Savannah River NUCLEAR SOLUTIONS℠

Corrective Measures Implementation Report (CMIR)/ Remedial Action Completion Report (RACR) for M-Area Inactive Process Sewer Lines (081-M) Operable Unit (OU) (U)

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U.S. Department of Energy
and
Savannah River Nuclear Solutions, LLC
Aiken, South Carolina

CERTIFICATION

CMIR/RACR for MIPSL OU
SRNS-RP-2025-00266, Revision 0, June 2025

[REF: 40CFR270.11 (d)(1)]

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TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF APPENDICES

LIST OF ACRONYMS AND ABBREVIATIONS

~	approximate, approximately
>	greater than
<	less than
%	percent
ASVE	active soil vapor extraction
AQC	Air Quality Control
Bgs	below ground surface
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cm	centimeter
CM	contaminant migration
CMIR/RACR	Corrective Measures Implementation Report/Remedial Action Completion Report
CMI/RAIP	Corrective Measures Implementation/Remedial Action Implementation Plan
CMS/FS	Corrective Measures Study/Feasibility Study
COC	constituent of concern
CY	calendar year
FFA	Federal Facility Agreement
ft	feet
HBL	Health-Based Limits
in	inch
LLC	Limited Liability Company
LUC	land use control
LUCIP	Land Use Control Implementation Plan
m	meter
MCL	maximum contaminant level
mg/kg	milligram per kilogram
mg/L	milligram per liter
µg/kg	microgram per kilogram
MH	manhole
MIPS	M-Area Inactive Process Sewer
MIPSL	M-Area Inactive Process Sewer Line
O&M	operations and maintenance
OU	Operable Unit
PCE	tetrachloroethylene
PCR	Post-Construction Report
PER	Performance Evaluation Report
ppmv	parts per million by volume
RA	remedial action
RAO	remedial action objectives
RCRA	Resource Conservation and Recovery Act

LIST OF ACRONYMS AND ABBREVIATIONS *(continued/end)*

ROD	Record of Decision
SCDES[1]	South Carolina Department of Environmental Services
SEMS	Superfund Enterprise Management System
SRNS	Savannah River Nuclear Solutions, LLC
SRS	Savannah River Site
SVE	soil vapor extraction
SVEU	soil vapor extraction unit
TCE	trichloroethylene
UIC	Underground Injection Control
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WSRC	Westinghouse Savannah River Company
WSRC	Washington Savannah River Company
ZOI	zone of influence

[1] SCDES was previously known as the South Carolina Department of Health and Environmental Control prior to July 1, 2024.

1.0 GENERAL DESCRIPTION

1.1 Purpose and Scope

This Corrective Measures Implementation Report/Remedial Action Completion Report (CMIR/RACR) documents the completion of the remedial action (RA) for the closure of the M-Area Inactive Process Sewer Line (MIPSL) Operable Unit (OU). The previously submitted Post-Construction Report (PCR) (WSRC 2008) summarized construction activities performed to implement the RA requirements in the Record of Decision (ROD) (WSRC 2006b) in accordance with the approved Corrective Measures Implementation/Remedial Action Implementation Report (CMI/RAIP) (WSRC 2006a). The selected RA for the MIPSL OU was phased soil vapor extraction (SVE) enhanced with soil fracturing and institutional controls (i.e., Land Use Controls [LUCs]) to address volatile organic compounds (VOCs) in the vadose zone. Following approval of the ROD, the MIPSL OU entered a period of long-term operation of SVE. The SVE operations period has ended and this CMIR/RACR documents the completion of all RA activities for this OU. The LUCs remain in effect.

This CMIR/RACR was completed after final inspection of operations and a determination that the RA is complete. The Savannah River Site (SRS) notified U.S. Environmental Protection Agency (USEPA) Region 4 and South Carolina Department of Environmental Services (SCDES) regarding completion of the aforementioned final operation and function determination. This CMIR/RACR documents that the remedial action objectives (RAOs) have been met, and no further Resource Conservation Recovery Act (RCRA)/Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) response is needed to protect human health and the environment. This CMIR/RACR is submitted to USEPA and SCDES for approval in accordance with Federal Facility Agreement (FFA) (FFA 1993) requirements.

This report includes the following items:

- A brief description of the OU background, including a brief statement on RA requirements and objectives in the ROD

- A chronology of completed events related to remediation of the OU
- A summary of reference to the PCR document which summarizes construction activities performed
- A summary of operations activities performed subsequent to the PCR
- Deviations from the original design of the approved CMI/RAIP or PCR
- Maps depicting source unit and groundwater constituents of concern (COC) both before and after the RA completion
- Performance standards and quality control inspections, including a summary of performance test results documenting verification of compliance with the acceptance criteria in the CMI/RAIP or PCR
- Final inspection and verification of OU closure
- As-built drawings
- LUCs
- Project costs

The PCR for the MIPSL OU was previously submitted and not combined with this CMIR/RACR because the OU required long-term RA, i.e., the final RA required long-term operation of SVE equipment. This CMIR/RACR is submitted upon completion of operation of the constructed equipment and attainment of all RAOs.

1.2 Operable Unit Background

The MIPSL OU is listed as a RCRA /CERCLA Unit in Appendix C of the SRS FFA (FFA 1993). The media associated with the MIPSL OU is vadose zone soil. Groundwater is not addressed under this OU. Groundwater is addressed under the RCRA program by the requirements of the M-Area and Metallurgical Laboratory Hazardous Waste Management Facilities groundwater monitoring and corrective action agreements

The 45-day public comment period for the Statement of Basis/Proposed Plan for the OU began on June 15, 2006, and ended on July 29, 2006. A responsiveness summary, prepared

to address comments received during the public comment period, is provided in Appendix A of the MIPSL ROD (WSRC 2006b).

1.2.1 Description and Location of MIPSL

The MIPSL OU is located in M Area in the northwest portion of SRS in Aiken County, South Carolina (Figure 1). The topography of the area is relatively flat, ranging in elevation from about 113 to 119 meters (m) (370 to 390 feet [ft.]) above mean sea level, and slopes to the south. The majority of the area is covered with concrete or gravel pavement with scattered areas of grassy vegetation.

From 1958 until 1985, several M Area facilities (313-M, 320-M, and 321-M) manufactured reactor fuel and target assemblies. Effluent from the production facilities and laboratories was discharged through networks of vitrified clay pipes to the M-Area Settling Basin and the A-014 Outfall. M-Area effluent wastes included chlorinated solvents used for degreasing fuel and target assemblies, acids, caustics, heavy metals, and minor amounts of radionuclides. Specific constituents of interest include trichloroethylene (TCE), tetrachloroethylene (PCE), 1,1,1-trichloroethylene, aluminum, copper, iron, lead, magnesium, manganese, mercury, nickel, zinc, and uranium.

The MIPSL OU is comprised of portions of the M-Area Inactive Process Sewer (MIPS) and 313-MIPS, including the segment of pipe from the slab of the 320-M Alloy Building to the former security fence and the segment of pipeline starting adjacent to the slab of the 322-M Metallurgical Laboratory and extending to the A-014 Outfall (Figure 2). The section of MIPS not included in the MIPSL OU are associated with the M-Area OU.

The MIPSL OU includes approximately (~) 1,158 m (3,800 ft.) of vitrified clay pipe ranging in diameter from 30.5 to 76 centimeters (cm) (12 to 30 inches [in.]), with pipe depths ranging from about 2.1 to 3.7 m (7 to 12 ft.) below ground surface (bgs). High-density polyethylene pipe liner, installed inside portions of the MIPS and 313-MIPS pipelines in 1983, range from 15 to 30 cm (6 to 12 in.) in diameter. Pre-cast concrete or brick manholes along the MIPS and 313-MIPS allowed access to the pipelines for

inspection, maintenance, effluent sampling, etc. The manholes are spaced ~ 107 to 122 m (350 to 400 ft.) apart.

1.2.2 Nature and Extent of Contamination

The primary contaminant release mechanism at the MIPSL OU is leakage of effluents from the process sewer lines leaching into the surrounding soil. Soils in M Area consist of fine-grained sediments to a depth of ~ 9 m (30 ft.). This low-permeability formation is referred to as the "Upland Unit". The Upland Unit has limited contaminant mobility to a significant degree although VOCs (primarily PCE and TCE) have migrated downward, principally by diffusion from the source zone.

The conclusions of the RCRA Facility Investigation/Remedial Investigation (RFI/RI) Work Plan, RFI/RI Report with Baseline Risk Assessment, and Corrective Measures Study/Feasibility Study (CMS/FS) for the M Area Inactive Process Sewer Lines (081-M) (U) confirmed there are no exposure pathways for human or ecological receptors at the MIPSL OU and problems warranting action are related to contaminant migration (CM) of deeper soils (WSRC 2005). Specifically, PCE and TCE were identified as CM COCs in the vadose zone soil adjacent to and beneath the manholes at depths greater than (>) 1.2 m (4 ft.) bgs. The higher concentrations were located beneath the manholes. A RA was deemed necessary at the MIPSL OU because there is the potential that PCE and TCE in the vadose zone soils could leach to groundwater at concentrations that would exceed maximum contaminant levels (MCLs).

1.3 Remedial Action Requirements and Objectives

1.3.1 Remedial Action Objectives

RAOs are unit-specific goals that establish the extent of cleanup required to protect human health and the environment and to mitigate the effects of contamination. As stated in the ROD (WSRC 2006b), the RAO identified for the MIPSL OU is the following:

- Prevent TCE and PCE from leaching to groundwater above MCLs.

The selected remedy for the MIPSL OU leaves hazardous substances in place that pose a potential future risk and will require land use restrictions until the concentration of

hazardous substances in the soil and groundwater are at such levels to allow for unrestricted use and exposure. The following LUC objectives for the MIPSL OU are necessary to ensure protectiveness of the selected remedy:

- Restrict worker access and prevent unauthorized contact, removal, or excavation of contaminated media (i.e., vadose zone soil and pipelines);
- Prohibit the development and use of property for residential housing, elementary and secondary schools, childcare facilities and playgrounds;
- Maintain the integrity of any current or future remedial or monitoring system, such as SVE systems or groundwater monitoring wells; and
- Prevent access or use of contaminated groundwater until cleanup levels are met.

1.3.2 Selected Remedial Action

The selected RA for the MIPSL OU is phased SVE enhanced with soil fracturing and institutional controls (i.e., LUCs). This RA was selected because it effectively treated contamination migration through the vadose zone to groundwater. SVE enhanced with soil fracturing was used to remove PCE and TCE from the vadose zone.

LUCs, including institutional controls, restrict the MIPSL OU to future industrial use and prohibit residential use of the area. LUCs selected as part of this action will be maintained for as long as they are necessary and termination of any LUCs will be subject to CERCLA requirements for documenting changes in RAs.

The selected RA was protective of human health and the environment and complied with applicable or relevant and appropriate requirements. It provided the best balance of tradeoffs between other alternatives because contaminant mobility and volume are reduced through treatment, and SVE was a readily implementable technology. In addition, exposure pathways that could result in unacceptable risk are controlled through LUCs. The MIPSL OU RA areas (manholes [MHs] 1, 11, 12, and 13) are depicted in Figure 2.

The conceptual site model (Figure 3) for the MIPSL OU illustrates how the implementation of the RA breaks the exposure pathways presented in the MIPSL ROD (WSRC 2006b).

1.4 Chronology of Events

A tabular summary of major milestones related to the RA for the MIPSL OU performed during the construction phase and post-construction are provided in Table 1.

