

# **2011 Inspection and Annual Site Status Report for the Site A/Plot M, Cook County, Illinois Decontamination and Decommissioning Program Site**

## **Summary**

Site A/Plot M was inspected on April 26, 2011. The site, located within a county forest preserve with significant tree and grass cover, was in good condition. No cause for a follow-up inspection was identified.

Erosion on top of the mounded earth cover at Plot M has been repaired, and the earth cover is in good condition (PL-1 and PL-2). The apparent cause of the erosion (bikers and pedestrians) has yet to be resolved. It is recommended that DOE work with ANL and the Forest Preserve to find a solution to eliminate the apparent cause of the erosion.

There are 25 groundwater monitoring wells at the site. Argonne National Laboratory (ANL) personnel visit the wells routinely when they collect water samples, and are doing a good job maintaining the security of the wells. A couple of minor well maintenance issues identified during last year's inspection remain at two of the ten monitoring wells located north of Plot M. A panel on the well head of monitoring well DH15 is missing, and wires are exposed to the public (PL-3). It is recommended that the cover be replaced, or the wires removed. Metal grating is present around monitoring well DH14 that could present a tripping hazard to the public and some wires are also exposed at the wellhead (PL-4). It is recommended that the metal grating and wires be removed.

## **1.0 Introduction**

This report presents the findings of the 2011 annual U.S. Department of Energy (DOE) Office of Legacy Management (LM) inspection of Site A/Plot M at the Palos Forest Preserve in Cook County, Illinois, and environmental monitoring results from 2010. Features and photograph locations (PLs) discussed in this report are shown on the attached figure.

The following points describe the site:

1. Site A is approximately 19 acres in size. It contains two buried nuclear reactor shells and buried debris from the various support buildings associated with the reactors and other laboratory operations. Operations commenced in 1943 and decommissioning was complete by 1956. The only structures visible are the stone monument marking the site, occasional concrete flatwork and fence post collars, a section of the original chain link fence, and monitoring wells. The site surface, which had been cleared and used as a golf course before World War II, is returning to hardwood forest. Groundwater in the glacial drift beneath Site A is being monitored for hydrogen-3 (tritium) and strontium-90 at 6 monitoring wells (BH41, BH51, BH52, BH54, BH55, and BH56).

2. Plot M is less than 1 acre in size and contains a series of trenches that were used to bury radioactive wastes. A granite monument and six corner markers are present on the site, which consists of a mounded earth cover, planted in grass, over an inverted concrete box. The concrete box was constructed in 1956. It is intended to reduce infiltration and lateral movement of soluble contaminants. Groundwater in the glacial drift beneath Plot M is monitored for hydrogen-3 (tritium) and strontium-90 at 9 monitoring wells (BH2, BH3, BH4, BH6, BH9, BH10, BH11a, BH26, and BH35). Groundwater in the dolomite bedrock wells north of Plot M is monitored for hydrogen-3 (tritium) at 10 monitoring wells (DH3, DH4, DH9, DH10, DH11, DH12, DH13, DH14, DH15, and DH17). Tritium contamination in groundwater beneath Plot M is thought to result from a single period of release before the concrete containment box was installed.
3. DOE LM contracts directly with ANL for all environmental sampling, analysis, and reporting. Environmental monitoring reports are issued annually by ANL.
4. In 2003 and 2004, DOE and S.M. Stoller staff from the DOE office in Grand Junction, Colorado, worked with representatives of the DOE Chicago Operations Office, ANL, and the Illinois Emergency Management Agency (IEMA) to evaluate groundwater and surface water conditions and the current monitoring program. The evaluation demonstrated that contaminant levels are diminishing, and the lateral and vertical extent of contamination has not increased. The monitoring program was revised, as described in the *Environmental Monitoring Program at Site A and Plot M, Palos Forest Preserve, Cook County, Illinois* (GJO-2004-558-TAC, February 2004).
5. The *Long-Term Surveillance and Maintenance Plan for Site A and Plot M, Palos Forest Preserve, Cook County, Illinois*, (DOE-LM/GJ704-2004, December 2004) incorporates the modified monitoring program.
6. In 2005, DOE LM incorporated monitoring data from the ANL database into the DOE LM database. The monitoring results are available on the DOE LM public website at <http://www.lm.doe.gov/land/sites/il/sitea/sitea.htm>.
7. In 2011 DOE LM performed a five year review of groundwater monitoring results. The report concluded that:
  - Quarterly monitoring for tritium should continue at all nine glacial drift monitoring wells and all surface water locations at Plot M
  - The long-term surveillance objective could be met with all other monitoring being performed on an annual schedule.

