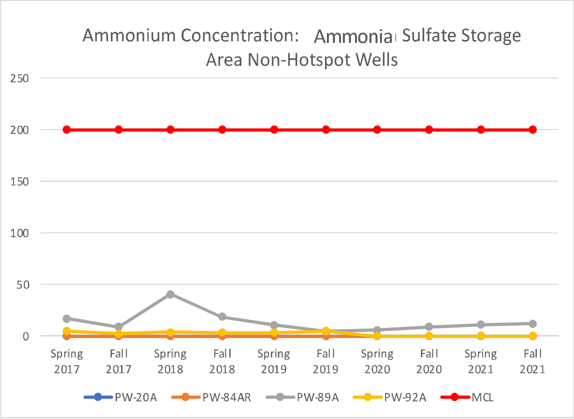
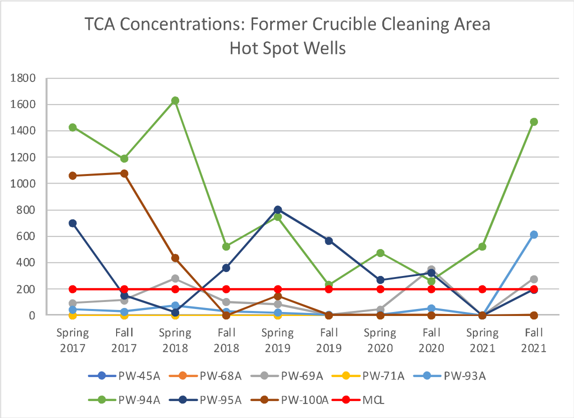
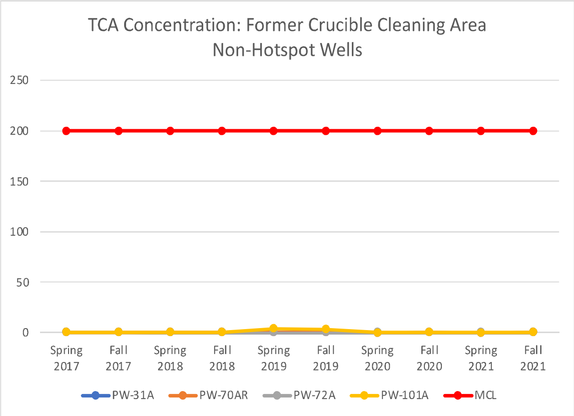


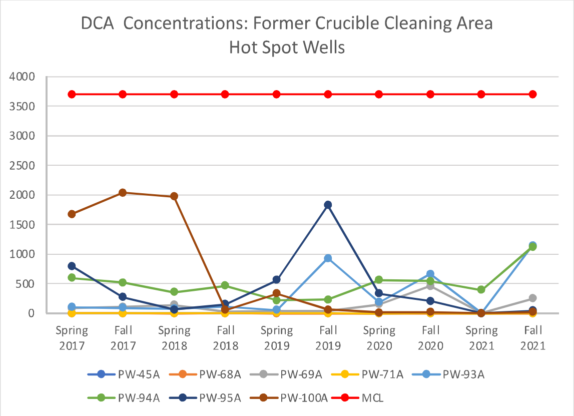
Figure F-4a. Fabrication Area: Former Crucible Cleaning Area

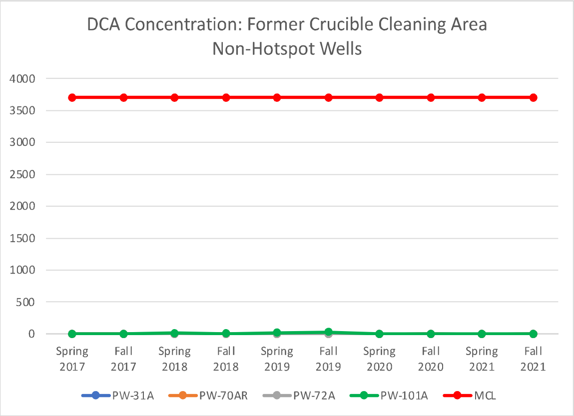
1,1,-Trichloroethane (TCA) Concentrations



