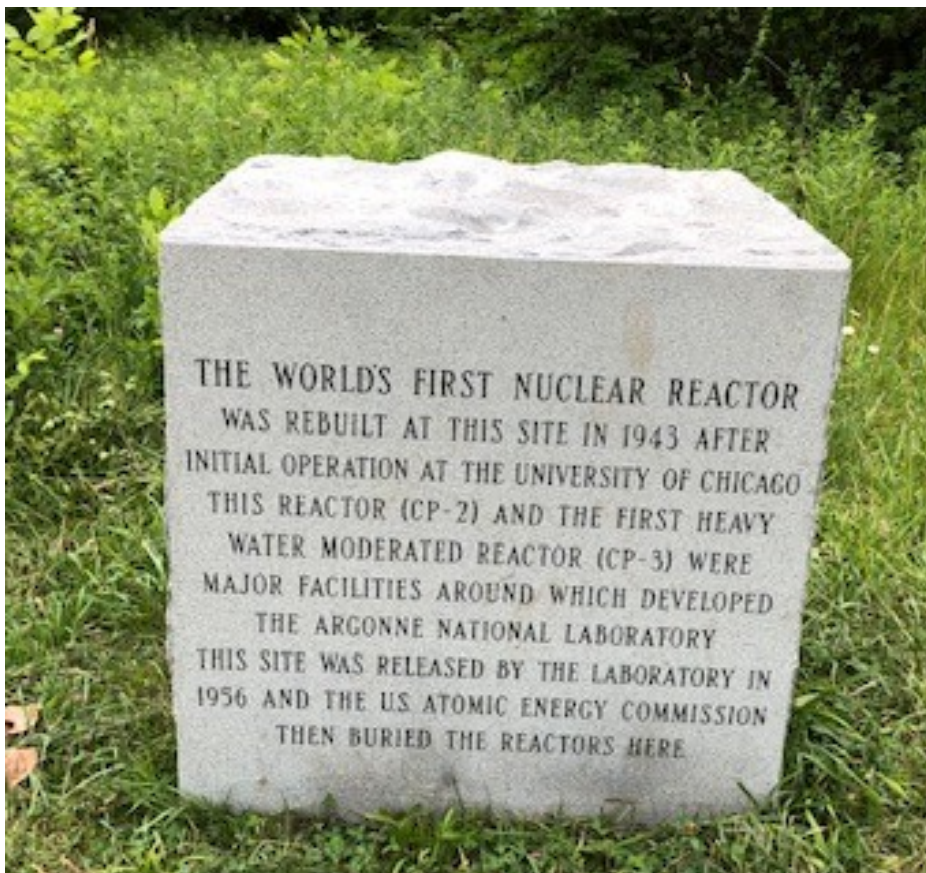


Inspection Status Report of Site A/Plot M

Report for 2023

Environment, Safety, and Health Directorate



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2023 Inspection Status Report of Site A/Plot M

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September 2023

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2023 SITE INSPECTION REPORT FOR SITE A AND PLOT M

1.0 EXECUTIVE SUMMARY

The Site A/Plot M Decommissioned Reactor Site was inspected on June 6, 2023. Site A/Plot M is in the Palos Area Preserves, operated by the Forest Preserve District of Cook County. The site was found to be in good condition with negligible erosional concerns across the grass covered mound at Plot M. Landscaping timbers installed along the footpath of Plot M have been effective in reducing erosion down the eastern slope, thus, no additional timber steps are needed at this time. The bike trail, installed by Cook County Forest Preserve, located to the south and east of Plot M has helped to significantly reduce traffic at the site. The Site A and Plot M monuments were both replaced on May 1, 2021, and remain in good condition, despite a small amount of graffiti observed on both monuments at the time of the inspection. The 19 groundwater monitoring wells at Site A/Plot M were found to be secure and in good condition.

Argonne National Laboratory (Argonne) prepares an annual report titled “Surveillance of Site A and Plot M”, which contains monitoring results and independent analysis of samples conducted by the Illinois Emergency Management Agency (IEMA). The results indicate the radioactivity remaining at Site A/Plot M does not pose a risk to the health or safety of the public visiting the site, using the picnic areas, bike trails, or living in the vicinity. Argonne continues to monitor the sites on a quarterly schedule as directed by the U.S. Department of Energy Office of Legacy Management (DOE-LM).

During the May 2018 Annual Inspection, increased erosion was noted along the path from the northeast corner of Plot M heading down towards the creek. Twelve timber steps were installed by Argonne during the Summer 2018 to reduce erosion along the northeast trail. In 2020, four additional timber steps were installed on the steep, top portion of the northeast trail. During the Spring of 2023, additional erosion control measures at this location, such as the addition of clay and topsoil, grass seeding, followed with the placement of biodegradable turf netting, were carried out by Argonne personnel. At the time of the inspection, it was observed that the installation of the additional timber steps and erosion control measures has been effective in reducing erosion along this trail.