A decision concerning monitoring changes recommended in the 2011 assessment is pending.

## 2.0 Inspection Results

M. Miller (Chief Inspector), K. Broberg, and Katie Payne, all with S.M. Stoller Corporation, the Legacy Management (LM) contractor, conducted the inspection on April 26, 2011. Inspection participants included:

- N. Golchert, ANL
- L. Moss, ANL
- N. Visser, ANL
- D. Robbins, Illinois Emergency Management Agency (IEMA).

It should be noted that IEMA does not have regulatory authority over DOE at Site A/Plot M but is informed of and consulted with on long-term surveillance and maintenance activities that DOE conducts at Site A/Plot M.

The inspection was 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 December 2004. The purposes of the inspection were to look for evidence that the integrity of the disposal site is not threatened, to evaluate the condition of the monuments, to determine if maintenance is needed, and to examine the condition of DOE monitoring wells.

Inspectors met at the Red Gate Woods parking area and reviewed the Plan of the Day and the Job Safety Analysis. Inspectors noted that the pump handles remained off the picnic wells and that a portable restroom remained in place (PL-5). The handles were removed from the pumps years ago to prevent use of the well due to fecal coliform in the water. The fecal coliform originated from a nearby permanent restroom facility, which was removed and replaced with a portable restroom.

### Site A

Inspectors drove to Site A, walked to the center of the area, examined the site marker and walked around the perimeter of the site. The site and marker were in good shape (PL-6).

Monitoring wells at Site A were secured with locks and identified with a well number on the outer casing. No monitoring wells were opened during the inspection. ANL personnel visit the wells quarterly for sampling, ensure well security, and perform required maintenance at that time.

A large drop on the access road leading to Site A (at the point where the old asphalt connects with the dirt road) remains. Noted in inspection reports since 2009, the drop off is present toward one side of the road, so the road remains passable. It is recommended that ANL work with the Palos Forest Preserve District to repair the drop off on the Site A access road.

Vegetation growth along the lower portion of the access road to Site A (near the Archer Avenue turn-off) is an on-going issue. ANL is doing a good job working with the Palos Forest Preserve District to maintain control of the encroaching vegetation. It is recommended that ANL continue to work with the forest preserve to keep the road passable from encroaching vegetation.

## Plot M

The Plot M site marker was unchanged from last year's inspection. It was in good shape, with the exception of some minor vandalism that occurred several years ago. Some words on the marker are chiseled off (PL-7). All Plot M corner markers were located and found to be in good shape.

Erosion on top of the grass covered mound at Plot M (identified in previous inspections) was repaired in 2010 by ANL. Two areas were fixed: one north of the site marker and one west of the site marker. The area north of the site marker was approximately 31 feet by 12 feet, by 2 feet deep, and was impacting monitoring well BH9, and one of the Plot M corner markers. The erosion west of the site marker was approximately 13 feet by 3 feet by 1 foot deep, and was close to one of the Plot M corner markers. Both areas have been restored to pre-erosion conditions using top soil. Inspection photo PL-8 shows the regraded surface next to monitoring well BH9 and photo PL-1 shows the regraded surface next to the corner marker that was impacted by the erosion. The apparent cause of the erosion (bikers and pedestrians) has yet to be resolved. It is recommended that DOE work with ANL and the Forest Preserve to find a solution to eliminate the apparent cause of the erosion.