2.0 OPERATIONS ACTIVITIES

The system operation consisted of the following:

- A portable soil vapor extraction unit (SVEU)
- 4 deep conventional SVE wells (1 for each manhole)
- 5 MicroBlowers™, 16 fracture wells, and 6 pressure-monitoring wells
- Annual site inspections and site maintenance

Post-construction activities included start-up testing and operation of the SVEU conducted by Savannah River Nuclear Solutions (SRNS) Operations & Maintenance (O&M). The fracture wells and deep SVE wells were tested to establish production rates, contaminant levels, and zones of influence (ZOI). This information was used to establish the baseline operating parameters of the SVEU. SRS submitted annual Performance Evaluation Reports (PERs) beginning on April 2, 2009 (i.e., three months after the first year of operation). The reports provide analysis and discussion of the data and are further discussed in Section 2.1.

Per the CMI/RAIP, two vadose zone pressure monitoring wells were originally planned at each manhole. As detailed in the MIPSL PCR (WSRC 2008), two wells were constructed at MH-01 and MH-11. Only one well was installed at MH-12 and MH-13 due to persistent water in the Upland Unit that flooded the locations for the two proposed wells. The sole purpose of the pressure monitoring wells was to detect the negative pressure produced by the SVE blower during the first year of operation. During normal operations, a hand-held manometer was used to measure the vacuum in the pressure monitoring wells. The measurement of negative pressure provides a better understanding of the ZOI of the SVE in the fractured Upland Unit. The probability of a screen zone being in alignment with a fracture, which resulted in a vacuum measurement, might be relatively low.

In the first year of operation of the SVE, the negative pressure in the pressure monitoring wells ranged from undetectable to ~20.3 cm (8 in.) of water (SRNS 2010). The presence of a vacuum in at least one screen zone in all wells was thought to indicate a reasonable ZOI around the extraction wells in the fractured Upland Unit. Pressure well monitoring was discontinued after the first year of monitoring because the wells had served their purpose.

MIPSL SVE operation started in 2008 and continued through 2019. During operation, the portable SVE unit was moved between manholes and each full rotation was known as a cycle. In 2008 and 2009, the portable SVEU, also known as active SVE (ASVE), cycled through the four manhole locations (MH-01, MH-11, MH-12, and MH-13) three times (i.e., Cycle #1, Cycle #2, and Cycle #3). Cycle #1 occurred in 2008 to dewater the formation of fracturing fluids injected previously to enhance flow patterns within the vadose clay zone. The primary purpose of Cycle #2 starting in 2008 was PCE removal to less than (<) 10 parts per million by volume (ppmv). Rebound testing was then initiated when concentrations sustained below 10 ppmv. Therefore in 2009, the focus of Cycle #3 was to determine if rebound of concentrations occurred.

At all manhole locations except MH-01, PCE concentrations at all fracture wells and the deep SVE series wells were reduced to <10 ppmv and rebound of concentrations had not been observed. As reported in the 2009 MIPSL PER (SRNS 2010), ASVE was replaced with passive SVE (i.e., MicroBlower™) at MH-11, -12, and -13 and ASVE was operated at MH-01 as Cycle #4 in 2010. Based on PCE concentrations exceeding 10 ppmv at the MH-12 location (late 2010 to early 2011), the SVEU was moved from MH-01 to MH-12. ASVE began at MH-12, September 1, 2011. This is considered Cycle #5. Cycle #5 ended on approximately March 31, 2012, when ASVE was discontinued at MH-12 because all soil vapor samples were <10 ppmv.

ASVE was reinitiated at MH-01 on April 2, 2012. Cycle #6 continued at MH-01 for all of 2013. Two rebound tests to assess mass removal efforts were conducted in 2013. Cycle #7 occurred in early 2014 as fracture well testing was conducted at all four MHs (SRNS 2014a). The SVE was moved to MH-12 on April 1, 2014, to reduce concentrations

at Well F12-3. ASVE lasted for three months at MH-12. Cycle #8 began as ASVE was reinitiated at MH-01 on July 1, 2014. For the last five years of operation (2015 to 2019), ASVE at the MIPSL OU was only connected to the wells at MH-01.

The MIPSL SVEU was temporarily shut down for soil sampling between October 7, 2019, and December 5, 2019. The 2019 soil sampling event collected vadose zone soil samples at MH-01, MH-11, MH-12, and MH-13, and the results revealed that cleanup levels for TCE and PCE established in the ROD have been achieved with the MIPSL SVE system. The system was permanently shut down in July 2020 with USDOE, USEPA, and SCDES approval. Cleanup levels for the MIPSL OU are discussed further in Section 2.1.

USEPA Modified Method 18 (WSRC 2003) was approved by SCDES as a modification of the SRS Part 70 Air Quality Permit in 2004 and was the procedure used for sampling SRS SVE systems. The SVEU was operated under the Title V Air Quality Control (AQC) Permit TV-0080-0041 (SCDES 2007).

2.1 Performance Reports

The PERs address remedial system performance, results of soil sampling conducted in the calendar year (CY), and recommendations considering both the soil and vapor results for the MIPSL OU. The 2008 PER (SRNS 2009), the 2009 PER (SRNS 2010), the 2010 PER (SRNS 2011), the 2011 PER (SRNS 2012), the 2012 PER (SRNS 2013b), the 2013 PER (SRNS 2014b), the 2014 PER (SRNS 2015), the 2015 PER (SRNS 2016), the 2016 PER (SRNS 2017), the 2017 PER (SRNS 2018b), and the 2018 PER (SRNS 2019) outlined the first eleven years of operations. The 2019 PER (SRNS 2020a) was the last evaluation report submitted for the MIPSL OU where it was shown all CM cleanup levels were met.

As defined in the ROD, the final cleanup levels for PCE and TCE were 0.3070 milligrams per kilograms (mg/kg) and 0.0408 mg/kg, respectfully. Exceedances of these values in soils indicated that PCE and TCE may leach to groundwater at levels above the MCL (0.005 milligrams/liter [mg/L]) and present an unacceptable risk to human receptors. The pre-operation maximum detected values presented in the ROD for PCE and TCE were 0.767 mg/kg and 0.411 mg/kg, respectively. Soil boring sampling data conducted in 2019

at all manholes showed that the maximum PCE concentration was 0.12 mg/kg and the maximum TCE concentration was 0.00701 mg/kg near MH-01 (Table 3). These values are less than the CM cleanup levels. Figure 4 depicts a graph for pounds of PCE removal at MH-01 and concentration spikes from 2008 through 2020. The soil sampling locations and the soil results are provided in the 2019 PER in addition to the recommendation to discontinue operation of the MIPSL SVE system (SRNS 2020a). Approval of the proposal was provided by USEPA and SCDES in July 2020 and the SVE system was shut down.

2.2 Equipment Decontamination and Decommissioning

Once the cleanup levels were met and operation of the MIPSL SVE was approved to be discontinued, monitoring wells and the SVEU were either abandoned or removed. MicroBlowers™ were dismantled and removed while all the wells were abandoned. The SVEU was relocated to the Site EY-1 Laydown Yard. All equipment was disconnected from wells and locking caps were placed on them. Plastic coverings were placed at both ends of the piping. Boxes filled with batteries and solar panels were also relocated to the Site EY-1 Laydown Yard. Above grade piping and instruments were size reduced. 480 voltage wires and wire covers were removed and discarded that stretched from the M-1 Air Stripper Control Building, 323-M, to MIPSL.

2.3 Waste Disposal

Waste management (handling, disposal, and transportation of construction-generated wastes) and dewatering met the requirements of applicable SRS manuals and procedures Aqueous remediation waste included decontamination liquids. Aqueous waste, including decontamination water, was managed in accordance with the guidelines set out in the SRS Investigation-Derived Waste Management Plan (WSRC 2007). If contaminants in the aqueous waste were below the Health-Based Limits (HBLs) listed in Appendix A of the Investigation-Derived Waste Plan, then they were land applied within the work area. If contaminants were above the HBLs, the aqueous waste was dispositioned to the M-1 Air Stripper. Operation of the SVE wells generated aqueous waste that was above the HBLs. This aqueous waste was sampled per procedure to ensure it passed the Site Waste Acceptance Criteria (SRNS 2020b). The Waste Acceptance Criteria ensures M-1 influents

do not cause an M-1 effluent National Pollutant Discharge Elimination System violation (Permit #SC 0000175). The compliant waste was collected by a dedicated tanker and dispositioned to the M-1 Air Stripper. In addition, the operation of the SVE wells generated soil and mud that was above the HBLs. Soil and mud were packaged and dispositioned to the SRS Hazardous Waste Storage Facility. All waste generated was packaged and transported in accordance with the appropriate facility Waste Acceptance Criteria (SRNS 2020b).

Secondary waste (e.g., personal protective equipment, sampling supplies) generated during the RA was decontaminated and disposed to the SRS Three Rivers Landfill as routine sanitary waste or decontaminated for reuse by SRS.

3.0 DEVIATIONS FROM ORIGINAL DESIGN

Field conditions required four design and/or construction changes during construction. The project team reviewed all changes prior to implementation to ensure compliance with regulatory requirements in the ROD and the CMI/RAIP. Consistent with the CMI/RAIP, notifications were made to USEPA and SCDES prior to implementation, as appropriate. Table 2 provides a summary of the basis and resolution of deviations from the original design. Where applicable, a statement is provided on how the deviation still meets a performance criterion.

4.0 VERIFICATION SAMPLING, TESTING, ANALYSIS, PERFORMANCE STANDARDS, AND OPERATIONS QUALITY CONTROL

4.1 Performance Requirements/Standards

The acceptance criterion for the RAs associated with the MIPSL OU was to reduce the source term that contributes to groundwater contamination. Verification sampling to determine whether the contaminant levels in the vadose zone soil were below the CM cleanup levels occurred after operation of the phased SVEU was completed. Progress updates were reported in the annual PERs.

In Fall 2019, seven soil borings were drilled near the four manholes (MH-01, MH-11, MH-12, and MH-13) where SVE occurred. The seven borings were advanced to a depth > 30.5

m (100 ft.). Soil core was collected, described for lithology, and sampled from each soil boring. The soil samples were collected in ~1.5-m (5-ft.) intervals or less based on lithologic characteristics and VOC screening for PCE and TCE. The soil boring sampling results are presented in Tables 3 through 9. The soil core data indicates that soil cleanup levels have been met for both PCE and TCE.

Overall, PCE and TCE concentrations were very low, with nearly all results being non-detect in six of seven of the borings. The highest PCE and TCE soil concentrations were detected in MIPSL01SB1 located near MH-01. Although the VOC concentrations at MIPSL01SB1 were elevated with respect to the other six soil borings, all results were well below the cleanup values as defined in the ROD (WSRC 2006b).

4.2 Operations Quality Control

Samples from SRS ASVE systems are analyzed using Modified Method 18 (WSRC 2003). Method 18 is a USEPA standard method for measurement of gaseous organic compound emissions, primarily from exhaust stacks, by gas chromatography. This procedure was approved by SCDES as a modification of the SRS Part 70 Air Quality Permit in 2004. Table 10, MIPSL SVE Performance Monitoring, provides the sampling locations (i.e., SVE wells, pressure monitoring wells, and MicroBlowers^{TM}), analytes and measurements, and frequency for monitoring.

5.0 VERIFICATION OF REMEDIAL ACTION COMPLETION AND FINAL INSPECTION

As detailed in Section 4.0, operations activities required for the RA have met the acceptance criteria established in the approved CMI/RAIP (WSRC 2006a) and PCR (WSRC 2008).

As outlined in Section 5.2, the final inspection with participation of USEPA and SCDES has been completed. No significant issues were identified during the inspection.

