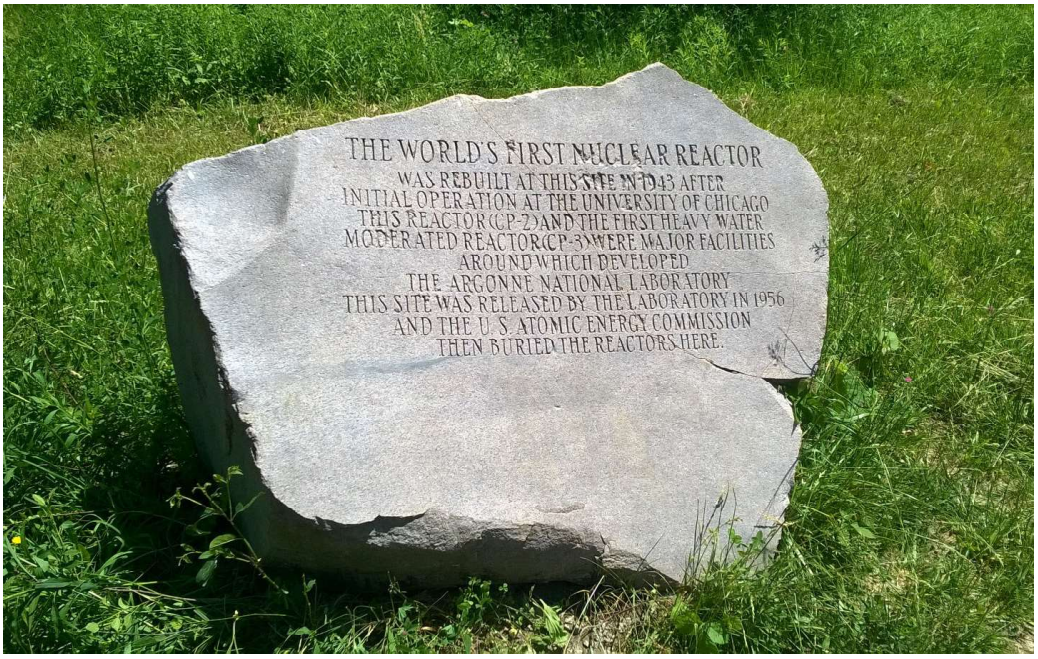
ANL-22/03

# Inspection Status Report of Site A/Plot M

*Report for 2022*

Environment, Health, and Safety Directorate



**ANL-22/03**

# Inspection Status Report of Site A/Plot M

*Report for 2022*

prepared by
Gerald A. Baudino

Environment, Health, and Safety Directorate, Argonne National Laboratory

November 2022

## TABLE OF CONTENTS

## LIST OF TABLES



## LIST OF FIGURES

# 2022 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 14, 2022. Site A/Plot M is located 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 excellent condition at the time of the inspection. No cause for a follow-up inspection of the monuments was identified at this time.

The 17 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. The installation of these timber steps has been effective in reducing erosion along this trail.

## 2.0 INTRODUCTION

### 2.1 Annual Inspection Background

This report presents the findings of the 2022 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 14, 2022. 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.