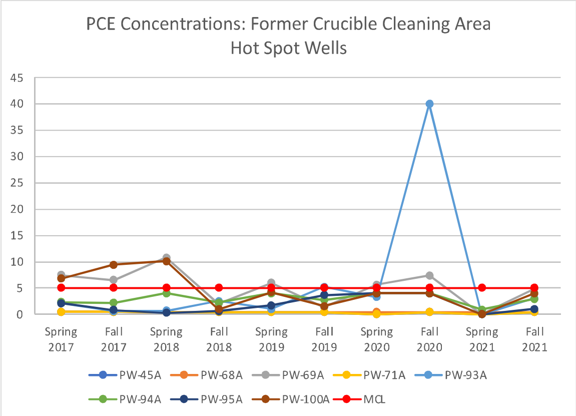


1,1,-Dichloroethane (DCA) Concentrations





Tetrachloroethene (PCE) Concentrations



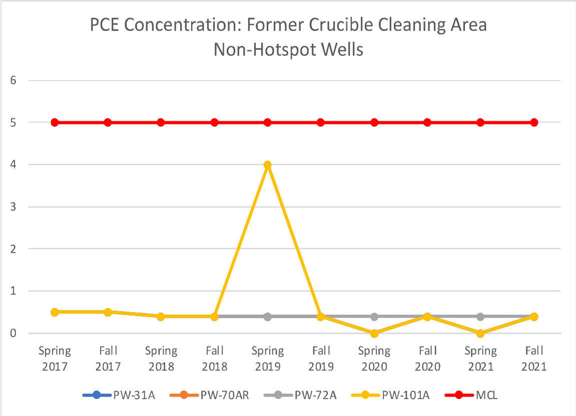
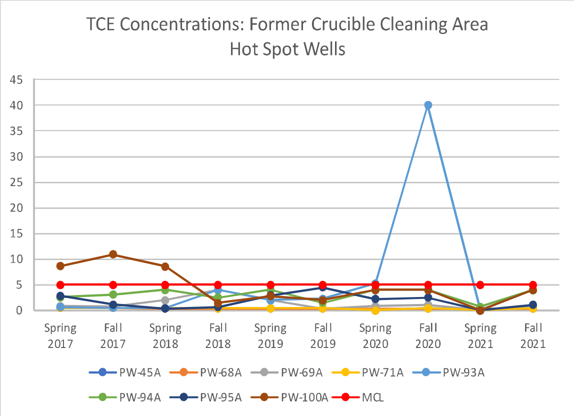
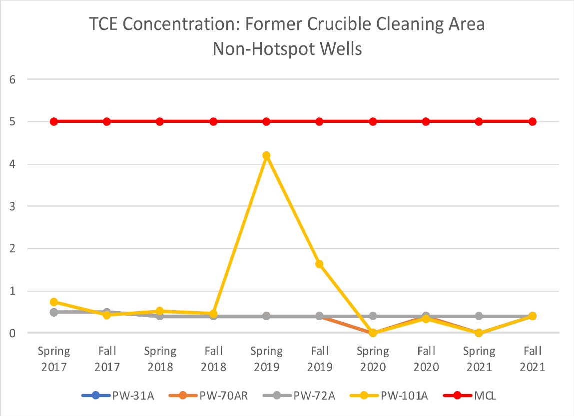


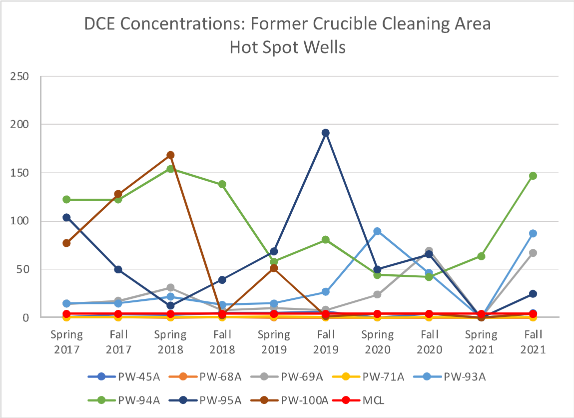
Figure F-4b. Fabrication Area: Former Crucible Cleaning Area