5.1 Verification of Remedial Action Completion

The verification is based on the Section 5.2 inspection and successful achievement of the RAO per discussion above. The soil sampling event conducted in 2019 to strategically

collect vadose zone soil samples at MH-01, MH-11, MH-12, and MH-13 (SRNS 2018c) has shown that the cleanup levels for TCE and PCE have been met with the MIPSL SVE system as discussed in the 2019 PER (SRNS 2020a). The cleanup levels (0.3070 mg/kg PCE and 0.0408 mg/kg TCE) were specifically derived from a fate and transport modeling effort which analyzed for the minimum concentration of soil contaminant necessary to leach into groundwater and elevate that groundwater above the MCLs for the specific contaminants (PCE and TCE). The 2019 soil concentrations were well below the accepted cleanup levels. It was concluded that the MIPSL closure had been completed satisfactorily and the RA was completed in accordance with the requirements of the MIPSL ROD. The results of analytical sampling and testing have been documented and the records are on file at SRS Environmental Compliance and Area Completion Department Document Control in the project file.

In accordance with the ROD, applicable post-closure activities (e.g., LUC, five-year remedy reviews, etc.) will be performed as described in Section 7.0 of this CMIR/RACR. The necessary LUCs described in the ROD (WSRC 2006b) are provided in the Land Use Control Implementation Plan (LUCIP) for the MIPSL OU (WSRC 2006c). LUCs will consist of site maintenance (site inspections, mowing, general housekeeping, repair of erosion damage, and other routine maintenance as needed) and access controls (warning signs and land use restrictions). The ROD RA will be reviewed every five years to ensure that the selected remedy remains protective of human health and the environment.

5.2 Final Inspection for Acceptance of MIPSL Closure

A final joint field inspection meeting was performed on March 15, 2023, by the MIPSL OU Project Team, USDOE, SCDES and USEPA. During the meeting, the participants viewed drone footage of the MIPSL OU and were provided an opportunity to walk it down. The USEPA and SCDES elected not to perform a walk down because the drone video provided adequate inspection of the OU with better views. No further outstanding issues resulted from the final field inspection. The participants of the final inspection are provided in Appendix A.

6.0 AS-BUILT DOCUMENTATION

6.1 As-Built Drawings

MIPSL OU post operations as-built drawings are provided in Appendix B. Figure B-1 shows the mobile SVEU that was removed from the area. Figure B-2 depicts abandoned fracturing wells, SVE wells and MicroBlowers™ and lists them out in a table. These drawings have been voided since all running equipment was either removed or abandoned in place. The survey plat of the area subject to LUCs as referenced in the LUCIP was provided in the MIPSL OU PCR (WSRC 2008).

6.2 Well Modifications

All of the MIPSL OU MicroBlowers™, fracture wells, and monitoring wells were abandoned on January 12-13, 2021, and are provided in Appendix C. Figures C-1 through C-4 show all the surrounding wells at MH-01, MH-11, MH-12, and MH-13.

7.0 POST-CMIR/RACR ACTIVITIES AND LAND USE CONTROL

As presented in Section 4.8 of the approved LUCIP (WSRC 2006c), post-closure activities will involve annual inspections and maintenance. Annual inspections will be performed to ensure that signs are in place and are legible and that pipeline and manholes are intact. Maintenance (including site inspections, mowing, general housekeeping, and repair of erosion damage) will be performed as needed. Maintenance and LUCs per the LUCIP will be reported during the five-year remedy review of the remedy.

A photograph of a typical warning sign is provided in Figure 5 of this CMIR/RACR. Inspection criteria are listed in the Field Inspection Checklist in Appendix B of the LUCIP.

7.1 Five-Year Remedy Review

Section 300.430(f)(4)(ii) of the National Oil and Hazardous Substances Contingency Plan requires that a five-year remedy review be performed if hazardous substances, pollutants, or contaminants above levels that allow for unlimited use and unrestricted exposure remain in the OU.

Since the MIPSL OU implemented remedy results in hazardous substances, pollutants, or contaminants remaining on site above levels that would allow for unlimited use and unrestricted exposure, a five-year remedy review is conducted every five years to ensure that the remedy is, and continues to be, protective of human health and the environment.

8.0 PROJECT COSTS

Table 11 compares the actual incurred remediation costs to estimated project costs reported in the ROD (WSRC 2006b). Total O&M costs were summed from three separate five-year remedy reviews from CY2007 through CY2020 (SRNS 2013a, 2018a, 2023). The incurred costs were less than the estimated project costs based upon the factors below:

1) Using a refurbished existing portable SVEU rather than designing, specifying and procuring a new unit;
2) Using an existing service task order drilling subcontractor as opposed to procuring a standalone subcontractor to install the wells;
3) Using SRS direct-hire forces to abandon the manholes;
4) Using internal SRS experienced personnel to issue a design in lieu of a separate formal design and detailed drawings which were assumed in the estimate; and
5) Total Indirect Costs were substantially less as a result of the above factors.

9.0 REFERENCES

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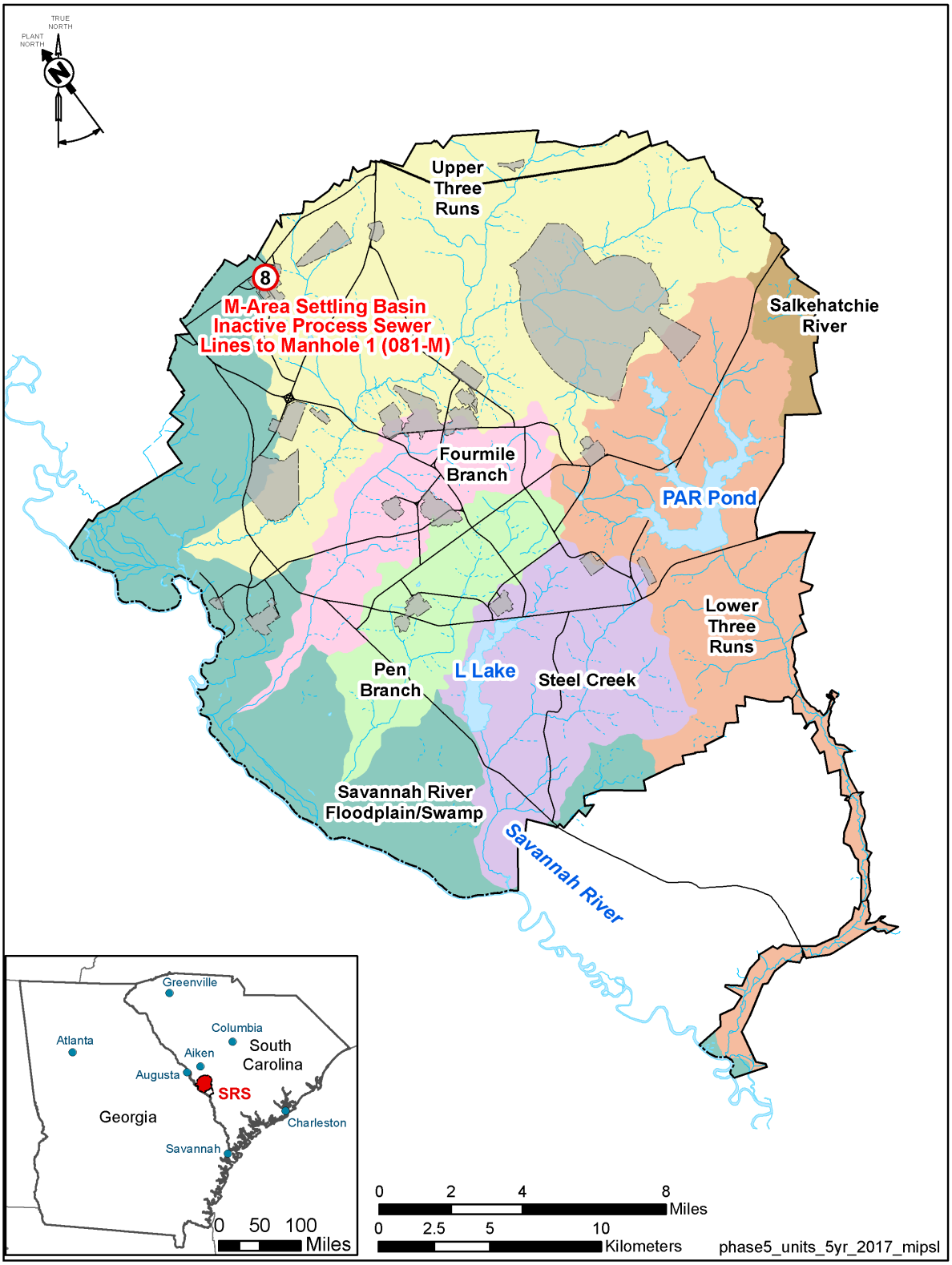