2.0 INTRODUCTION

2.1 Annual Inspection Background

This report presents the findings of the 2023 annual inspection of the Site A/Plot M, Illinois, Decommissioned Reactor Site at the Palos Forest Preserve in Cook County, Illinois. Features and photographed locations discussed in this report are shown in Sections 4.0 and 6.0.

Argonne conducted the site inspection on June 6, 2023. The DOE-LM contracts directly with Argonne for all environmental sampling, analysis, and reporting. This DOE-LM site located in a Cook County Forest Preserve is open to the public and was found to be in good condition as documented in this inspection report.

2.2 Site History

Site A/Plot M was the former site of Argonne and its predecessor, the University of Chicago's Metallurgical Laboratory. The site was part of the World War II Manhattan Engineer District Project and was located in a forested area southwest of Chicago, IL, currently owned by the Forest Preserve District of Cook County, now known as the Palos Area Preserves. Research was conducted at two locations in the Palos Area Preserves. The location of the Palos Area Preserves is shown in Figure 2.1. The locations of Site A and Plot M are shown in Figure 2.2.

Site A is a 19-acre area that contained experimental laboratories and nuclear reactor facilities; Plot M, is a 150 ft x 140 ft area used for the burial of radioactive waste. Operations at Site A began in 1943 and ceased in 1954. Among the research programs carried out at Site A were reactor physics studies, fission product separations, hydrogen-3 recovery from irradiated lithium, and work related to the metabolism of radionuclides in laboratory animals. Radioactive waste and radioactively contaminated laboratory articles from these studies were buried at Plot M. At the termination of the programs, the reactor fuel and heavy water, used for neutron moderation and reactor cooling, were removed and shipped to Oak Ridge National Laboratory. The biological shield for the CP-3 reactor located at Site A, together with various pipes, valves, and building debris, was buried in place in 1956. Currently at Site A, the only structures visible are the stone monument, information signage, a remnant of the original chain-link fence, fence post sections, and the remaining two groundwater monitoring wells.