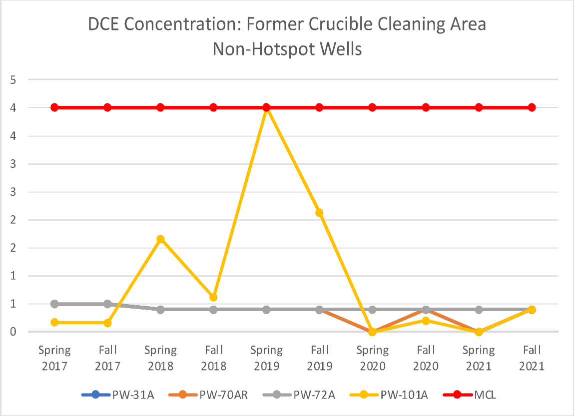
Trichloroethene (TCE) Concentrations



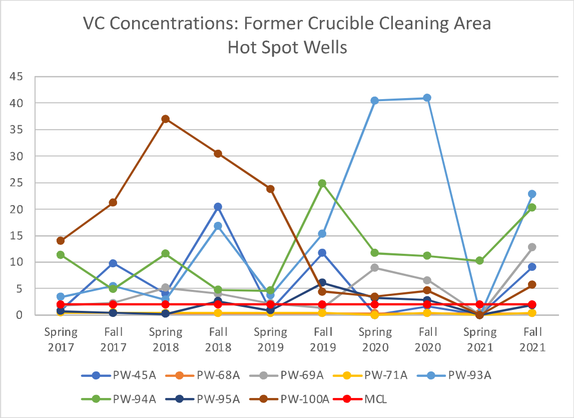


1,1,-Dichloroethene (DCE) Concentrations





Vinyl Chloride (VC) Concentrations



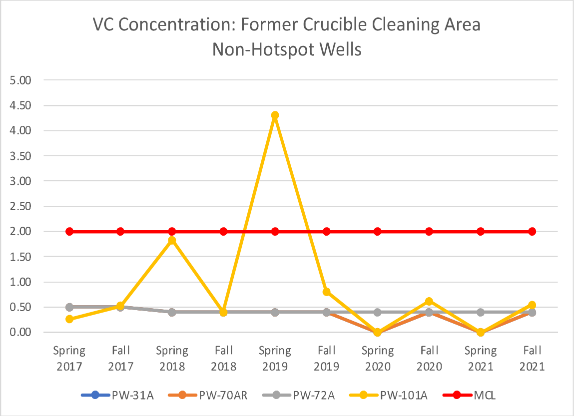
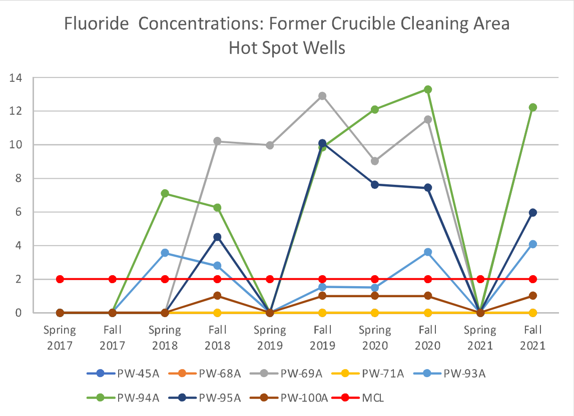
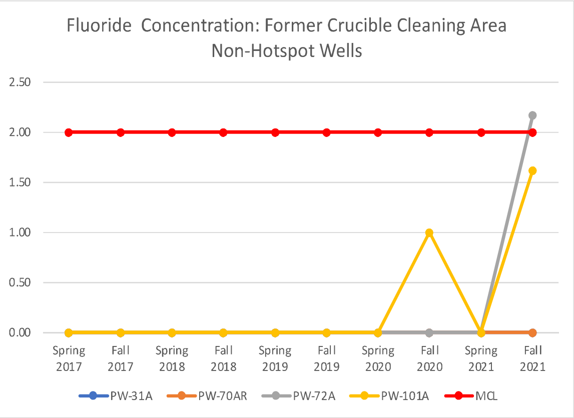


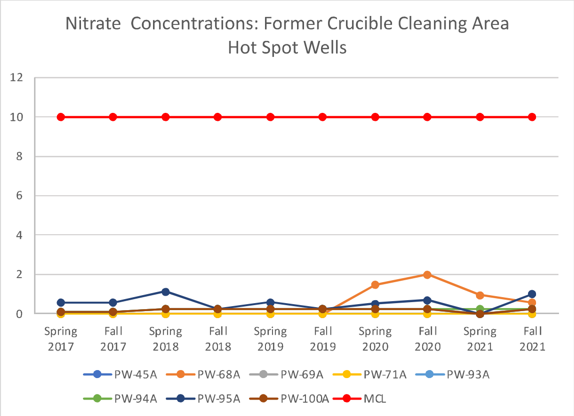
Figure F-4c. Fabrication Area: Former Crucible Cleaning Area

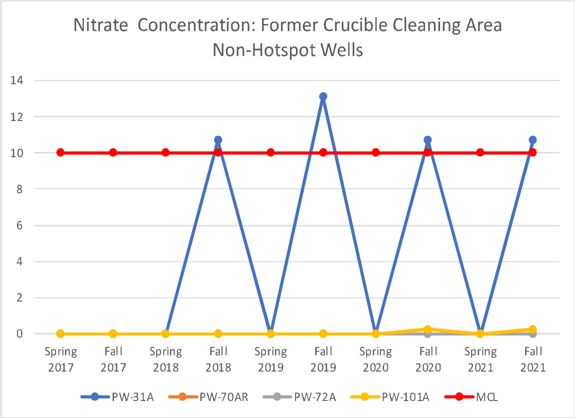
Fluoride Concentration





Nitrate Concentration





Arsenic

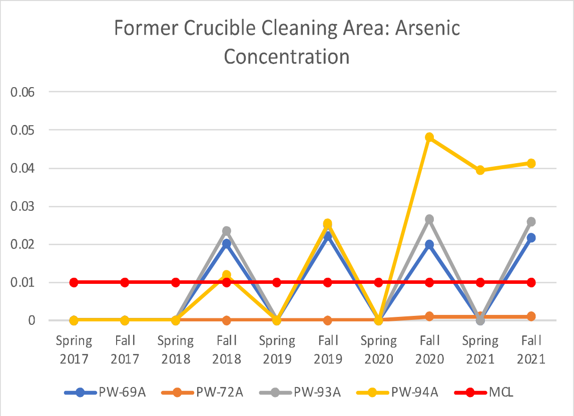
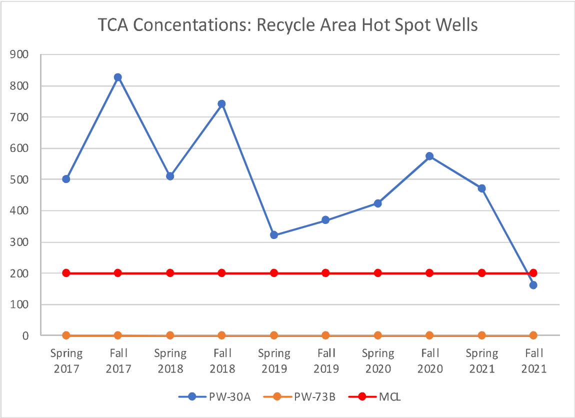
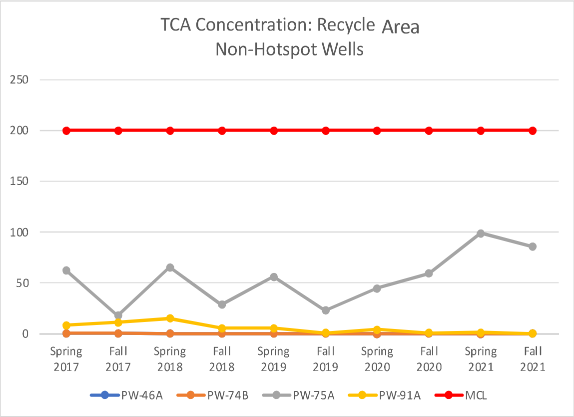