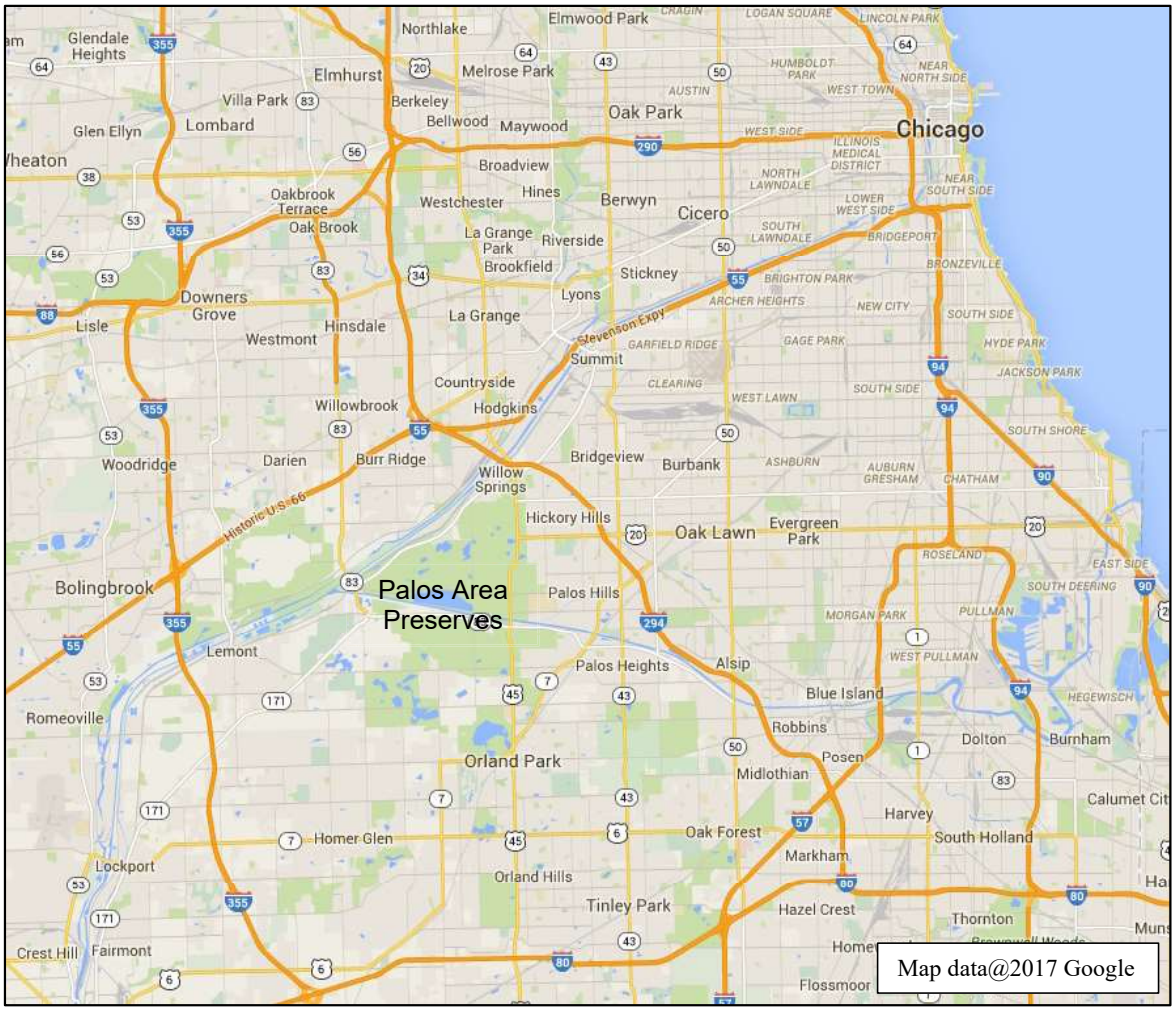



**Figure 2-1 Location of Palos Area Preserves**

Burial of radioactive waste at Plot M began in 1944 and was discontinued in 1949. Waste was buried in six-foot deep trenches and covered with soil until 1948, after which burial took place in steel bins. The steel bins were removed in 1949 and sent to Oak Ridge National Laboratory for disposal; however, the waste buried in trenches was allowed to remain in place. Concrete sidewalls, eight feet deep, were poured around the perimeter of the burial area and a one-foot-thick reinforced concrete slab was poured over the top. The concrete slab was covered with soil and seeded with grass. Both the Site A and Plot M areas were decommissioned in 1956. Currently at Plot M there is a granite monument and six stone corner markers, which denote the location of the corners of the concrete cap.