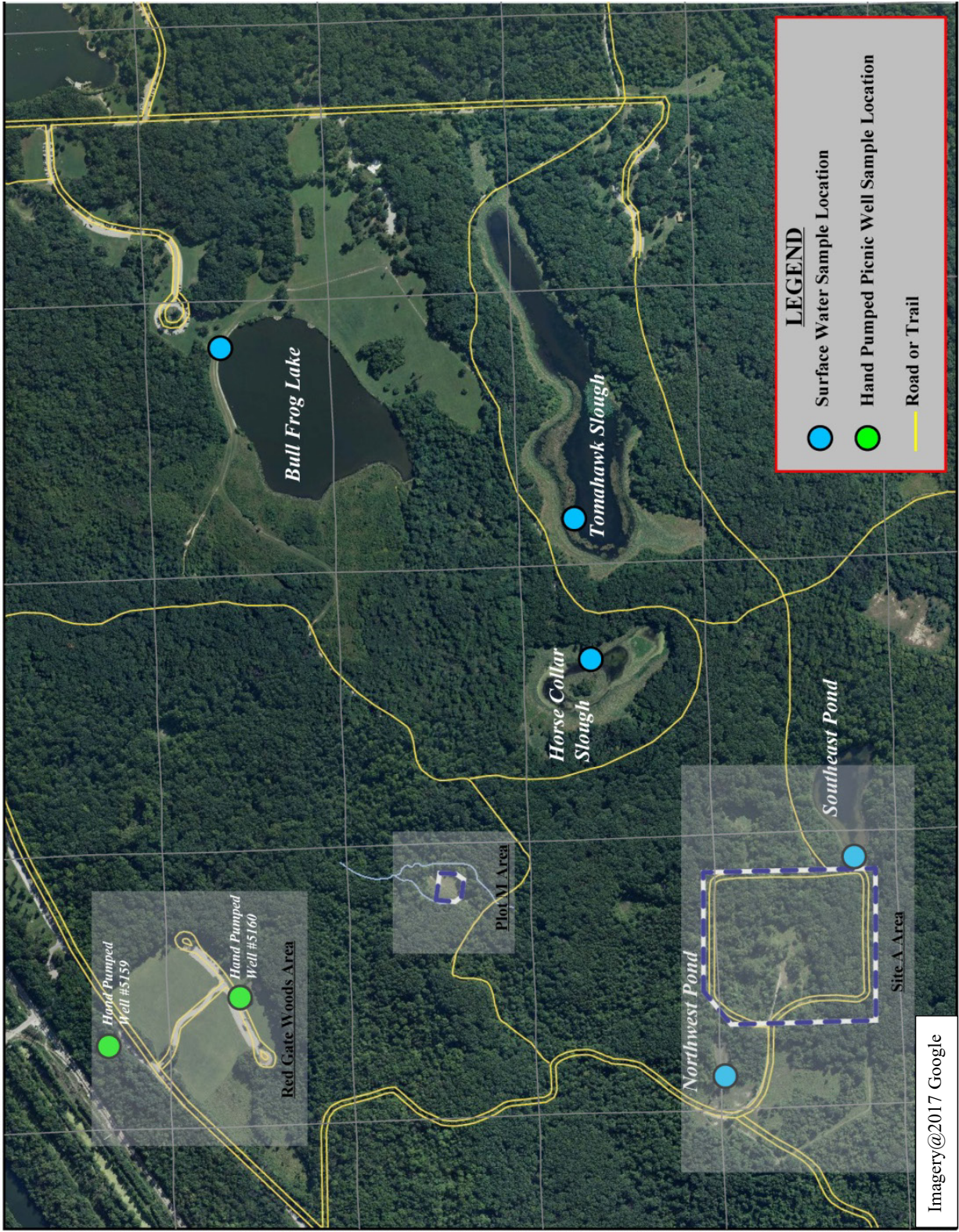


Figure 2-2 Site A/Plot M Area Map

Geologically, Plot M is constructed on a moraine upland which is dissected by two valleys, the Des Plaines River valley to the north and the Calumet Sag valley to the south. The upland is characterized by rolling terrain with poorly developed drainage. Streams are intermittent and either drain internally or flow to one of the valleys. The area is underlain by glacial drift, dolomite, and other sedimentary rocks. The uppermost bedrock is Silurian dolomite, into which both the picnic wells and some of the monitoring wells are placed. The dolomite bedrock is about 200 feet thick. The overlying glacial drift has a thickness that ranges from 165 feet at Site A to zero at the Des Plaines River and Calumet Sag Canal. The boreholes terminate in this layer of overlying glacial drift. The depth to bedrock at Plot M is about 130 feet.

Hydrologically, the surface water consists of ponds and intermittent streams. When there is sufficient precipitation, an intermittent stream flows past Plot M, continues near the Red Gate Woods picnic well (#5160 in Figure 2.2), and eventually discharges into the Illinois and Michigan (I&M) Canal. The groundwater in the glacial drift and dolomite bedrock forms two distinct flow systems. The flow of groundwater in the drift is controlled principally by topography. The groundwater in the dolomite, which is recharged by groundwater migrating downward through the glacial drift, flows toward two discharge areas, the Des Plaines River to the north and the Calumet Sag Canal to the south. There is no groundwater usage downgradient of Site A/Plot M. The former hand-pumped picnic wells have been disabled by removing the handles. These wells are currently used only for groundwater monitoring.

3.0 ENVIRONMENTAL MONITORING PROGRAM

The environmental monitoring program at Site A/Plot M is conducted in accordance with the “Long-Term Surveillance and Maintenance Plan for Site A and Plot M, Palos Forest Preserve, Cook County, Illinois”, issued in January 2015 by DOE-LM. DOE-LM conducts stewardship activities at Site A and Plot M to protect human health and the environment, facilitate stakeholder involvement, and to comply with applicable regulations. DOE-LM carries out its stewardship responsibilities through a combination of government ownership, conducting regular inspections, maintaining institutional controls, facilitating public awareness, and monitoring environmental media.