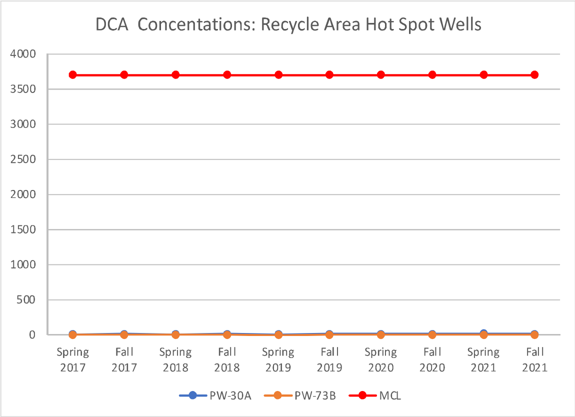
Figure F-5a. Fabrication Area: Recycle Area

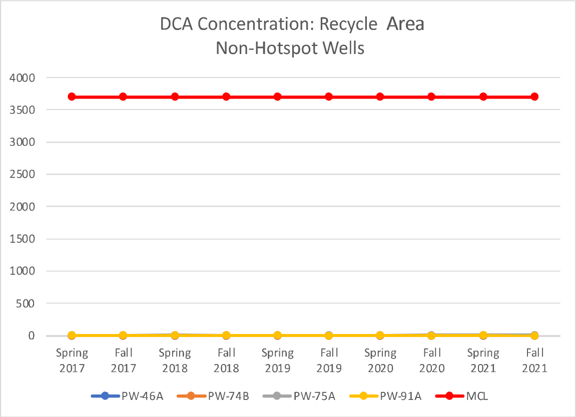
1,1,-Trichloroethane (TCA) Concentrations



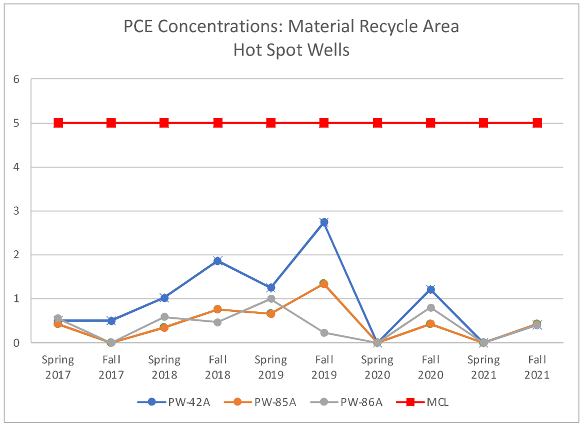


1,1,-Dichloroethane (DCA) Concentrations





Tetrachloroethene (PCE) Concentrations



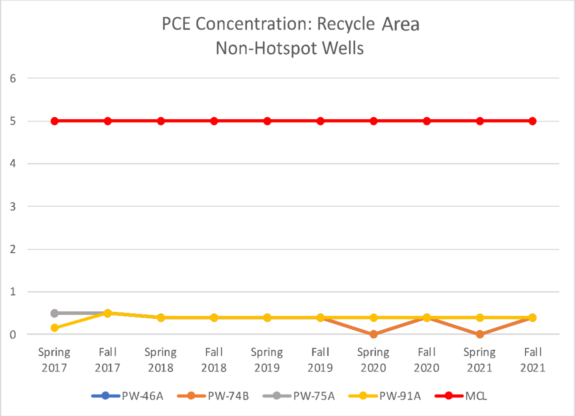
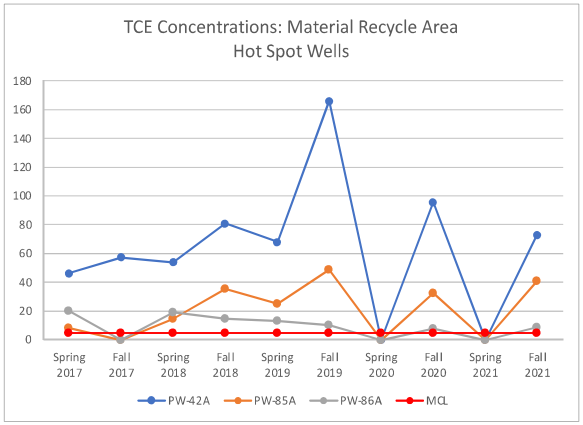
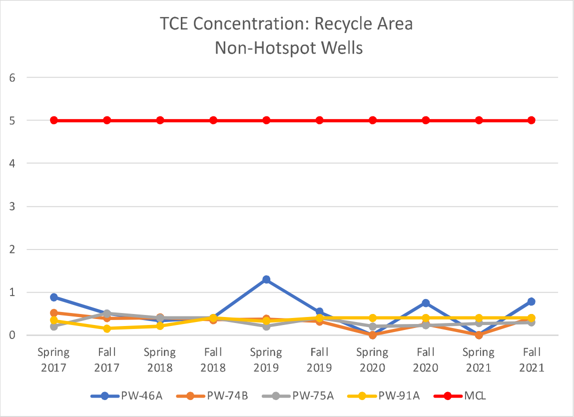