Figure 1. MIPSL Location on SRS Map

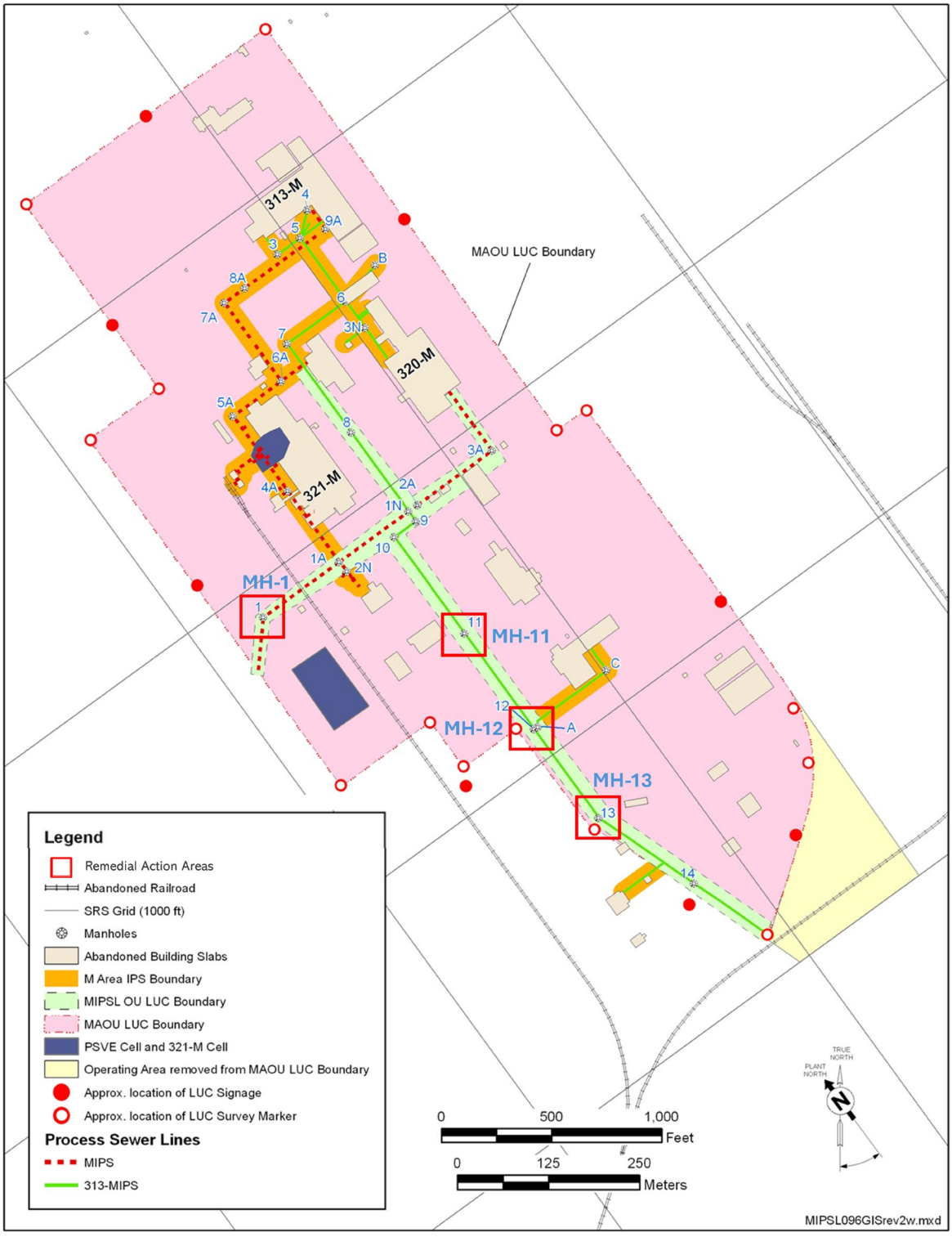

Figure 2. MIPSL OU Boundary

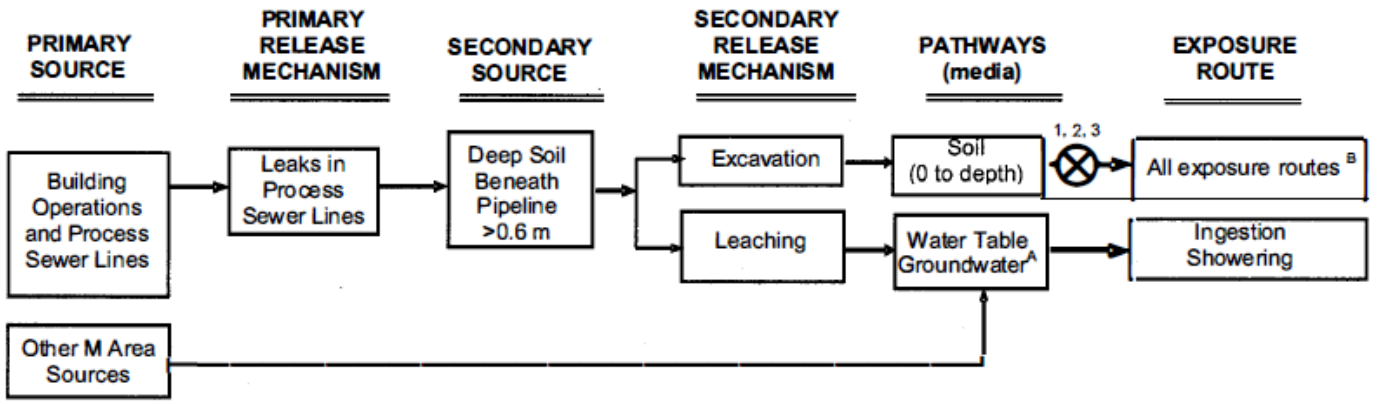

Figure 3. MIPSL Conceptual Site Model

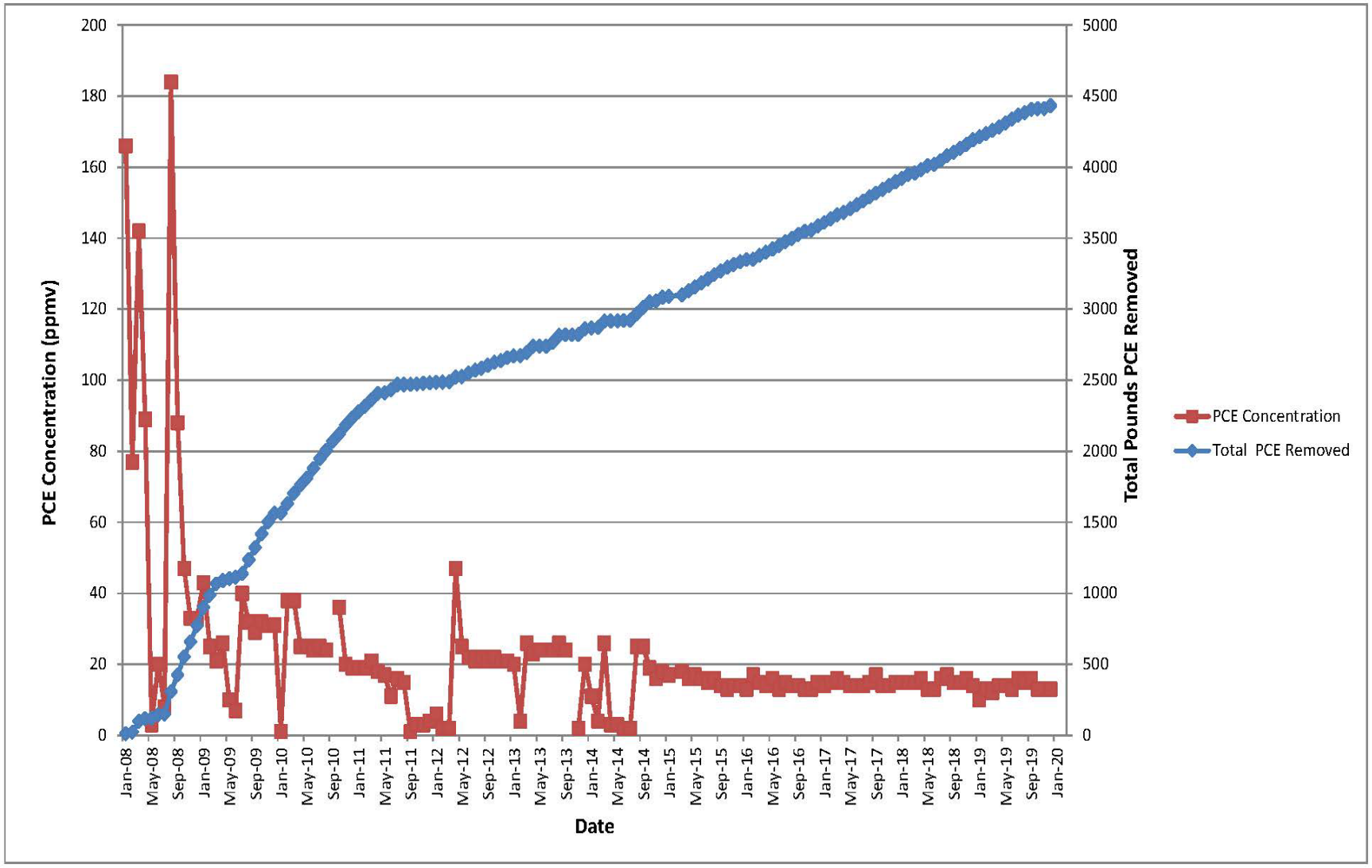

Figure 4. PCE Concentrations and Mass Removal by ASVE at MH-01

Figure 5. Typical MIPSL Warning Sign

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Table 1. Chronology of Events

Description of Activity	Date
AQC Revision	April 2006
Three Party Signed ROD, Rev. 1	April 2007
CMI/RAIP Approval	May 2007
RA Start	June 2007
Underground Injection Control (UIC) Permit #915 to Construct Approval	June 2007
Grouted MHs and A-014	June 2007
Cone Penetrometer Testing Lithology	July 2007
Installed Fracted Wells	August 2007
Installed Deep SVE Wells	October 2007
UIC Permit #915 to Operate Approval	December 2007
Installed Pressure-Monitoring Wells	January 2008
Startup Testing Completed and Placed into Operation	January 2008
Core Team Walkdown	April 2008
Installed Warning Signs	April 2008
Completed Survey Plat	May 2008
Post Construction Activities	**Date**
MIPSL Post Construction Walkdown	May 2008
Rev 0 Post Construction Report Submitted	May 2008
Rev 1 Post Construction Report Regulator Approval	October 2008
Rev 0 Land Use Control Implementation Plan Submitted	November 2008
Rev 1 Land Use Control Implementation Plan Approval	May 2009
Performance Evaluation Report of 2008 for MIPSL (081-M) OU Approval	August 2009
Performance Evaluation Report of 2009 for MIPSL (081-M) OU Approval	July 2010
Performance Evaluation Report of 2010 for MIPSL (081-M) OU Approval	November 2011
Performance Evaluation Report of 2011 for MIPSL (081-M) OU Approval	November 2012
Performance Evaluation Report of 2012 for MIPSL (081-M) OU Approval	February 2014
Performance Evaluation Report of 2013 for MIPSL (081-M) OU Approval	December 2014
Performance Evaluation Report of 2014 for MIPSL (081-M) OU Approval	September 2015
Performance Evaluation Report of 2015 for MIPSL (081-M) OU Approval	December 2016
Performance Evaluation Report of 2016 for MIPSL (081-M) OU Approval	February 2018
Performance Evaluation Report of 2017 for MIPSL (081-M) OU Approval	October 2018
Sampling and Analysis Plan for MIPSL (081-M) OU Approval	July 2019
Performance Evaluation Report of 2018 for MIPSL (081-M) OU Approval	November 2019
Performance Evaluation Report of 2019 for MIPSL (081-M) OU Approval	July 2020
Verification Soil Sampling at Four MIPSL MHs	September 2019
SRNS Site Inspection	July 2022
SRNS Site Inspection	December 2022
Final Regulatory Inspection	March 2023

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Table 2. Summary of Design Changes

Item	Change	Reason
1	Each manhole location included four shallow fracture wells and one deep SVE well. The CMI/RAIP, Section 2.5.2, included the following requirement: "After the fracturing process has been completed, one SVE well will be installed in the center of the fractured area. During the installation of the SVE well, soil cores will be sampled to establish the baseline contaminant profile." The deep SVE well was installed but a soil core contaminant profile was not collected.	The RFI/RI/Baseline Risk Assessment (BRA)/CMS/FS for M Area OU (WSRC 2005) included the collection and analysis of shallow soil-gas and soil samples, and deep soil-gas sampling. These results were used to determine the full nature and extent of contamination. Contamination was found to be largely limited to the shallow depths immediately below the manholes and restrained within the dense shallow clays therein. The deep SVE well was to be installed to recover deep VOCs that has already migrated beyond the four shallow fracture SVE wells. Based upon the lack of deep contamination, it was decided to screen the deep SVE well over the entire zone between the Upland unit and the water table (60 to 100 ft bgs) rather than screen it based upon the CMI/RAIP-specified soil core contaminant profile. In the end, all contaminated depths beneath each manhole were adequately screened. SVE recovery includes four fracture wells screened from 10 to 30 ft bgs and a single deep SVE well screened from 60 to 100 ft bgs. All performance criteria were met.
2	To allow monitoring within the fracture elevations (10 to 30 ft bgs) per the CMI/RAIP, Section 2.5.2, two pressure-monitoring wells were planned at each of the four manhole locations (for a total of eight) to allow periodic monitoring with a portable vacuum gauge. Only six were installed.	Due to a persistent perched water table at manholes 12 and 13, only one pressure-monitoring well was installed at each manhole location (P12-2 and 13-1, respectively). In the presence of water, the pressure-monitoring wells would not have been effective because water is not compressible, and this interferes with the vacuum measurement. Three attempts were made to install the second pressure-monitoring well at P12-1. Two were pushed to 26 ft and a third push was made to 9 ft. P13-2 was installed at the wrong location and relocated to P13-2R, which was pushed to 25-ft and it too was abandoned due to the presence of perched water. Having six pressure-monitoring wells instead of the planned eight wells will not inhibit the ability to monitor and interpret the performance of the SVE system at the MIPSL OU. The pressure information lacking at manholes 12 and 13 can be inferred from the pressure information at the other two manholes (MH-01 and MH-11), which have two pressure-monitoring wells each. All performance criteria were met.