The Site A/Plot M environmental monitoring program follows the guidance for monitoring stated within the Long-Term Surveillance and Maintenance Plan, Site A and Plot M, Palos Forest Preserve, Cook County, Illinois, January 2015, DOE-LM, and stated within the Statement of Work - Argonne Technical Support for Site A/Plot M, DOE-LM Work Authorization MILM00142 for Argonne.

The monitoring program is designed to assess the concentration of hydrogen-3 and strontium-90 in groundwater near these sites, and to monitor hydrogen-3 in two of the former picnic wells in Red Gate Woods and several surface water locations in the vicinity. This is accomplished by analyzing water samples collected from groundwater wells and surface water bodies. Sampling locations are shown in Figures 4.2 through 4.5 and listed in Table 3-1.

Table 3-1 Environmental Monitoring Program for Site A and Plot M

Location name	Frequency – Hydrogen-3	Frequency – Strontium-90
Site A – Groundwater from monitoring wells in glacial drift		
BH55	Annual	Annual
BH56	Annual	Annual
Site A region – surface water ponds		
Northwest Pond	Annual	NSR
Southeast Pond	Annual	NSR
Bull Frog Lake	Annual	NSR
Horse Collar Slough	Annual	NSR
Tomahawk Slough	Annual	NSR
Plot M - Groundwater from monitor wells in glacial drift		
BH02	Quarterly	Annual
BH03	Quarterly	Annual
BH04	Quarterly	Annual
BH06	Quarterly	Annual
BH09	Quarterly	Annual
BH10	Quarterly	Annual
BH11	Quarterly	Annual
BH26	Quarterly	Annual
BH35	Quarterly	Annual
Red Gate Woods – Groundwater from monitor wells in dolomite		
DH03	Annual	NSR
DH04	Annual	NSR
DH11	Annual	NSR
DH12	Annual	NSR
DH14	Annual	NSR
DH15	Annual	NSR
Red Gate Woods - Groundwater from former picnic wells in dolomite		
5159	Annual	NSR
5160	Annual	NSR
Plot M - Surface Water		
Location 1	Quarterly	NSR
Location 6	Quarterly	NSR
Location 7	Quarterly	NSR
Location 8	Quarterly	NSR