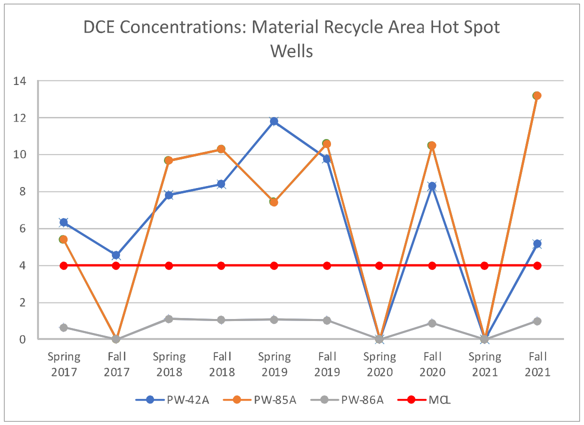
Figure F-5b. Fabrication Area: Recycle Area

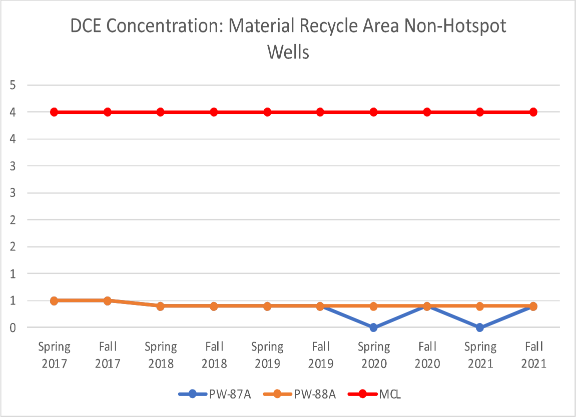
Trichloroethene (TCE) Concentrations


TCE Concentrations: Material Recycle Area Hot Spot Wells

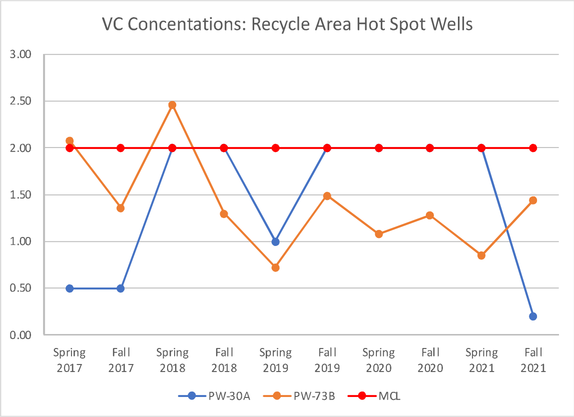

TCE Concentration: Recycle Area Non-Hotspot Wells

1,1,-Dichloroethene (DCE) Concentrations


DCE Concentrations: Material Recycle Area Hot Spot Wells


DCE Concentration: Material Recycle Area Non-Hotspot Wells

Vinyl Chloride (VC) Concentrations


VC Concentations: Recycle Area Hot Spot Wells

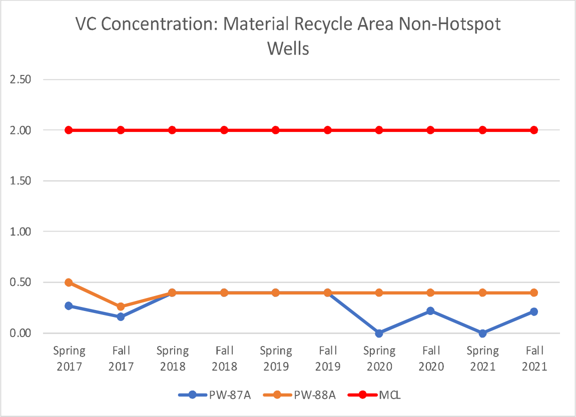
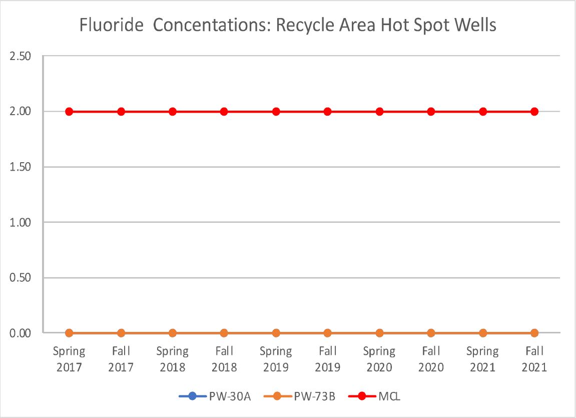
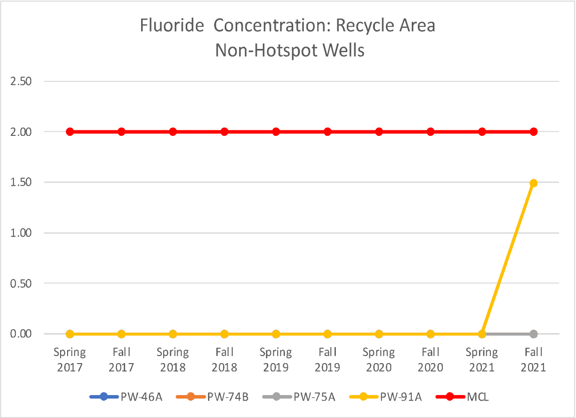