Table 2. Summary of Design Changes (*continued/end)*

Item	Change	Reason
3	In addition to the pressure-monitoring wells around the fracture wells, in Section 2.5.2 of the CMI/RAIP, it states: "Each deep SVE well will have at least one pressure-monitoring well with multiple discrete ports positioned to allow monitoring of the contaminated zone."	The deep SVE well was to be installed to recover any deep VOCs that had already migrated beyond the four shallow fracture wells. The purpose of the CMI/RAIP specified pressure-monitoring well was to confirm the zone of capture of this deep SVE well. It was decided that the CMI/RAIP specified pressure-monitoring well was not required because 1) the deep SVE well was screened over the entire horizon zone between the Upland unit and the water table (60 to 100 ft bgs), 2) this zone is highly permeable and 3) very little contamination exists therein. In the end, where contaminants actually exist and permeability is not assured pressure-monitoring is provided (i.e., as detailed in Item 2 above, at 10 to 30 ft bgs). All performance criteria were met.
4	The CMI/RAIP, Section 4.2, inadvertently required a "Professional Engineer (PE) Certification of the RCRA remediation activities."	The PE certification of RCRA remediation activities required in the CMI/RAIP is not applicable because the MIPSL OU was not closed under the RCRA permit. All performance criteria were met.

Table 3. Manhole 01 Soil Boring 1

Sample	Depth *(ft)*	PCE *(µg/kg)*	TCE *(µg/kg)*
MIPSL01SB1	8	1.04 (U)	1.04 (U)
MIPSL01SB1	14	1.18 (U)	1.18 (U)
MIPSL01SB1	20	1.2 (U)	1.2 (U)
MIPSL01SB1	23	1.23 (U)	1.23 (U)
MIPSL01SB1	28	6.96	1.2 (U)
MIPSL01SB1	31	56.5	1.27 (U)
MIPSL01SB1	35	31.4	1.17 (U)
MIPSL01SB1	39	22.8	1.1 (U)
MIPSL01SB1	45	4.02	1.05 (U)
MIPSL01SB1	51	0.885 (J)	1.18 (U)
MIPSL01SB1	56	15.2	1.07 (U)
MIPSL01SB1	61	120	4.3
MIPSL01SB1	66	0.46 (J)	1.07 (U)
MIPSL01SB1	75	1.15 (U)	1.15 (U)
MIPSL01SB1	86	5.25	1.15 (U)
MIPSL01SB1	93	4.47	1.2 (U)
MIPSL01SB1	94.5	63.3	3.74
MIPSL01SB1	96	18.9	2.81
MIPSL01SB1	103	3.13	1.13 (U)
MIPSL01SB1	106	5.57	7.01

(U) = Analyzed for but not detected
(J) = Estimated Quantity

Table 4. Manhole 01 Soil Boring 2

Sample	Depth *(ft)*	PCE *(µg/kg)*	TCE *(µg/kg)*
MIPSL01SB2	14	0.93 (J)	1.16 (U)
MIPSL01SB2	19	0.41 (J)	1.14 (U)
MIPSL01SB2	22	1.17 (U)	1.17 (U)
MIPSL01SB2	30	1.2 (U)	1.2 (U)
MIPSL01SB2	33	1.16 (U)	1.16 (U)
MIPSL01SB2	35	1.08 (U)	1.08 (U)
MIPSL01SB2	39	1.22 (U)	1.22 (U)
MIPSL01SB2	45	1.14 (U)	1.14 (U)
MIPSL01SB2	50	1.09 (U)	1.09 (U)
MIPSL01SB2	54	1.19 (U)	1.19 (U)
MIPSL01SB2	60	1.29	1.15 (U)
MIPSL01SB2	65	0.978 (J)	1.19 (U)
MIPSL01SB2	70.5	1.13 (U)	1.13 (U)
MIPSL01SB2	75	1.13 (U)	1.13 (U)
MIPSL01SB2	79	1.17 (U)	1.17 (U)
MIPSL01SB2	84	1.02 (U)	1.02 (U)
MIPSL01SB2	88	1.12 (U)	1.12 (U)
MIPSL01SB2	92	1.12 (U)	1.12 (U)
MIPSL01SB2	94.5	1.54	1.18 (U)
MIPSL01SB2	100	2.75	1.21 (U)
MIPSL01SB2	104	1.05 (U)	1.05 (U)

(U) = Analyzed for but not detected
(J) = Estimated Quantity

Table 5. Manhole 01 Soil Boring 3

Sample	Depth *(ft)*	PCE *(µg/kg)*	TCE *(µg/kg)*
MIPSL01SB3	8	1.11 (U)	1.11 (U)
MIPSL01SB3	14	1.15 (U)	1.15 (U)
MIPSL01SB3	18	1.22 (U)	1.22 (U)
MIPSL01SB3	21	1.19 (U)	1.19 (U)
MIPSL01SB3	22.5	1.08 (U)	1.08 (U)
MIPSL01SB3	28	1.22 (U)	1.22 (U)
MIPSL01SB3	34	1.18 (U)	1.18 (U)
MIPSL01SB3	40	1.19 (U)	1.19 (U)
MIPSL01SB3	45	1.12 (U)	1.12 (U)
MIPSL01SB3	50	1.16 (U)	1.16 (U)
MIPSL01SB3	55	1.15 (U)	1.15 (U)
MIPSL01SB3	59	1.26 (U)	1.26 (U)
MIPSL01SB3	60.5	1.1 (U)	1.1 (U)
MIPSL01SB3	65	1.16 (U)	1.16 (U)
MIPSL01SB3	75	1.23 (U)	1.23 (U)
MIPSL01SB3	85	1.15 (U)	1.15 (U)
MIPSL01SB3	90	1.2 (U)	1.2 (U)
MIPSL01SB3	94	1.25 (U)	1.25 (U)
MIPSL01SB3	95.5	1.27 (U)	1.27 (U)
MIPSL01SB3	100	1.07 (U)	1.07 (U)

(U) = Analyzed for but not detected
(J) = Estimated Quantity

Table 6. Manhole 11 Soil Boring 1

Sample	Depth *(ft)*	PCE *(µg/kg)*	TCE *(µg/kg)*
MIPSL11SB1	10	1.07 (U)	1.07 (U)
MIPSL11SB1	15	1.18 (U)	1.18 (U)
MIPSL11SB1	18	1.16 (U)	1.16 (U)
MIPSL11SB1	24	1.19 (U)	1.19 (U)
MIPSL11SB1	29	1.19 (U)	1.19 (U)
MIPSL11SB1	34	1.14 (U)	1.14 (U)
MIPSL11SB1	39	1.16 (U)	1.16 (U)
MIPSL11SB1	44	1.09 (U)	1.09 (U)
MIPSL11SB1	49	1.15 (U)	1.15 (U)
MIPSL11SB1	53	1.15 (U)	1.15 (U)
MIPSL11SB1	60	1.18 (U)	1.18 (U)
MIPSL11SB1	63	1.16 (U)	1.16 (U)
MIPSL11SB1	65	1.07 (U)	1.07 (U)
MIPSL11SB1	70	1.16 (U)	1.16 (U)
MIPSL11SB1	74	1.06 (U)	1.06 (U)
MIPSL11SB1	80	1 (U)	1 (U)
MIPSL11SB1	81.5	1.11 (U)	1.11 (U)
MIPSL11SB1	85	1.06 (U)	1.06 (U)
MIPSL11SB1	90	1.11 (U)	1.11 (U)
MIPSL11SB1	94	1.11 (U)	1.11 (U)
MIPSL11SB1	98	1.15 (U)	1.15 (U)
MIPSL11SB1	104	1.07 (U)	1.07 (U)

(U) = Analyzed for but not detected
(J) = Estimated Quantity

Table 7. Manhole 12 Soil Boring 1

Sample	Depth *(ft)*	PCE *(µg/kg)*	TCE *(µg/kg)*
MIPSL12SB1	11	1.17 (U)	1.17 (U)
MIPSL12SB1	15	1.18 (U)	1.18 (U)
MIPSL12SB1	20	1.13 (U)	1.13 (U)
MIPSL12SB1	25	1.09 (U)	1.09 (U)
MIPSL12SB1	28	1.18 (U)	1.18 (U)
MIPSL12SB1	33	1.14 (U)	1.14 (U)
MIPSL12SB1	39	1.2 (U)	1.2 (U)
MIPSL12SB1	43	1.12 (U)	1.12 (U)
MIPSL12SB1	49	1.13 (U)	1.13 (U)
MIPSL12SB1	54	1.14 (U)	1.14 (U)
MIPSL12SB1	59	0.649 (J)	1.18 (U)
MIPSL12SB1	64	1.07 (U)	1.07 (U)
MIPSL12SB1	67	1.12 (U)	1.12 (U)
MIPSL12SB1	75	1.08 (U)	1.08 (U)
MIPSL12SB1	80	1.19 (U)	1.19 (U)
MIPSL12SB1	85	0.779 (J)	1.08 (U)
MIPSL12SB1	89	0.462 (J)	1.1 (U)
MIPSL12SB1	95	1.23	1.28
MIPSL12SB1	99	1.12 (U)	1.12 (U)
MIPSL12SB1	102.5	0.813 (J)	1.05

(U) = Analyzed for but not detected
(J) = Estimated Quantity

Table 8. Manhole 12 Soil Boring 2

Sample	Depth *(ft)*	PCE *(µg/kg)*	TCE *(µg/kg)*
MIPSL12SB2	10	1.15 (U)	1.15 (U)
MIPSL12SB2	15	1.17 (U)	1.17 (U)
MIPSL12SB2	20	1.08 (U)	1.08 (U)
MIPSL12SB2	24	1.09 (U)	1.09 (U)
MIPSL12SB2	29	1.18 (U)	1.18 (U)
MIPSL12SB2	33	1.12 (U)	1.12 (U)
MIPSL12SB2	40	1.1 (U)	1.1 (U)
MIPSL12SB2	43	1.16 (U)	1.16 (U)
MIPSL12SB2	49	1.1 (U)	1.1 (U)
MIPSL12SB2	52	1.21 (U)	1.21 (U)
MIPSL12SB2	55	1.1 (U)	1.1 (U)
MIPSL12SB2	59	0.406 (J)	1.16 (U)
MIPSL12SB2	64	1.02 (U)	1.02 (U)
MIPSL12SB2	70	1.11 (U)	1.11 (U)
MIPSL12SB2	73	1.03 (U)	1.03 (U)
MIPSL12SB2	80	1.12 (U)	1.12 (U)
MIPSL12SB2	85.5	0.54 (J)	0.463 (J)
MIPSL12SB2	90	2.35	2.19
MIPSL12SB2	94	1.05 (U)	1.05 (U)
MIPSL12SB2	97	1.09 (U)	1.09 (U)
MIPSL12SB2	103	4.41	3.33