Monitoring wells at Plot M and north of Plot M were secured with locks and identified with a well number on the outer casing. No monitoring wells were opened during the inspection. ANL personnel visit the wells quarterly for sampling, ensure well security, and perform required maintenance at that time. A couple of minor maintenance issues remained in two of the ten wells north of Plot M. A panel on the well head of monitoring well DH15 is missing, and wires are exposed to the public (PL-3). It is recommended that the cover be replaced, or the wires removed. Metal grating remains around monitoring well DH14 that could present a tripping hazard to the public and some wires are also exposed at the wellhead (PL-4). It is recommended that the metal grating and wires be removed.

## **3.0 Monitoring Results**

ANL collects water samples quarterly in accordance with the *Environmental Monitoring Program at Site A and Plot M, Palos Forest Preserve, Cook County, Illinois*. All samples are analyzed for tritium. Samples from monitoring locations near historic occurrences of strontium-90 are analyzed for that radionuclide, as well. Monitoring results for 2010 are compiled in *Surveillance of Site A and Plot M, Report for 2010* (ANL-10/01, April 2011) which will be available to the public on the LM website. Monitoring results for 2010 are summarized below.

### **3.1 Surface Water**

An intermittent stream flows past Plot M and a seep issues from the stream bank adjacent to the historic burial area.

Tritium levels exceeded the State of Illinois standard of 20,000 picocuries per liter (pCi/L) at seep location 0006 which is located just downgradient of Plot M. Seep activities at location 0006 ranged from 13,900 to 87,000 pCi/L (Figure 1).

**Site A/Plot M Decommissioned Reactor (SAM01)  
Tritium Concentration, Plot M, Surface Water**

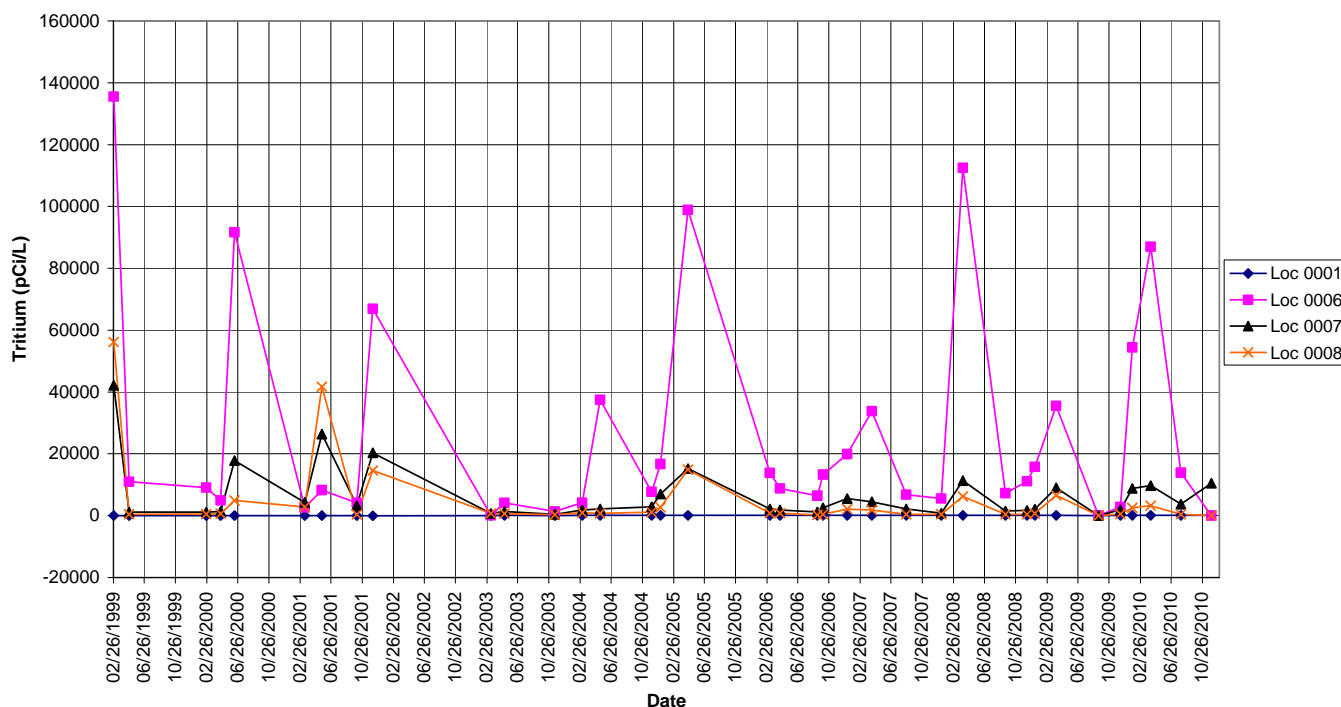


Figure 1. Tritium Activities in Surface Water at Site A/Plot M, Cook County, Illinois