VC Concentration: Material Recycle Area Non-Hotspot Wells

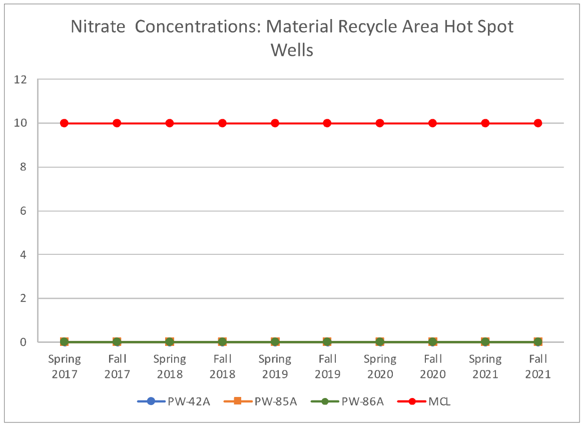
Figure F-5c. Fabrication Area: Recycle Area

Fluoride Concentration





Nitrate Concentration



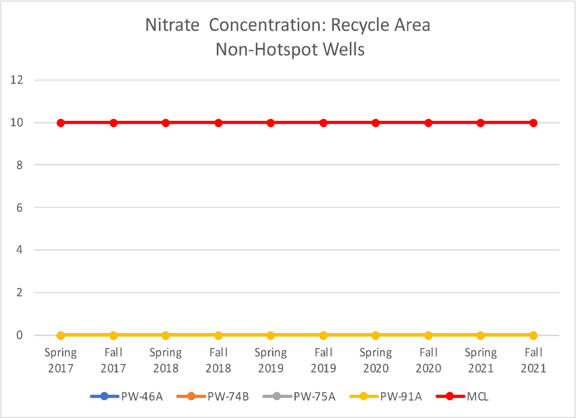
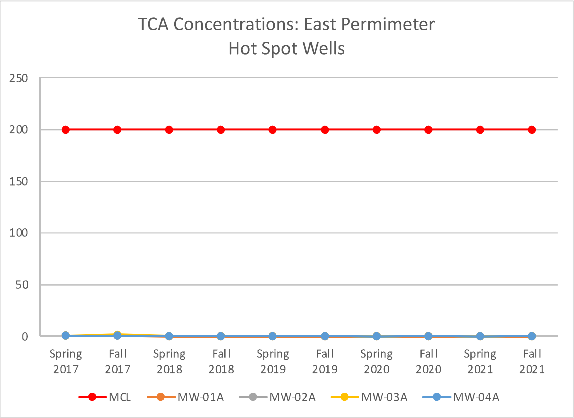
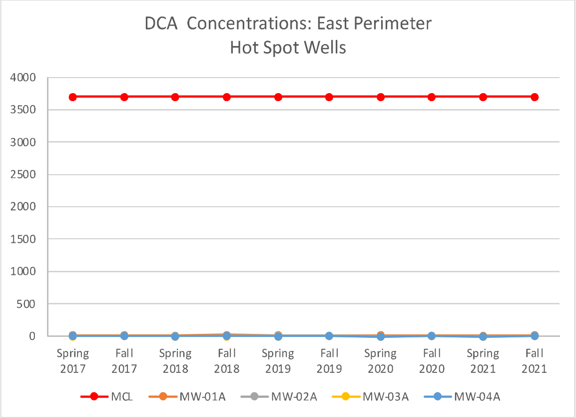


Figure F-6a. Fabrication Area: East Perimeter Hotspot Wells

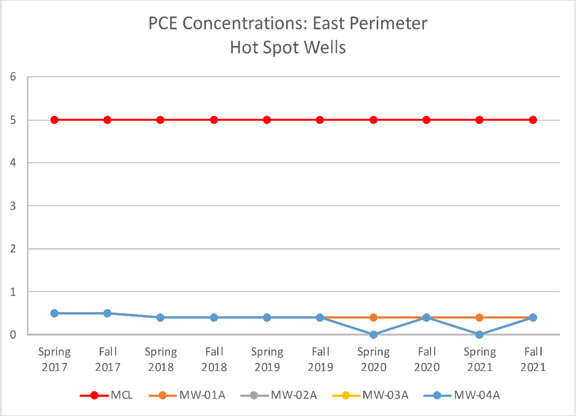
1,1,-Trichloroethane (TCA) Concentrations



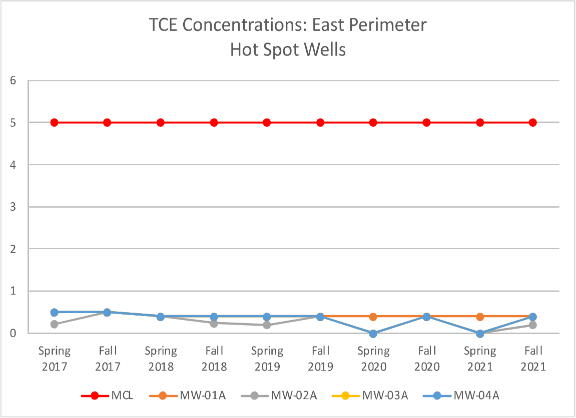
1,1,-Dichloroethane (DCA) Concentrations