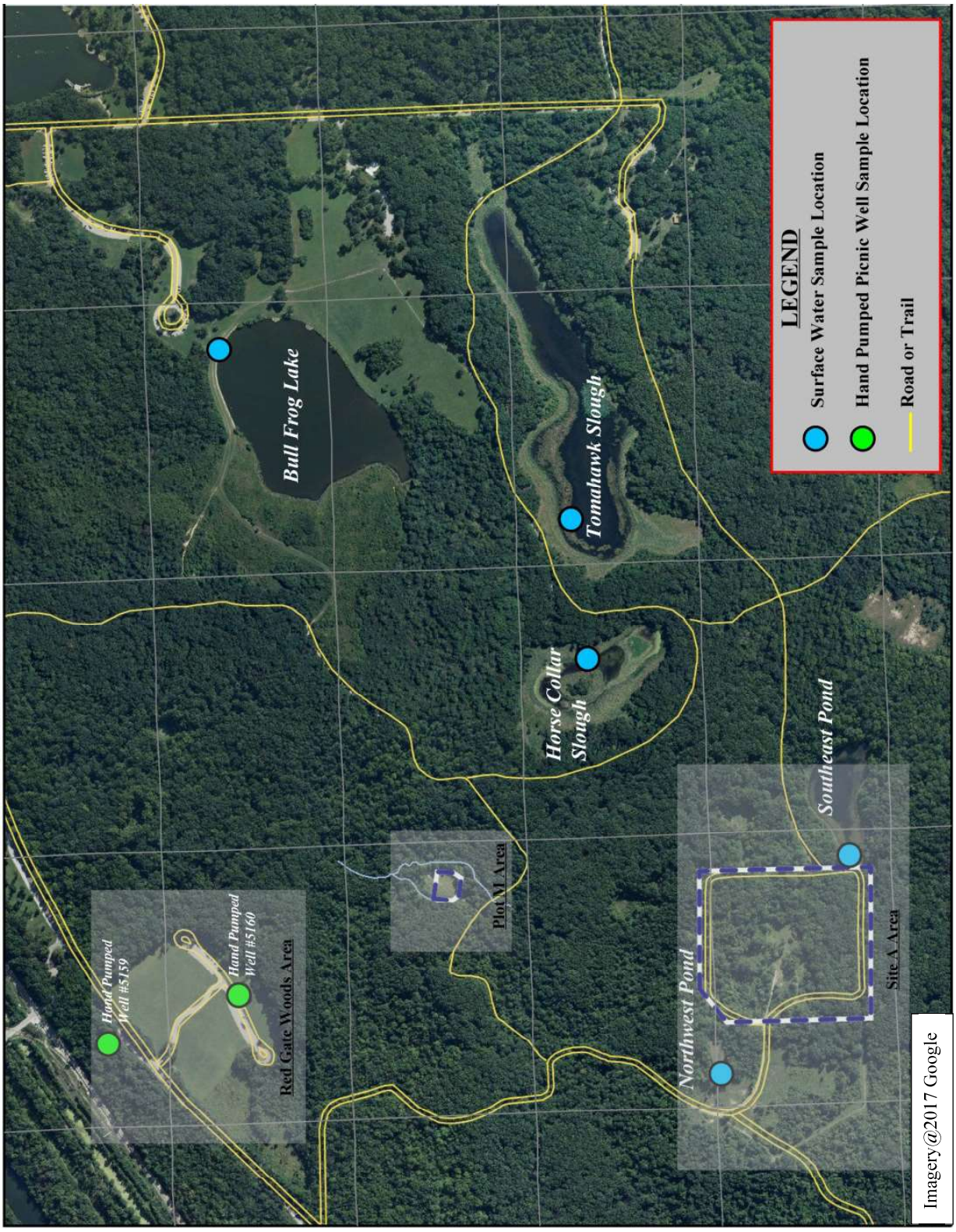



**Figure 2-2 Site A/Plot M Area Map**

## 2.3 Site Characteristics

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 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, and the boreholes terminate in this layer. 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 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.

Although Site A/Plot M is not an active DOE-LM facility, the same monitoring principles are applicable. 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, listed in the below 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

Employees from Argonne conducted the annual site inspection (Figure 4-1) of Site A and Plot M. Representatives from DOE-LM and the IEMA 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 convened at the Red Gate Woods parking area at 0900 hours on June 14, 2022, and reviewed the Plan of the Day and Job Safety Analysis. Conditions were 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 of the various monitoring wells, and the new monuments at Site A and Plot M.

### 4.3 Red Gate Woods

The former picnic well (#5160) does not have a pump handle, as shown in Photograph P15 (Section 6). Cook County Forest Preserve owns the well and removed the handle years ago because of fecal coliform found in the water. The fecal coliform originated from a nearby restroom facility, which has since been removed. Argonne uses a portable handle to collect the water sample. In 2020, it was found that the inner pump control rod was not functioning. At the request of Argonne, this handpump well was repaired in May 2021 by the Cook County Forest Preserve.

Four dolomite wells, shown in Photographs P11-P14, in addition to dolomite wells DH04 and DH11, were all locked and intact and in good condition. The paint designation on dolomite well DH11 has become faded. Noted as an improvement opportunity, with further discussion found within Section 5.0 of this report, Argonne will re-paint and/or affix a new label to the well cap for DH11. 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 with all well numbers on the outer casing. During a previous groundwater sampling event, Argonne noted that the well cap to BH35 had been forcibly removed. Immediate action by Argonne involved borrowing the well cap from BH2 and placing it on BH35. A new well cap was subsequently placed on BH2. Cited as an improvement opportunity, and further discussed in Section 5.0 of this report, Argonne will re-paint the label to the BH35 well cap. Photographs P01 through P07 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.

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 years ago. Photographs P17 and P18 show the new monument at Plot M; it remains in excellent condition. All six corner markers of Plot M were located during the inspection and found to be in good condition. Photograph P16 shows one of the Plot M corner markers in the foreground, with a location marker for well BH06 in the 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 P23 shows one of the Argonne inspectors, S. Miller, standing within the terraced timber steps along the eastern slope of Plot M.