Quarterly surface water samples collected from five area ponds in 2010 (NW Site A, SE Site A, Bull Frog Lake, Horse Collar Slough, and Tomahawk Slough) were all less than 100 pCi/L.

### 3.2. Groundwater—Glacial Drift

In 2010, tritium was detected in the groundwater at Site A in all six monitoring well locations completed in the glacial drift. None exceeded the standard of 20,000 pCi/L. Activities ranged from non-detect (less than 100 pCi/L) to 3,000 pCi/L (Figure 2).

**Site A/Plot M Decommissioned Reactor (SAM01)  
Tritium Concentration, Site A, Glacial Drift**

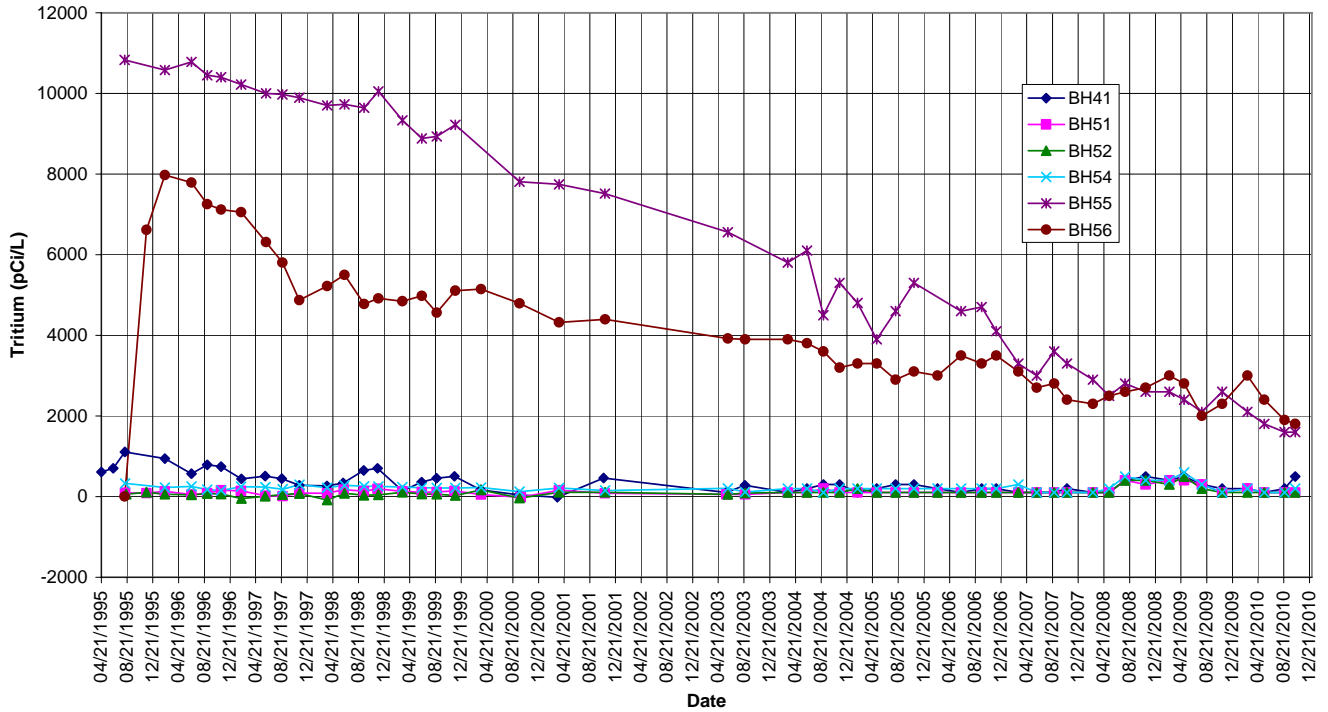


Figure 2. Tritium Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2010, strontium-90 was detected in the groundwater at Site A in two of the six monitoring well locations completed in the glacial drift. Activities ranged from non-detect (less than 0.25 pCi/L) to 1.87 pCi/L, but none exceeded the State of Illinois standard of 8 pCi/L (Figure 3).