(U) = Analyzed for but not detected
(J) = Estimated Quantity

Table 9. Manhole 13 Soil Boring 1

Sample	Depth *(ft)*	PCE *(µg/kg)*	TCE *(µg/kg)*
MIPSL13SB1	12.5	1.19 (U)	1.19 (U)
MIPSL13SB1	14.5	1.13 (U)	1.13 (U)
MIPSL13SB1	20	1.05 (U)	1.05 (U)
MIPSL13SB1	24	1.07 (U)	1.07 (U)
MIPSL13SB1	28	1.12 (U)	1.12 (U)
MIPSL13SB1	34	1.07 (U)	1.07 (U)
MIPSL13SB1	40.5	1.09 (U)	0.513 (J)
MIPSL13SB1	43	1.09 (U)	1.09 (U)
MIPSL13SB1	49.5	1.22 (U)	6.31
MIPSL13SB1	55	1.16 (U)	1.16 (U)
MIPSL13SB1	60	1.15 (U)	1.15 (U)
MIPSL13SB1	64	1.04 (U)	1.04 (U)
MIPSL13SB1	70	1.31 (U)	1.31 (U)
MIPSL13SB1	74.5	1.07 (U)	1.07 (U)
MIPSL13SB1	79	1.06 (U)	1.06 (U)
MIPSL13SB1	84	1.03 (U)	1.03 (U)
MIPSL13SB1	89	1 (U)	1 (U)
MIPSL13SB1	94	1 (U)	1 (U)
MIPSL13SB1	100.5	1.12 (U)	1.12 (U)
MIPSL13SB1	102.5	1.08 (U)	1.08 (U)

(U) = Analyzed for but not detected
(J) = Estimated Quantity

Table 10. MIPSL SVE Performance Monitoring

Sampling Location	Analytes/Measurements	Frequency
SVE Wells	PCE, TCE, Flow Rate, Pressure (Vacuum)	From Initial Startup Daily (1 week), Weekly (1 month), Monthly (6 months), Quarterly (duration)
Pressure monitoring wells	Pressure (Vacuum)	During Initial Startup Daily (1 week), Weekly (1 month), Monthly (6 months)
MicroBlower™ Wells	PCE and TCE	Annual

Table 11. Project Cost Comparison

	ROD Cost ($K)	Incurred Cost ($K)	Delta Cost (%)
Total Capital Costs	1,910	967	-49
Total O&M Costs	3,606	1,954	-54

Notes: O&M costs for site inspections will continue for the foreseeable future and will be presented in the five-year-remedy-reviews. Incurred cost of total O&M was only calculated up to RA completion in 2020.

APPENDIX A

MIPSL Final Inspection Participants

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Sixth Five-Year Remedy Review Report for Savannah River Site Operable Units with Operating Equipment
Regulatory Field Visit via Drone Fly Overs

Building 730-2B, Collaboration Center **March 15, 2023**

Name	Organization
DENA BRETT	SRNS/EC&ACP ENGINEERING
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Kevin Boerstler	SRNS/EC&ACP Engineering
Bryce Garner	SRNS/EC&ACP Engineering
~~Seth Dray~~	~~SRNS/EC&ACP Eng~~
JUSTIN STEADMAN	SRNS/EC+ACP Eng
Hannah Herlong	SCDHEC
Jeff Thibault	SRNS/ACP Engineering
JOAO CAADOSO-NETO	SRNS/EC&ACP
SHANNAN LUCERO	SRNS/EC&ACP
JUANA MADDOX	SRNS/EC&ACP
Rasheed Muwwakkil	SRNS/EC&ACP
JOSEPH BURCH	SRNS/EC&ACP
Jeff Ross	SRNS/EC&ACP
Sadika O'Quinn	SRNS/EC&ACP
KAREN DOWNS	DOE/ACP
GREGG O'QUINN	SCDHEC
Philip Prater	DOE-SR/RDDD
Shelia McFalls	SRNS/EC&ACP
Manuel J. Perrotez	SRNS/EC&ACP
Susan Fulmer via MS Teams	SCDHEC
Heather Cathcart via MS Teams	SCDHEC
Branden Kramer via MS Teams	SRNS/ACP Engineering
Keehna Frasier via MS Teams	SCDHEC

Sixth Five-Year Remedy Review Report for Savannah River Site Operable Units with Operating Equipment
Regulatory Field Visit via Drone Fly Overs

Building 730-2B, Collaboration Center **March 15, 2023**

Name	Organization
Brian Hennessey	DOE-SR
Jon Richards	EPA
Gabby Munn via MS Teams	SCDHEC
Terry Killeen	SRNS
Duke Taylor via MS Teams	SCDHEC

APPENDIX B

As-Built Drawings

Drawing M-M6-G-0983, MIPSL Mobile SVEU No. 1 Piping and Instrumentation Diagram

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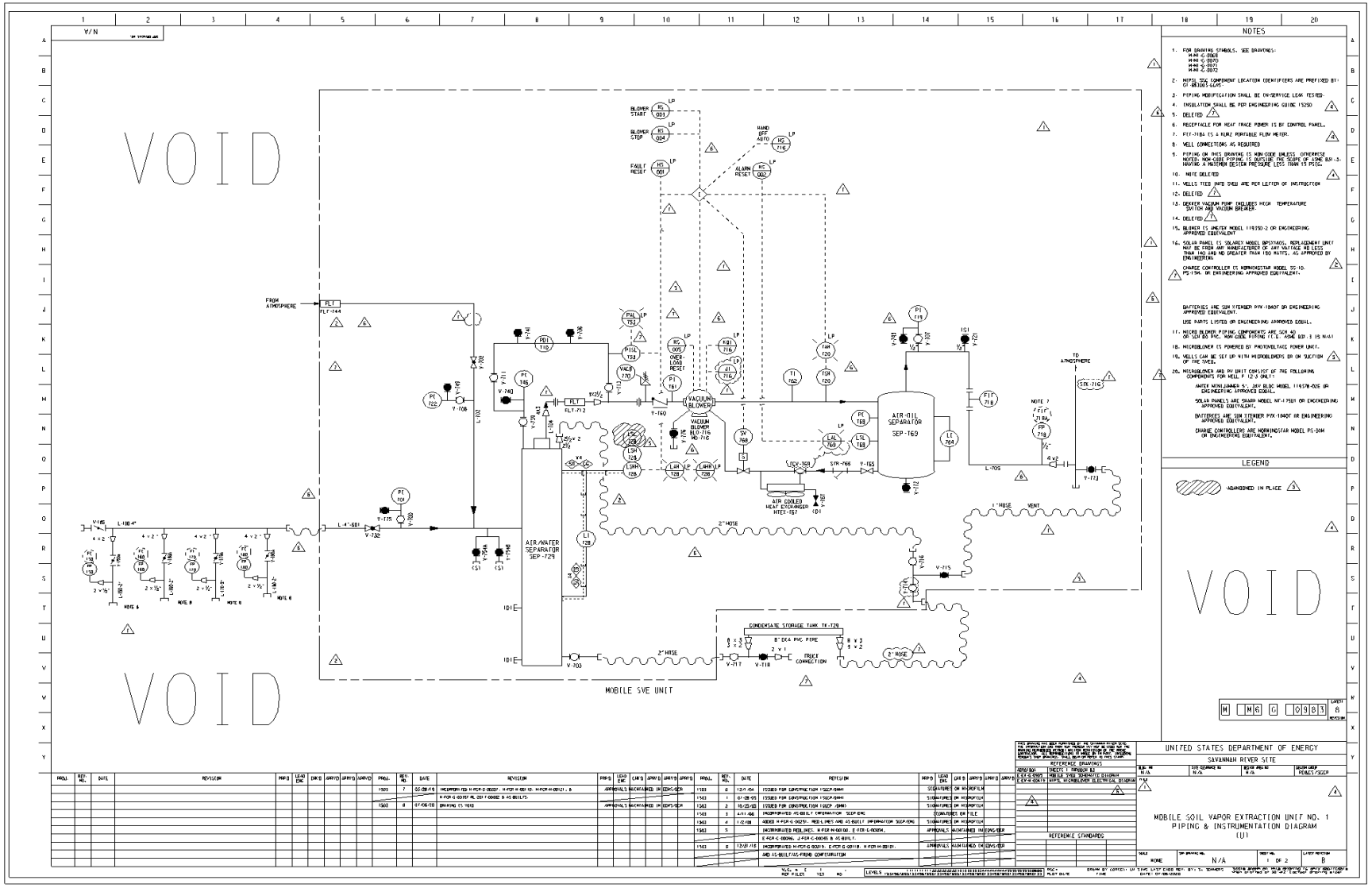
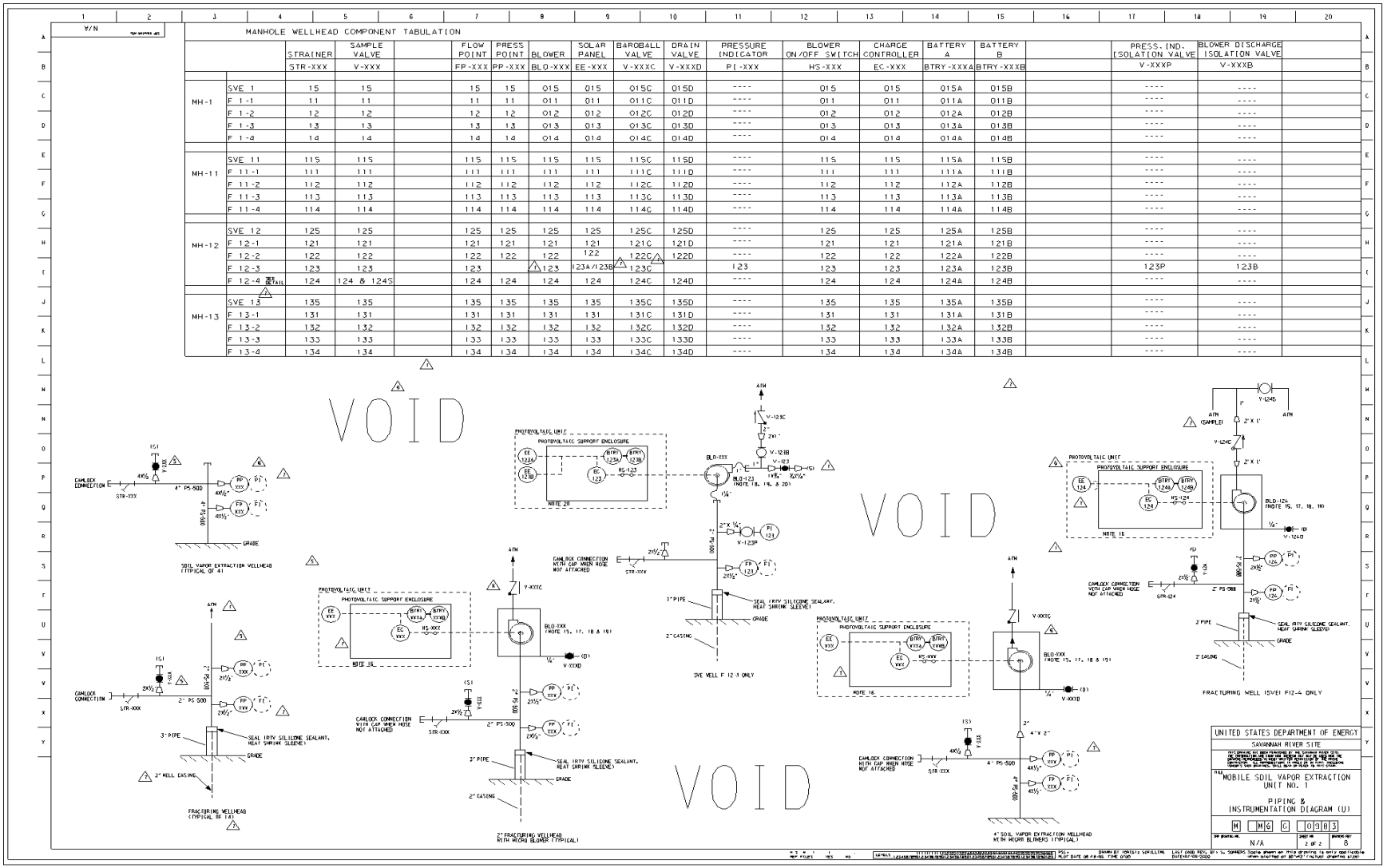