## 4.5 Site A

Photograph P22 shows the information marker at the entrance to 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

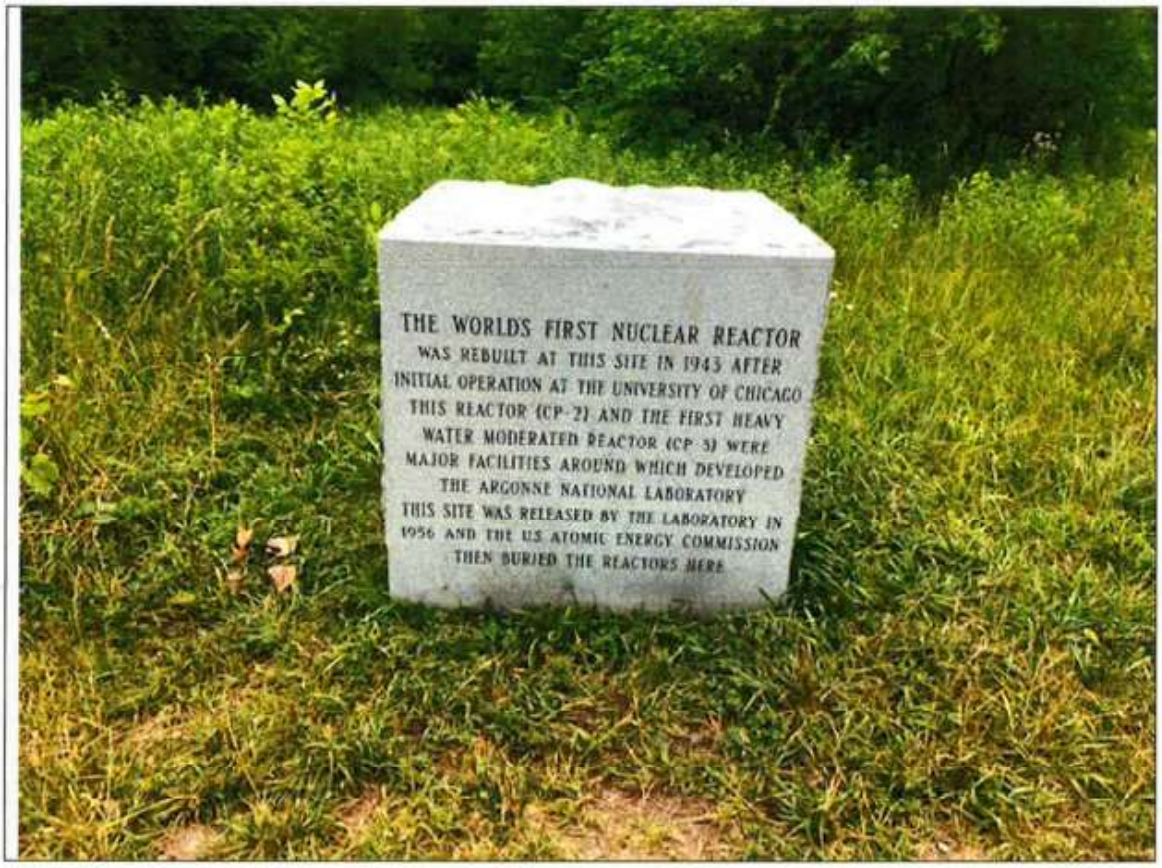
visible on the outer casing. Photographs P08 to P10 show the two monitoring wells, BH55 and BH56, at Site A. Argonne personnel are keeping the two monitoring wells secure and in good condition at Site A. Upon removal of the well cap from BH56, the Argonne inspectors noted an ant infestation within this well. Noted as an improvement opportunity, Argonne will attempt to mitigate the ant population from within this well, further discussed within Section 5.0 of this report.

The Site A monument was replaced in May 2021. Visible cracks were present in the old monument. Photographs P19 to P21 show the new monument at Site A, which remains in excellent condition.

**Site A/Plot M**

**CY2022 Annual Inspection**

**Tuesday, June 14, 2022. Commence at 0900 hours at Red Gate Woods Parking Lot.**




**SIGN IN SHEET**

| Name | Organization | E-mail | Contact Phone No. |
|---|---|---|---|
| Gerald F. Gaudino | ANL | gaudino@anl.gov | 630-252-7637 |
| Steve Miller | ANL | smiller@anl.gov | 630 252-6933 |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |
| | | | |