NSR = No Sample Required

4.0 INSPECTION RESULTS

Two employees from Argonne conducted the annual site inspection (Figure 4-1) of Site A and Plot M. Additionally, two representatives from the IEMA, and one individual representing a contractor for DOE-LM, who was concurrently conducting a Federal Inventory Management System (FIMS) Survey of Site A/Plot M, were in attendance. Representatives from DOE-LM were not in attendance, in addition to other invited stakeholders.

The inspection was conducted in accordance with the Long-Term Surveillance and Maintenance Plan, Site A and Plot M, Palos Forest Preserve, Cook County, Illinois (LMS/SAM/S01063, January 2015). The purposes of the inspection were to look for evidence that the integrity of the disposal site is not threatened, evaluate the condition of the monuments, locate and assess the condition of the Plot M corner markers, determine whether maintenance is needed, and examine the condition of the DOE-LM monitoring wells.

The inspectors from Argonne and the attendees convened at the Red Gate Woods parking area at 0900 hours on June 6, 2023, and reviewed the Plan of the Day and Job Safety Analysis. Figure 4-1 shows the Site A/Plot M 2023 Annual Inspection Sign-In Sheet. Maps containing the locations of the inspection areas, as shown in Figures 4-2 through 4-5, were distributed to the attendees. Conditions were mostly sunny, unseasonably warm and dry, and due to overgrowth, trip hazards and uneven ground conditions were discussed prior to advancing towards the monitoring wells. During the inspection, photographs were taken by the Argonne inspection team of various monitoring wells, and the monuments at Site A and Plot M.

4.3 Red Gate Woods

Six dolomite wells, shown in Photographs P12-P17, were all locked and intact and in good condition with all well numbers on the outer casing. Argonne personnel are keeping the Red Gate Woods monitoring wells secure and in good condition.

4.4 Plot M

All groundwater wells at Plot M were locked and intact and found to be in good condition. During the inspection, Argonne noted that the identification found on the well cap to BH26 was absent. Immediate action by Argonne involved re-painting and affixing a new label to the BH26 well cap. This was cited as an improvement opportunity, and further discussed in Section 5.0 of

this report. Photographs P01 through P09 show the various monitoring wells at Plot M. Argonne personnel are keeping the Plot M monitoring wells secure and in good condition.

Six wells cased into the dolomite bedrock are located downgradient of Plot M. One of the dolomite wells is located near Plot M, and five are located north of Plot M in the Red Gate Woods area, as shown in Figure 4.5. The two dolomite wells, DH03 and DH04, are located close to and downgradient of Plot M. All six of these wells are shown in photographs P12 through P17.

During the time of the inspection, Plot M surface water flow was nonexistent from the four sampling locations along the two stream beds that flow around Plot M, shown in Figure 4.1. Location 1 is upstream of the Plot M area. Locations 6, 7, and 8 are immediately north and downstream of Plot M.

The Plot M monument was replaced in May 2021. Several letters had been chiseled off the old monument by vandals as reported several years ago. Photographs P18 and P19 show the new monument at Plot M; it remains in good condition. During the inspection, graffiti, which appeared to be made using charcoal, was observed on the rear face of the Plot M monument. Noted as an improvement opportunity, and further discussed in Section 5.0 of this report, Argonne will remove the graffiti. All six corner markers of Plot M were located during the inspection and found to be in good condition. Photograph P20 shows one of the Plot M corner markers, with the Plot M monument in the distant background. Erosion controls have been reasonably effective with the addition of four additional landscape timbers installed in 2020 along the north trail. Argonne conducts quarterly maintenance reviews of the cap and north trail. Photograph P21 shows the terraced steps along the eastern slope of Plot M. Photograph P22 shows erosion control measures recently carried out by Argonne in the Spring of 2023.

4.5 Site A

The locations of the two groundwater wells at Site A are shown in Figure 4.4. Both wells, BH55 and BH56, were found to be locked and intact and in good condition, with the well numbers visible on the outer casing. Photographs P10 and P11 show the two monitoring wells, BH55 and BH56, respectively, at Site A. Argonne personnel are keeping the two monitoring wells secure and in good condition at Site A.

The Site A monument was replaced in May 2021. Visible cracks were present in the old monument. Photographs P23 and P24 show front and rear views, respectively, of the new monument at Site A, which remains in good condition. At the time of the inspection, a small amount of graffiti, which appeared to be made using charcoal, was observed on the front and near the top surface of the Site A monument. Argonne identified this as an improvement opportunity and is further discussed in Section 5.0 of this report.