Figure B-1. Voided As-Built Drawing for MIPSL Mobile SVEU No. 1



		STRAINER	SAMPLE VALVE	FLOW POINT	PRESS POINT	BLOWER	SOLAR PANEL	BAROBALL VALVE	DRAIN VALVE	PRESSURE INDICATOR	BLOWER ON/OFF SWITCH	CHARGE CONTROLLER	BATTERY A	BATTERY B	PRESS. IND. ISOLATION VALVE	BLOWER DISCHARGE ISOLATION VALVE
		STR-XXX	V-XXX	FP-XXX	PP-XXX	BLO-XXX	EE-XXX	V-XXXC	V-XXXD	PI-XXX	HS-XXX	EC-XXX	BTRY-XXXA	BTRY-XXXB	V-XXXP	V-XXXB
MH-1	SVE 1	15	15	15	15	015	015	015C	015D	----	015	015	015A	015B	----	----
	F 1-1	11	11	11	11	011	011	011C	011D	----	011	011	011A	011B	----	----
	F 1-2	12	12	12	12	012	012	012C	012D	----	012	012	012A	012B	----	----
	F 1-3	13	13	13	13	013	013	013C	013D	----	013	013	013A	013B	----	----
	F 1-4	14	14	14	14	014	014	014C	014D	----	014	014	014A	014B	----	----
MH-11	SVE 11	115	115	115	115	115	115	115C	115D	----	115	115	115A	115B	----	----
	F 11-1	111	111	111	111	111	111	111C	111D	----	111	111	111A	111B	----	----
	F 11-2	112	112	112	112	112	112	112C	112D	----	112	112	112A	112B	----	----
	F 11-3	113	113	113	113	113	113	113C	113D	----	113	113	113A	113B	----	----
	F 11-4	114	114	114	114	114	114	114C	114D	----	114	114	114A	114B	----	----
MH-12	SVE 12	125	125	125	125	125	125	125C	125D	----	125	125	125A	125B	----	----
	F 12-1	121	121	121	121	121	121	121C	121D	----	121	121	121A	121B	----	----
	F 12-2	122	122	122	122	122	122	122C	122D	----	122	122	122A	122B	----	----
	F 12-3	123	123	123		123	123A/123B	123C		123	123	123	123A	123B	123P	123B
	F 12-4 SEE DETAIL	124	124 & 124S	124	124	124	124	124C	124D	----	124	124	124A	124B	----	----
MH-13	SVE 13	135	135	135	135	135	135	135C	135D	----	135	135	135A	135B	----	----
	F 13-1	131	131	131	131	131	131	131C	131D	----	131	131	131A	131B	----	----
	F 13-2	132	132	132	132	132	132	132C	132D	----	132	132	132A	132B	----	----
	F 13-3	133	133	133	133	133	133	133C	133D	----	133	133	133A	133B	----	----
	F 13-4	134	134	134	134	134	134	134C	134D	----	134	134	134A	134B	----	----

Figure B-2. Voided As-Built Drawing for MIPSL SVE Wells Details

APPENDIX C

Well Abandonment Report for MIPSL Wells

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SRNS-RP-2021-00649
Revision 1
Page 1 of 31

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F1-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/12/2021	No longer needed for soil vapor extraction (SVE)
Total Abandoned Footage	Geophysical Logs (If applicable, list.)
16.31	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/12/2021	Portland Cement	1 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:43:45-05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:42:17 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F1-2

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/12/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
19.42	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/12/2021	Portland Cement	1.5 bags	47lbs/bag

Comments
Two bollards and one concrete pad remain in place.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 09:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:42:37 -05'00'	02/26/2021

SRNS-RP-2021-00649
Revision 1
Page 3 of 31

QSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F1-3

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/12/2021	No longer needed for soil vapor extraction (SVE)
Total Abandoned Footage	**Geophysical Logs (If applicable, list.)**
23.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/12/2021	Portland Cement	1.5 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 09:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	**Signature**	**Date**
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:43:48 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F1-4

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/12/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
27.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/12/2021	Portland Cement	2 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 09:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:44:07 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F11-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)
Total Abandoned Footage	Geophysical Logs (If applicable, list.)
11.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:43:45-05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:44:11-05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F11-2

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
14.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1.5 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 09:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:44:05 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F11-3

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
19.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1.5 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 09:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:44:20 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F11-4

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
24.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	2 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 09:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:44:04 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F12-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
13.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 02:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:40:08 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F12-2

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
17.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1.5 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:45:19 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F12-3

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
21.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1.5 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:40:37 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F12-4

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
24.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	2 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:40:40 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F13-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
13.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:45:08 -05'00'	02/26/2021

SRNS-RP-2021-00649
Revision 1
Page 14 of 31

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F13-2

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)
Total Abandoned Footage	**Geophysical Logs (If applicable, list.)**
15.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1.5 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:43:45 -05'00'	02/25/2021
Site Inspected By (Print)	**Signature**	**Date**
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:46:11 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F13-3

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
17.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	1.5 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:40:24 -05'00'	02/26/2021

SRNS-RP-2021-00649
Revision 1
Page 16 of 31

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
F13-4

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)
Total Abandoned Footage	Geophysical Logs (If applicable, list.)
19.33	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	2 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:26:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:46:38 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
MVE012

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/12/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
45.7	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/12/2021	Portland Cement	2 bags	47lbs/bag

Comments
Four bollards and one concrete pad remain in place.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:40:50 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
P1-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/12/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
30	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/12/2021	Portland Cement	0.5 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:47:03 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
P1-2

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/12/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
36	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/12/2021	Portland Cement	0.5 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 07:41:54 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
P11-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
28	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	0.5 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 07:27:49 -05'00'	02/26/2021

SRNS-RP-2021-00649
Revision 1
Page 21 of 31

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
P11-2

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
36	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	0.5 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 07:47:20 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
P12-2

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
31	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	0.5 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 07:47:57 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
P13-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)
Total Abandoned Footage	Geophysical Logs (If applicable, list.)
26	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	0.5 bag	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:26:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:48:01 -05'00'	02/26/2021

SRNS-RP-2021-00649
Revision 1
Page 24 of 31

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
SVE1-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/12/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
115	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/12/2021	Portland Cement	12 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:48:16 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
SVE11-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
115	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	12 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:48:30 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
SVE12-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)

Total Abandoned Footage	Geophysical Logs (If applicable, list.)
105	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	12 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.25 08:28:43 -05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:48:43 -05'00'	02/26/2021

OSR 30-29 (Rev. 07-23-2019)
Page 1 of 1

Well Abandonment Report

Proc. Ref. 3Q1-9010

Well Number
SVE13-1

Project Name	Project Manager	Location Description
A/M Area Well Abandonments	Joao Cardoso	A/M Area

Driller Name/Company/Certification No.	Oversight Name/Company
Donald Myles / Cascade Environmental / 2232	Bryce Garner / SRNS

Date Well Abandoned	Reason for Abandonment
1/13/2021	No longer needed for soil vapor extraction (SVE)
Total Abandoned Footage	Geophysical Logs (If applicable, list.)
105	

Abandonment Method
☒ Pumping/Pouring Grout ☐ Pressure Grout ☐ Perforate Casing/Grout ☐ Over Ream ☐ Drill Out

Other Method (Describe)

	Date	Grout Type	Quatity (Bags, Yds, Etc.)	Weight (If Applicable)
Grout	1/13/2021	Portland Cement	12 bags	47lbs/bag

Comments
One concrete pad remains in place. There were no previously existing bollards.

Report Prepared By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:43:45-05'00'	02/25/2021
Site Inspected By (Print)	Signature	Date
Bryce Garner	Bryce Garner Digitally signed by Bryce Garner Date: 2021.02.26 09:46:46-05'00'	02/26/2021

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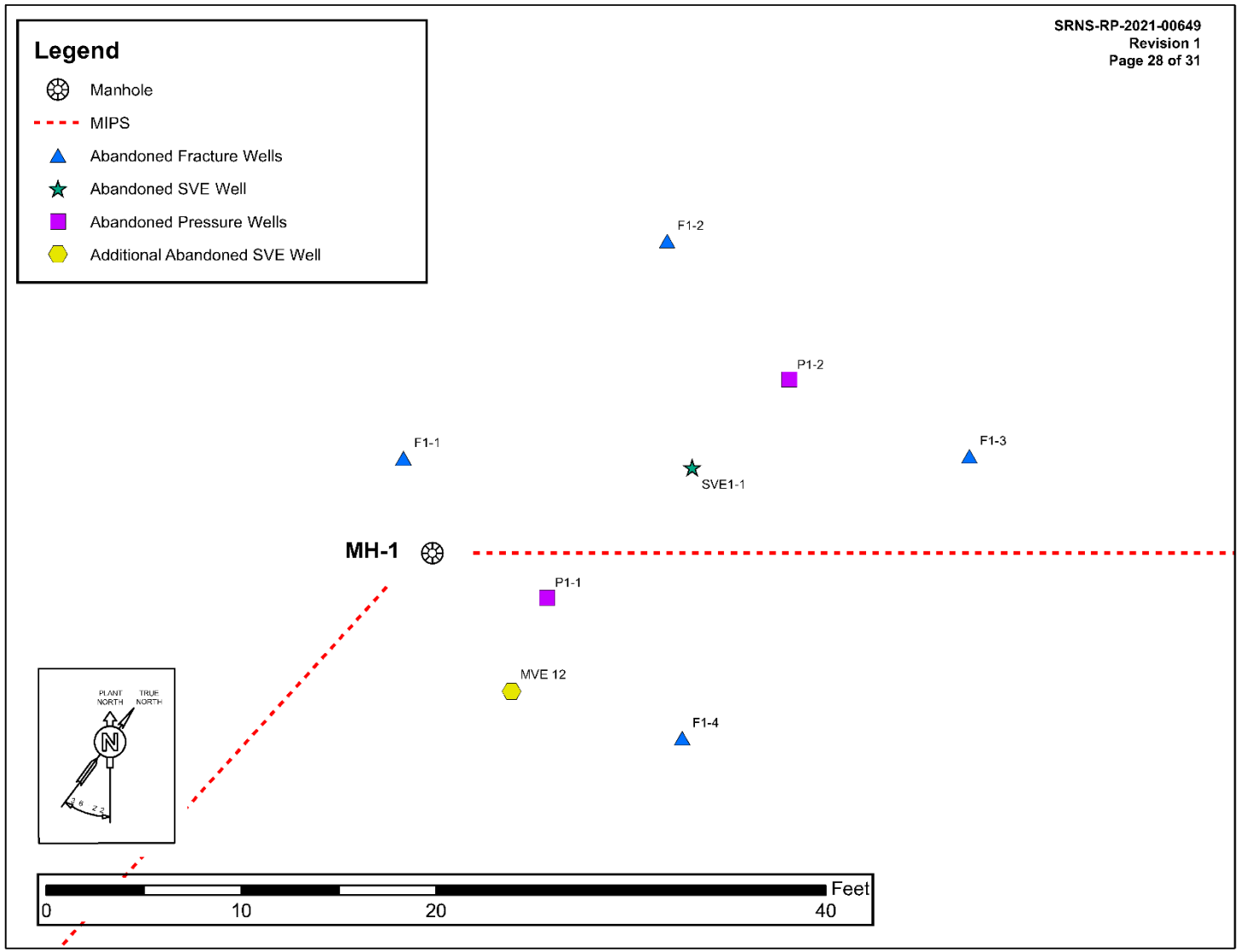