**Figure 4-1 2022 Site A/Plot M Annual Inspection Sign In Sheet**

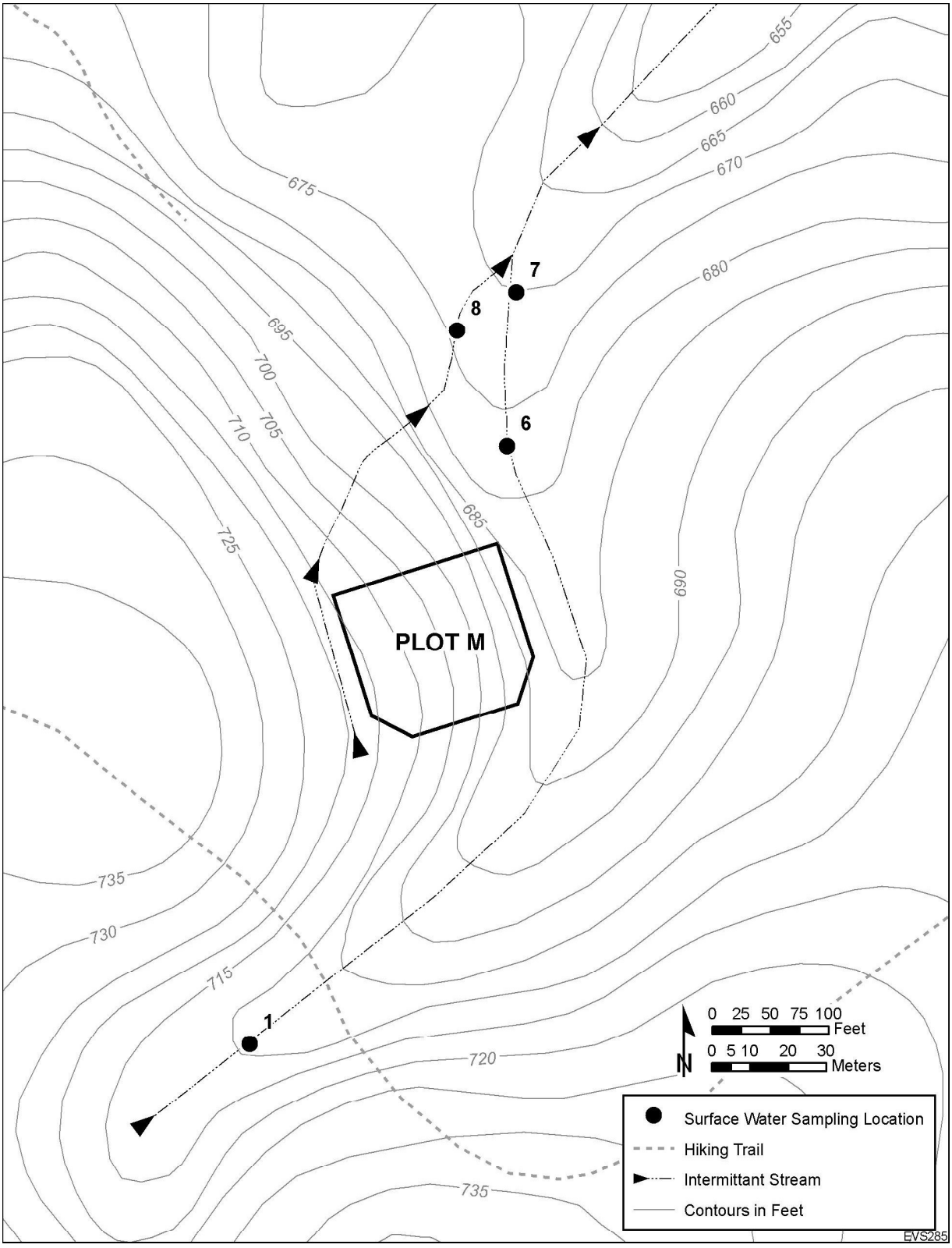



**Figure 4-2 Stream Sampling Locations near Plot M**

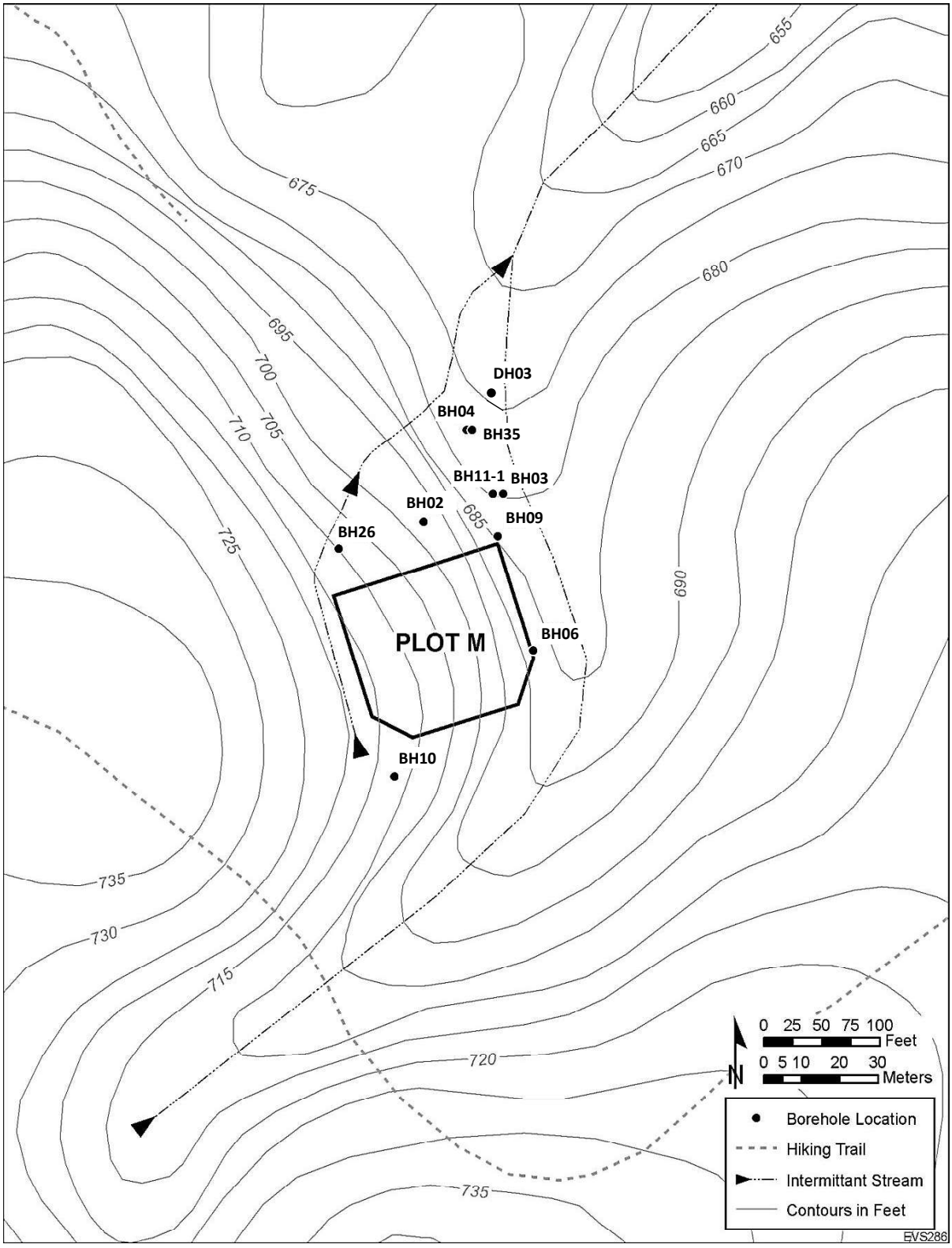



**Figure 4-3 Map of Plot M Site**

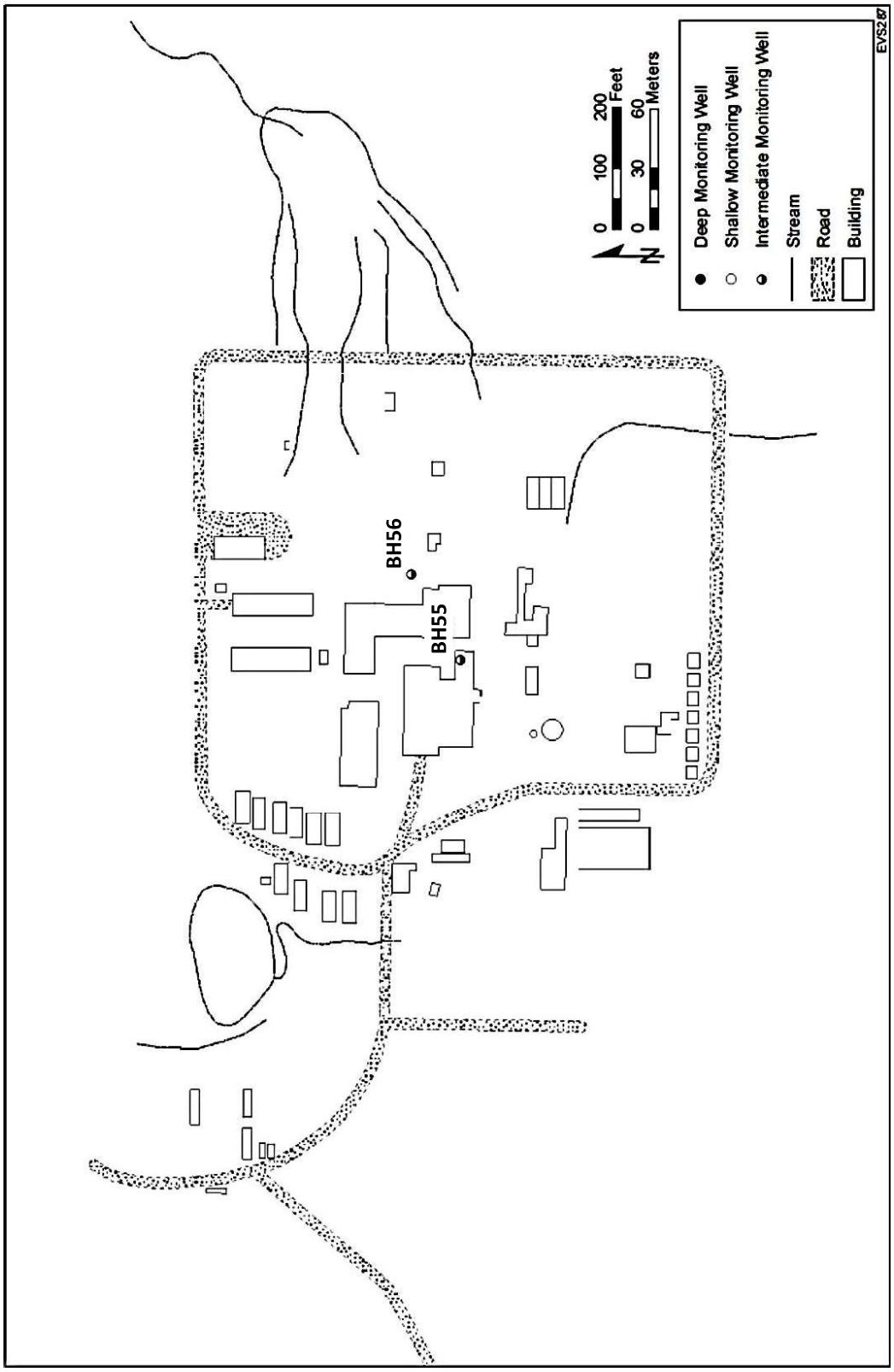



**Figure 4-4 Monitoring Wells at Site A**

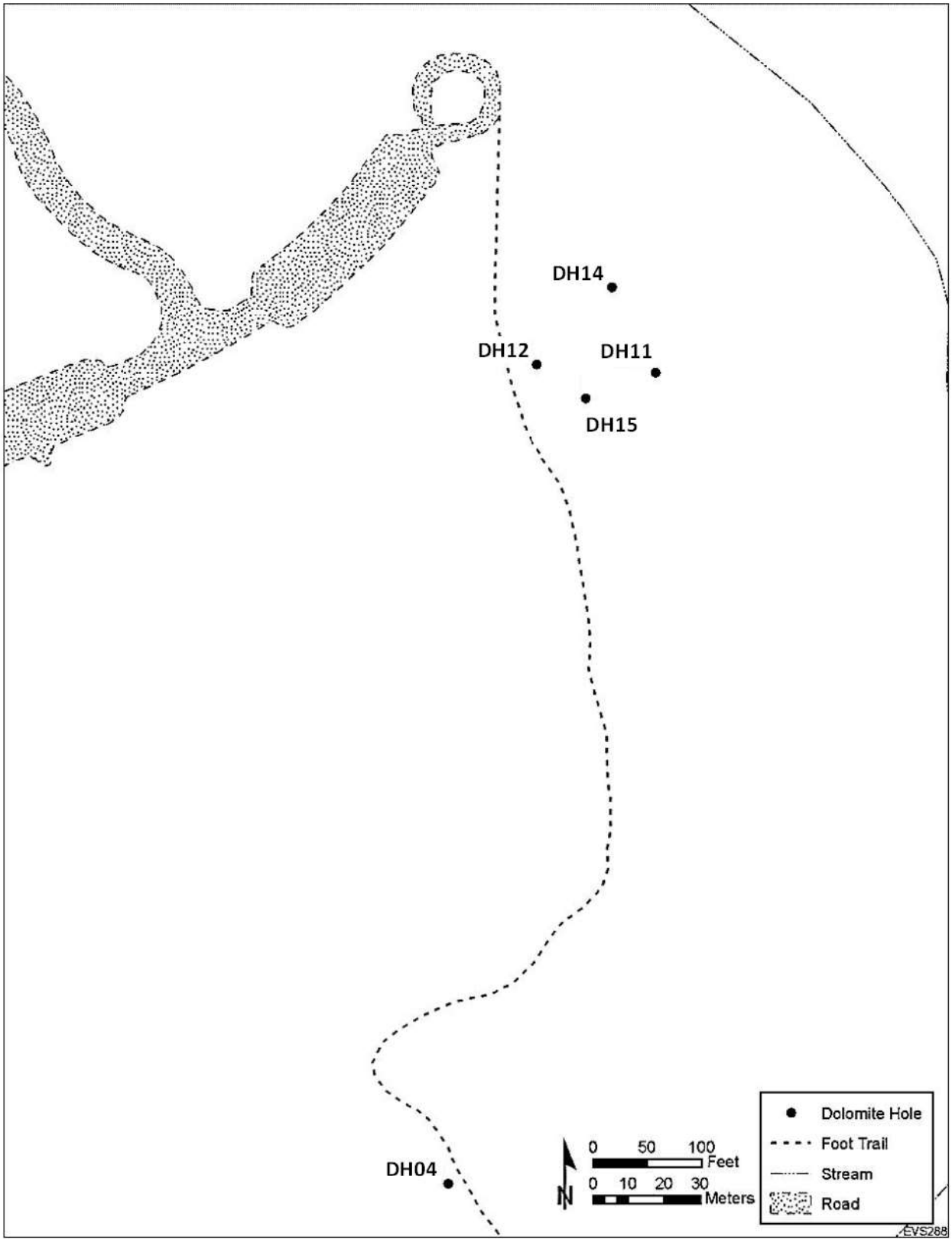



**Figure 4-5 Locations of Dolomite Wells North of Plot M**

## 5.0 ISSUES, IMPROVEMENT OPPORTUNITIES, AND CORRECTIVE ACTIONS

1. **Improvement Opportunity #1:** Monitoring Well BH56 was observed having an ant infestation. The presence of this colony of ants is a safety hazard while attempting to collect a groundwater sample from this well. The ant population needs to be safely eradicated by a means that will do no harm to the groundwater, as well as the surrounding flora and fauna.

   *Corrective Action:* Argonne will insert ant bait traps, e.g., Terra, into the top of the casing of this well to eliminate the ant colony.

2. **Improvement Opportunity #2:** Repaint and/or affix a new label to well cap DH11.