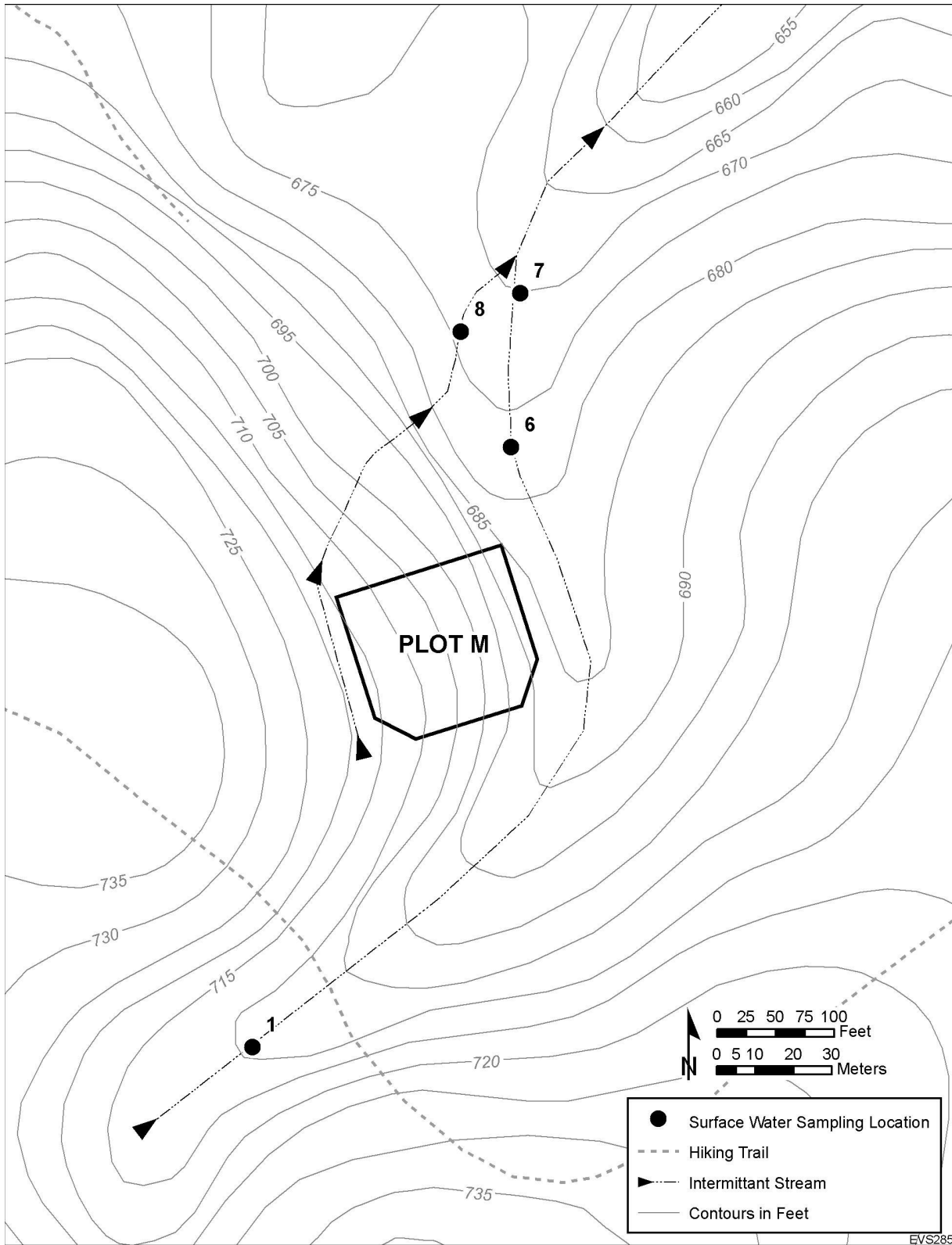


Figure 4-2 Stream Sampling Locations Near Plot M