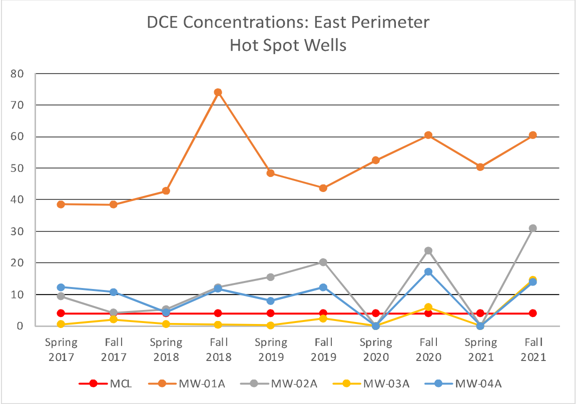
Tetrachloroethene (PCE) Concentrations



Trichloroethene (TCE) Concentrations



1,1,-Dichloroethene (DCE) Concentrations



Vinyl Chloride (VC) Concentrations

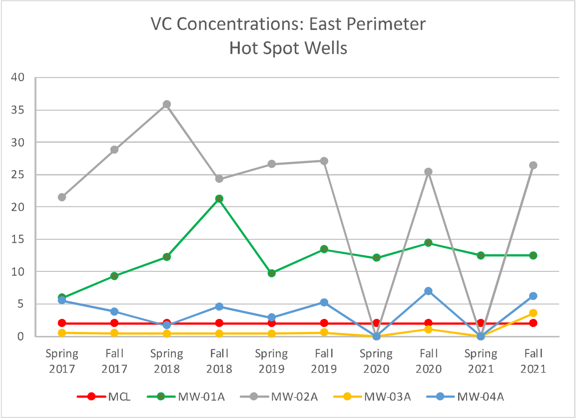


Figure F-6b. Fabrication Area: East Perimeter Hotspot Wells

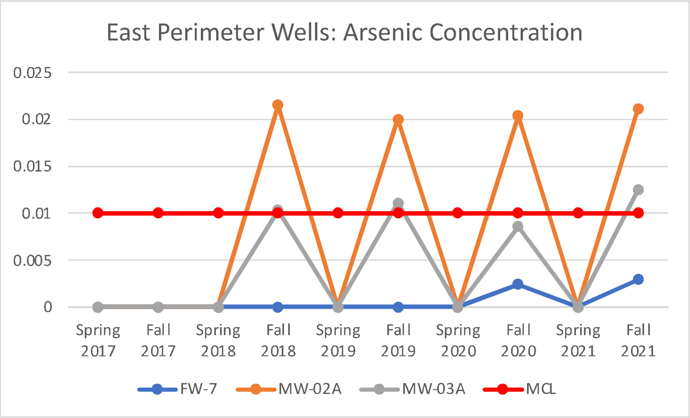
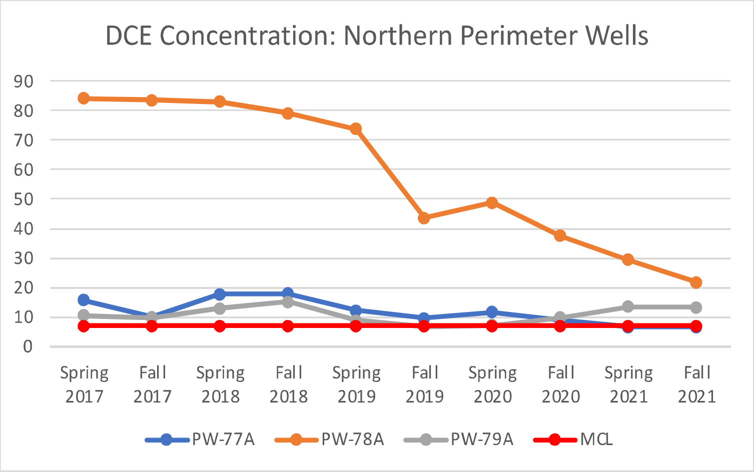