   *Corrective Action:* Argonne will repaint the label to properly identify the dolomite well DH11.

3. **Improvement Opportunity #3:** Repaint and/or affix a new label to well cap BH35. This well cap was borrowed from well BH2 when the well cap to BH35 was vandalized earlier this year.

   *Corrective Action:* Argonne will order a new well cap and install for BH2 and repaint and/or affix a new label to well cap BH35.

The results of the CY2022 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. *Photos were taken in June 2022* |
|---|---|
| P01 | Monitoring Well BH04 at Plot M |
| P02 | Monitoring Well BH06 at Plot M |
| P03 | Monitoring Well BH9 at Plot M |
| P04 | Monitoring Well BH11A at Plot M |
| P05 | Monitoring Well BH35 (View #1) at Plot M |
| P06 | Monitoring Well BH35 (View #2) at Plot M |
| P07 | Monitoring Well BH35 (View #3) at Plot M |
| P08 | Monitoring Well BH55 at Site A |
| P09 | Monitoring Well BH56 at Site A |
| P10 | Monitoring Well BH56 at Site A, Uncapped to Depict Ant Infestation, with Ant Bait Trap Resting on Top |
| P11 | Monitoring Well DH3 at Red Gate Woods |
| P12 | Monitoring Well DH12 at Red Gate Woods |
| P13 | Monitoring Well DH14 at Red Gate Woods |
| P14 | Monitoring Well DH15 at Red Gate Woods |
| P15 | Handpump Well (#5160) at Red Gate Woods Parking Lot |
| P16 | Plot M Corner Marker with Location Marker for Monitoring Well BH06 in Background |
| P17 | Plot M Monument, Front View |
| P18 | Plot M Monument, Back View |
| P19 | Site A Monument, Front View |
| P20 | Site A Monument, Back View, with Information Signage to the Left |
| P21 | Site A Monument, Side View, with Information Signage to the Right. |
| P22 | Information Marker at Entrance to Site A |
| P23 | Terraced Timber Steps Along Eastern Slope of Plot M |


P01 - Monitoring Well BH04 at Plot M

P02 – Monitoring Well BH06 at Plot M


P03 – Monitoring Well BH9 at Plot M


P04 – Monitoring Well BH11A at Plot M

P05 - Monitoring Well BH35 (View #1) at Plot M

P06 – Monitoring Well BH35 (View #2) at Plot M


P07- Monitoring Well BH35 (View #3) at Plot M


P08 - Monitoring Well BH55 at Site A


P09 – Monitoring Well BH56 at Site A

P10 – Monitoring Well BH56 at Site A,
Uncapped to Depict Ant Infestation with Ant Bait Trap Resting on Top


P11 – Monitoring Well DH3 at Red Gate Woods


P12 - Monitoring Well DH12 at Red Gate Woods


P13 - Monitoring Well DH14 at Red Gate Woods


P14 – Monitoring Well DH15 at Red Gate Woods

P15 – Handpump Well (#5160) at Red Gate Woods Parking Lot

P16 – Plot M Corner Marker
with Location Marker for Monitoring Well BH06 in Background


P17 – Plot M Monument, Front View

P18 - Plot M Monument, Back View


P19 - Site A Monument, Front View

P20 - Site A Monument, Back View, with Information Signage to the Left


P21 - Site A Monument, Side View, with Information Signage to the Right


P22 - Information Marker at Entrance to Site A

P23 - Terraced Timber Steps Along Eastern Slope of Plot M

**Environment, Health, and Safety Directorate**
Argonne National Laboratory
9700 South Cass Avenue, Bldg. 200
Lemont, IL 60439

www.anl.gov

Argonne National Laboratory is a U.S. Department of Energy
laboratory managed by UChicago Argonne, LLC