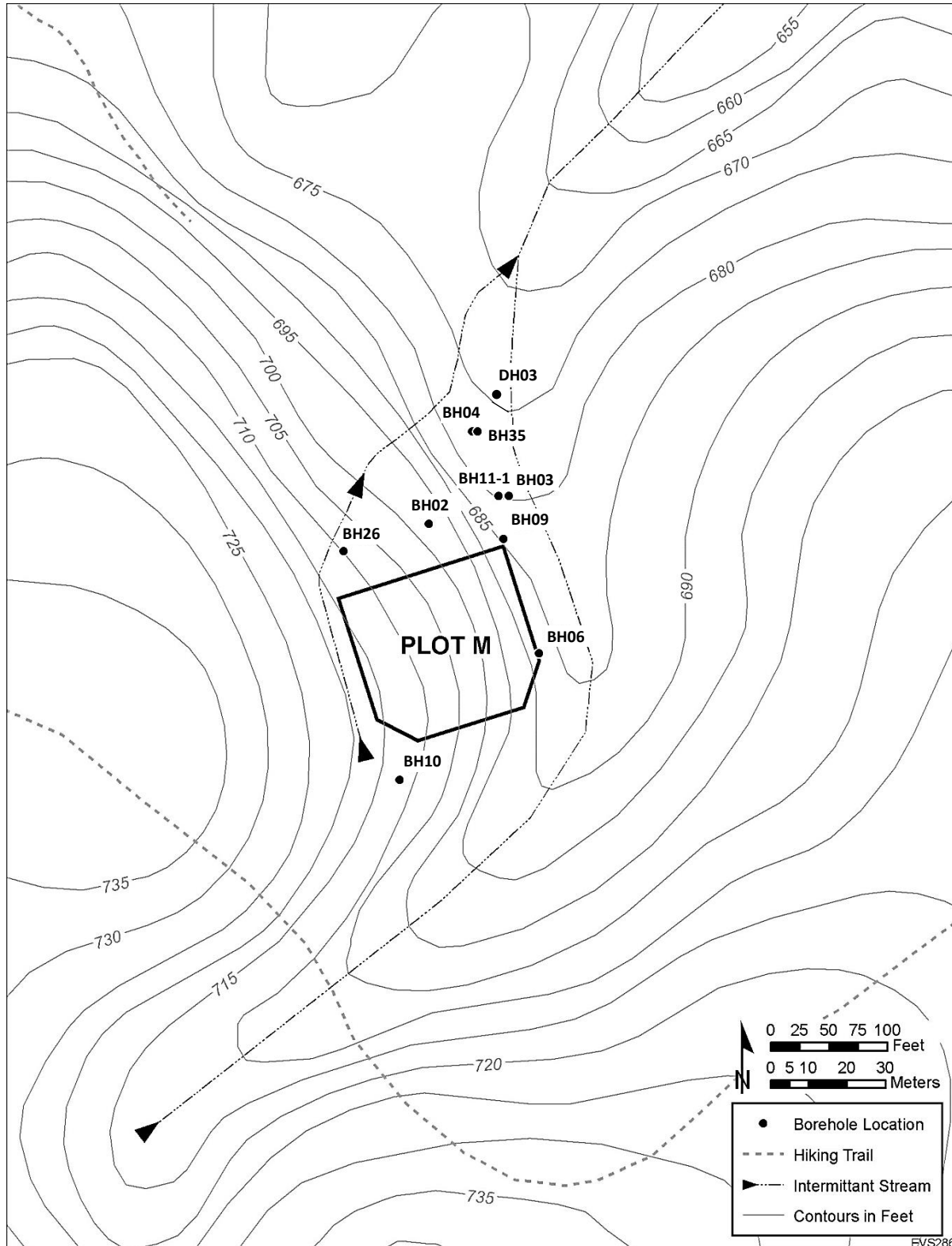
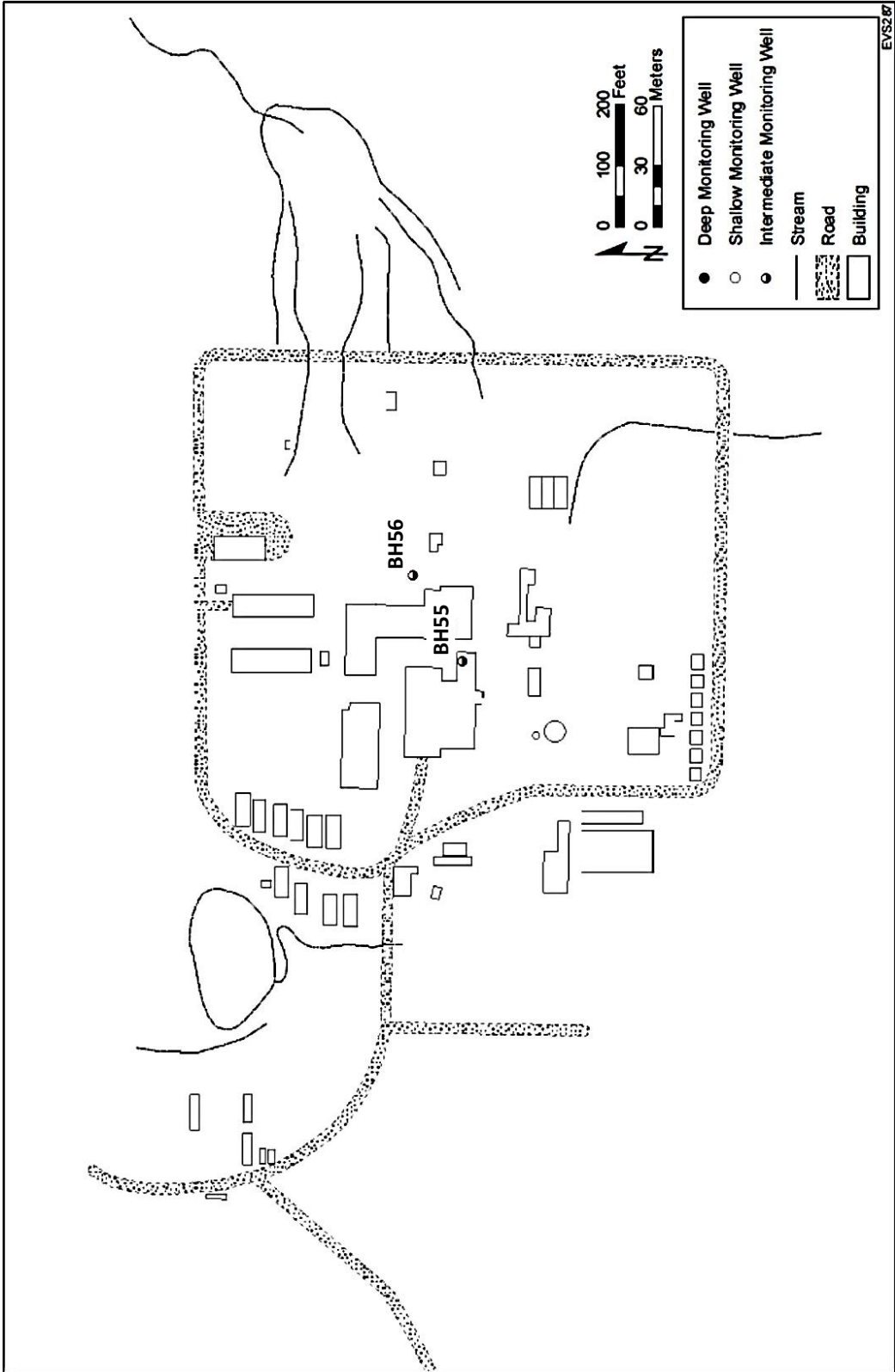