Figure F-7. Fabrication Area: Northern Perimeter Wells – Murder Creek

1,1,-Dichloroethene (DCE) Concentrations



Vinyl Chloride (VC) Concentrations

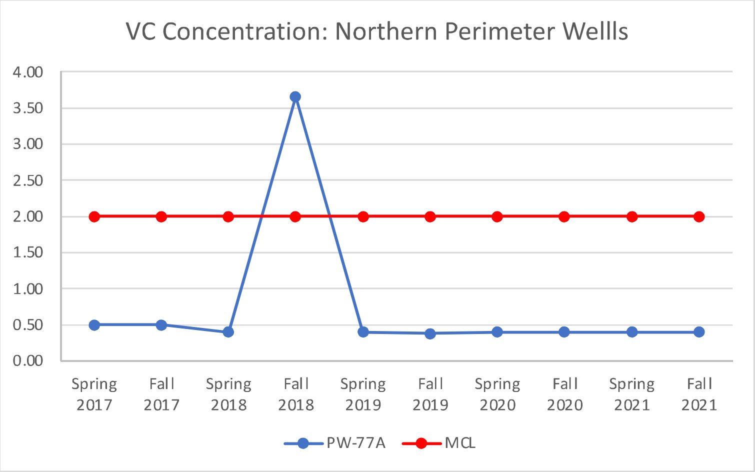
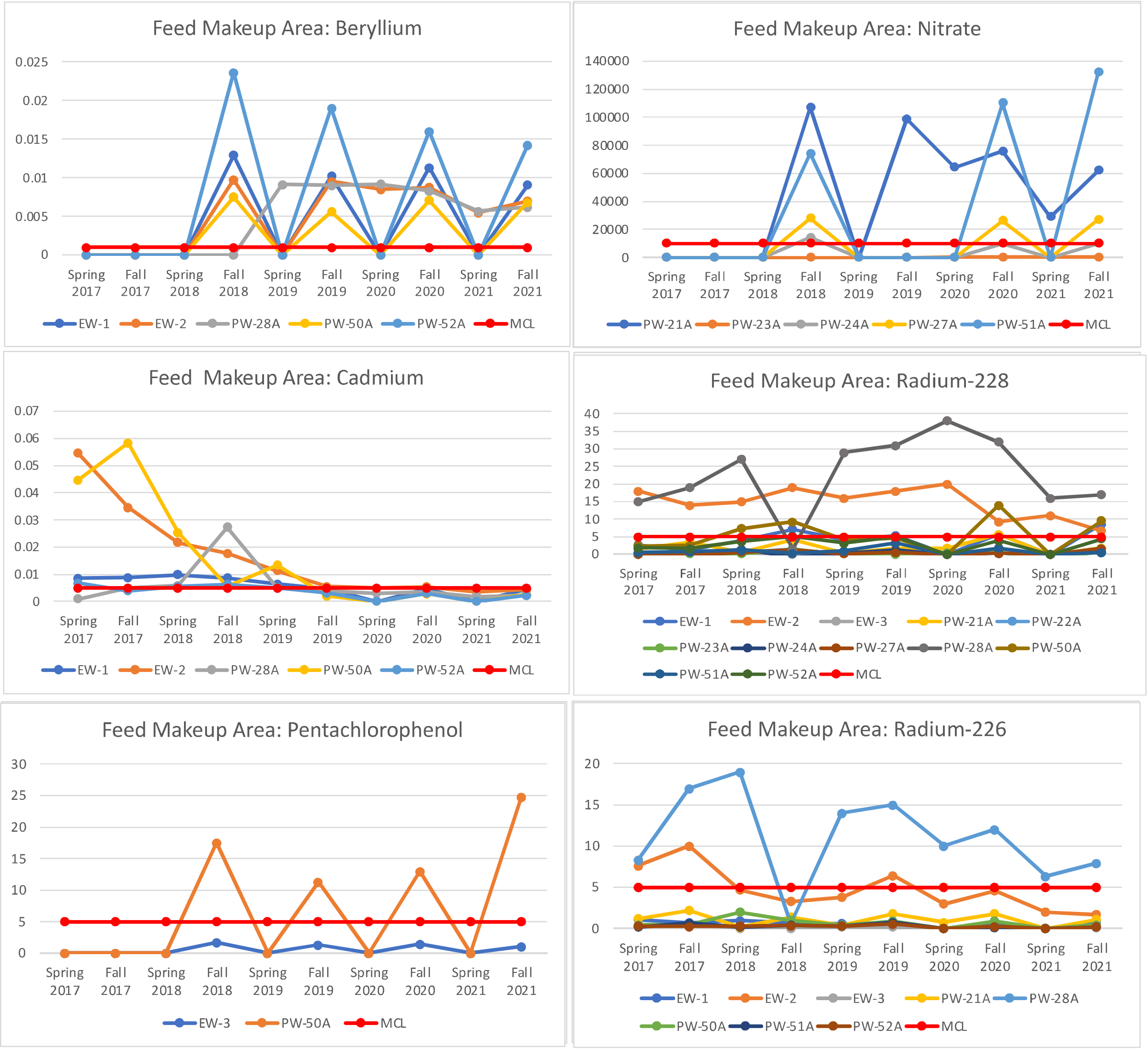


Figure F-8. Extraction Area

Feed Makeup Area



South Extraction Area

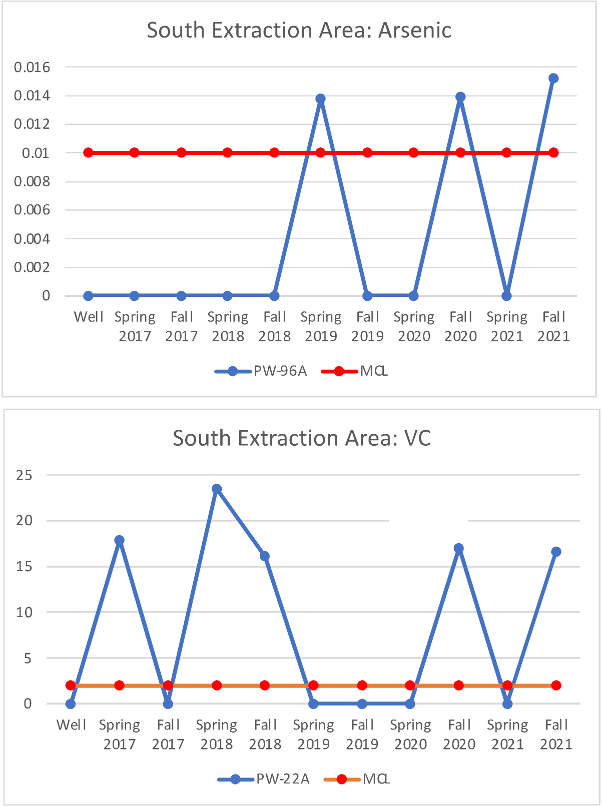


Figure F-9. Solids Area