Figure C-1. MH-01 and Surrounding Wells

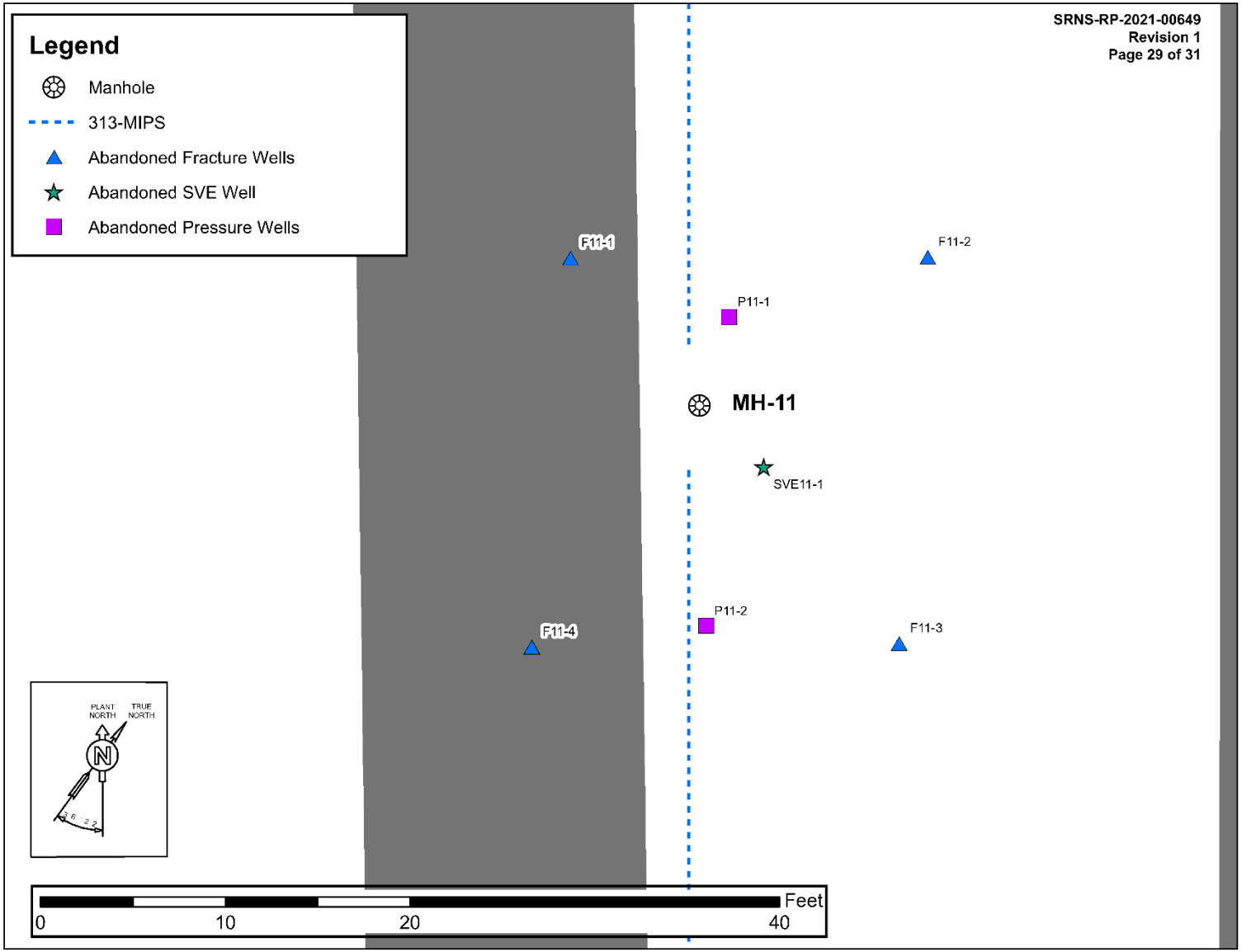

Figure C-2. MH-11 and Surrounding Wells

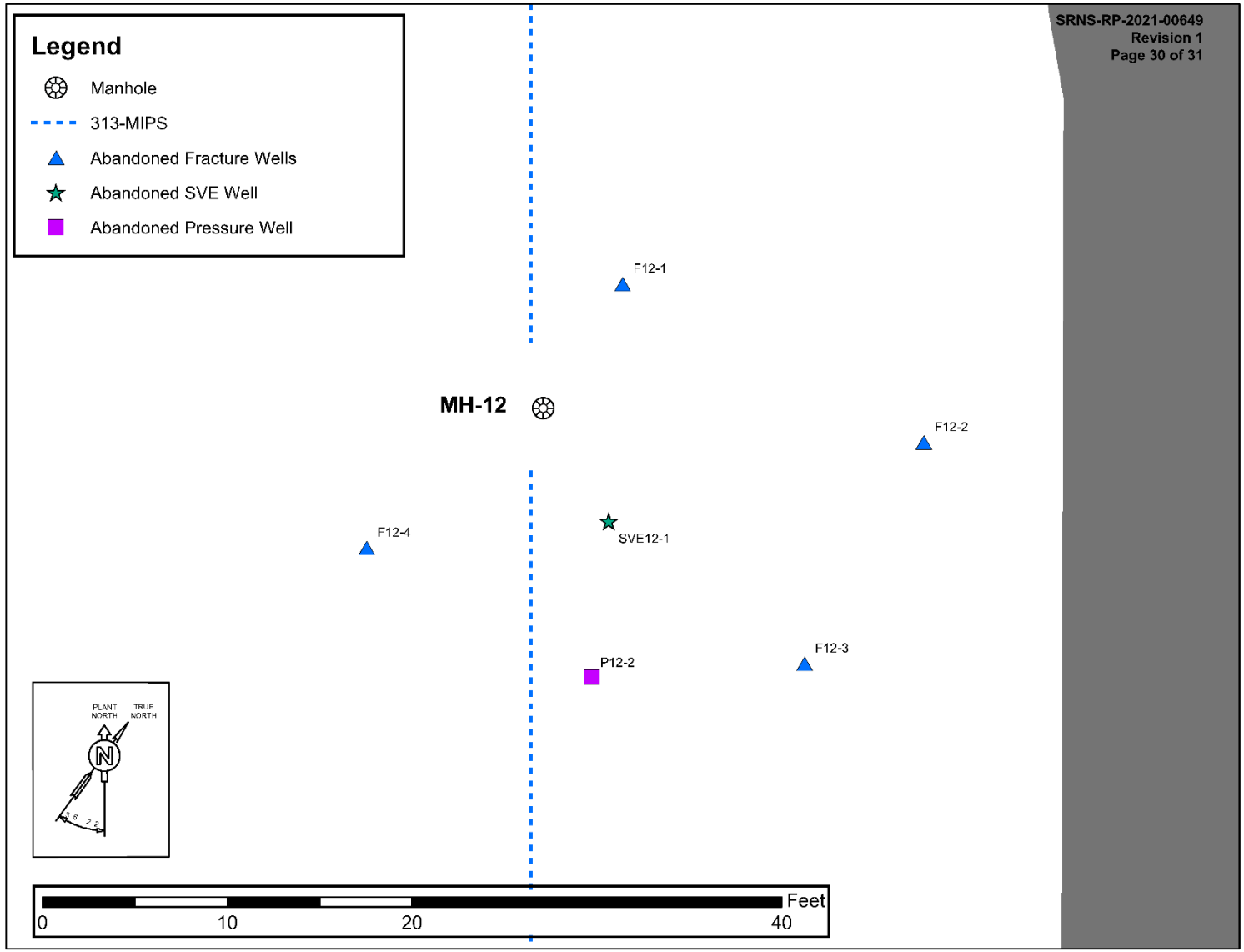

Figure C-3. MH-12 and Surrounding Wells

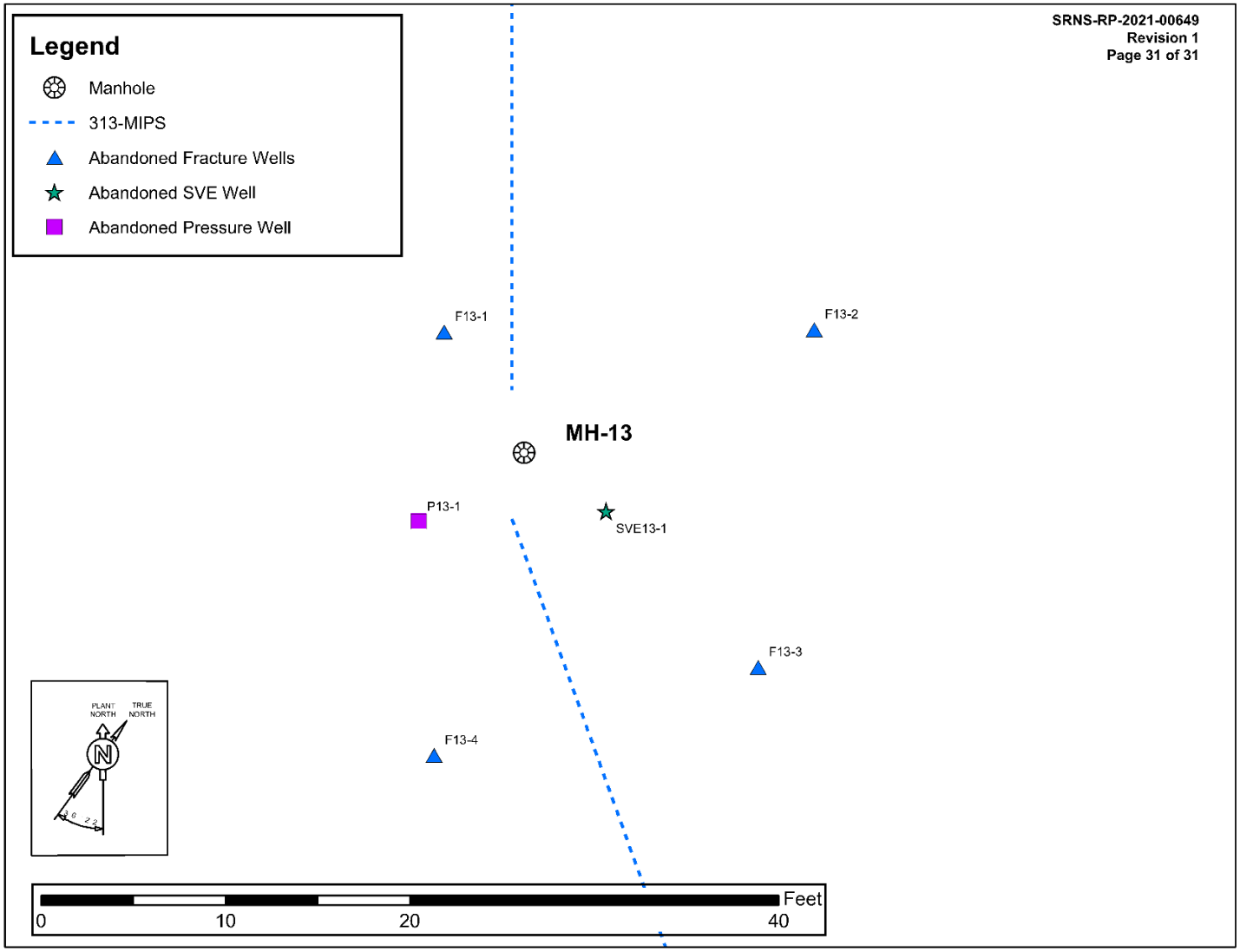

Figure C-4. MH-13 and Surrounding Wells