Figure 4-3 Map of Plot M Site



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Figure 4-4 Monitoring Wells at Site A

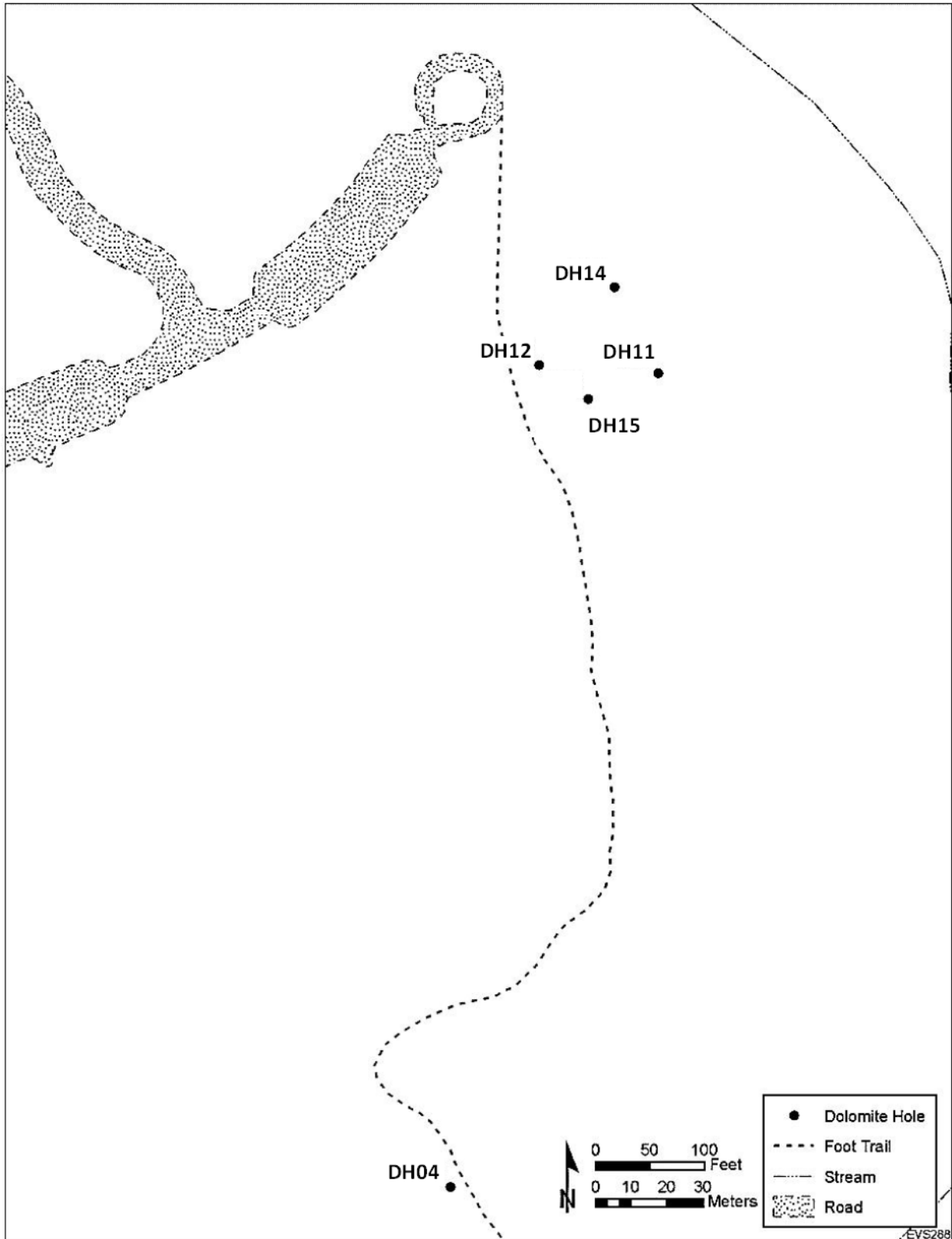


Figure 4-5 Locations of Dolomite Wells North of Plot M

5.0 ISSUES, IMPROVEMENT OPPORTUNITIES, AND CORRECTIVE ACTIONS

1. **Improvement Opportunity #1:** At the time of the inspection, the rear of the Plot M monument was observed to have been tagged with graffiti, which appeared to be made using charcoal.

Corrective Action: Argonne personnel will remove the graffiti from the rear of the Plot M monument prior to November 1, 2023.

2. **Improvement Opportunity #2:** Repaint and/or affix a new label to Plot M well cap BH26.

Corrective Action: Argonne personnel repainted the label and affixed a new label to properly identify the Plot M monitoring well BH26, at the time of the inspection.

3. **Improvement Opportunity #3:** During the inspection, the front, near the top surface, of the Site A monument was observed to have been tagged with graffiti, which appeared to be made using charcoal.

Corrective Action: Argonne personnel will remove the graffiti from the front of the Site A monument prior to November 1, 2023.

The results of the CY2023 annual inspection cited three improvement opportunities, as noted above. The inspection results will be entered into the PRISM database, Argonne's online management tool for tracking and trending issues, opportunities for improvement, assessments, inspections, and tracked to completion.

6.0

PHOTOGRAPHS

Photograph Number	Photograph Location and Description. <i>Photos were taken at the time of the inspection.</i>
P01	Monitoring Well BH2 at Plot M
P02	Monitoring Well BH04 at Plot M
P03	Monitoring Well BH06 at Plot M
P04	Monitoring Well BH9 at Plot M
P05	Monitoring Well BH10 at Plot M
P06	Monitoring Well BH11A at Plot M
P07	Monitoring Well BH26 (Before) at Plot M
P08	Monitoring Well BH26 (After) at Plot M
P09	Monitoring Well BH35 at Plot M
P10	Monitoring Well BH55 at Site A
P11	Monitoring Well BH56 at Site A
P12	Monitoring Well DH3 at Red Gate Woods
P13	Monitoring Well DH4 at Red Gate Woods
P14	Monitoring Well DH11 at Red Gate Woods
P15	Monitoring Well DH12 at Red Gate Woods
P16	Monitoring Well DH14 at Red Gate Woods
P17	Monitoring Well DH15 at Red Gate Woods
P18	Plot M Monument, Front View
P19	Plot M Monument, Rear View, with IEMA Representatives in Background
P20	Plot M Corner Marker with Monument in Distant Background
P21	Terraced Steps Along Eastern Slope of Plot M
P22	Erosion Control Application at Plot M
P23	Site A Monument, Front View
P24	Site A Monument, Rear View, with IEMA Representatives in Background



P01 - Monitoring Well BH2 at Plot M



P02 – Monitoring Well BH04 at Plot M



P03 – Monitoring Well BH06 at Plot M



P04 – Monitoring Well BH9 at Plot M



P05 - Monitoring Well BH10 at Plot M



P06 – Monitoring Well BH11A at Plot M



P07- Monitoring Well BH26 (Before) at Plot M



P08 - Monitoring Well BH26 (After) at Plot M



P09 – Monitoring Well BH35 at Plot M



P10 – Monitoring Well BH55 at Site A



P11 – Monitoring Well BH56 at Site A



P12 - Monitoring Well DH3 at Red Gate Woods



P13 - Monitoring Well DH4 at Red Gate Woods



P14 – Monitoring Well DH11 at Red Gate Woods



P15 – Monitoring Well DH12 at Red Gate Woods



P16 – Monitoring Well DH14 at Red Gate Woods



P17 – Monitoring Well DH15 at Red Gate Woods



P18 - Plot M Monument, Front View



P19 – Plot M Monument, Rear View, with IEMA Representatives in Background



P20 – Plot M Corner Marker with Monument in Distant Background



P21 – Terraced Steps Along Eastern Slope of Plot M



P22 – Erosion Control Application at Plot M



P23 – Site A Monument, Front View



P24 – Site A Monument, Rear View, with IEMA Representatives in Background



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