**Site A/Plot M Decommissioned Reactor (SAM01)  
Strontium-90 Concentration, Site A, Glacial Drift**

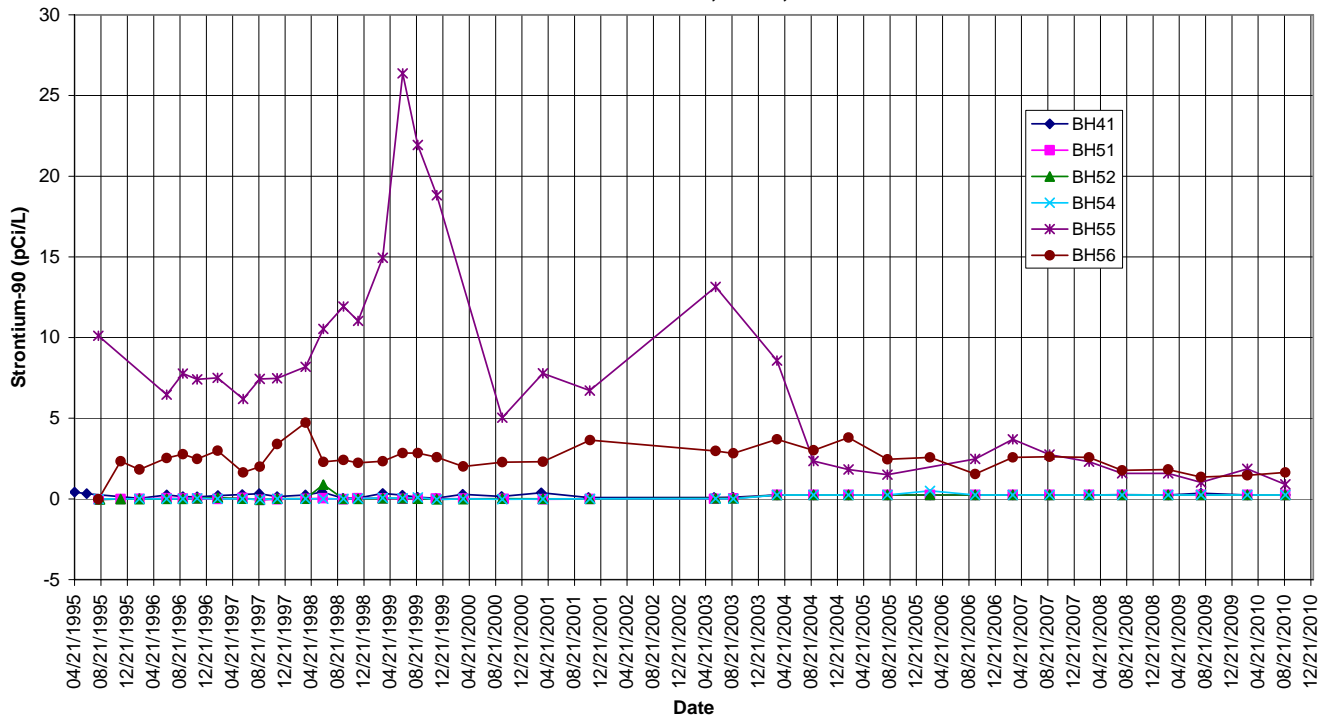


Figure 3. Strontium-90 Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2010, tritium was detected in the groundwater at Plot M at all nine monitoring wells completed in the glacial drift. Tritium concentrations ranged from 5,700 pCi/L to 1,142,000 pCi/L (Figure 4). The highest reading was taken at BH9 on May 18, 2010. BH9 was dry in two of the four sampling attempts in 2010.

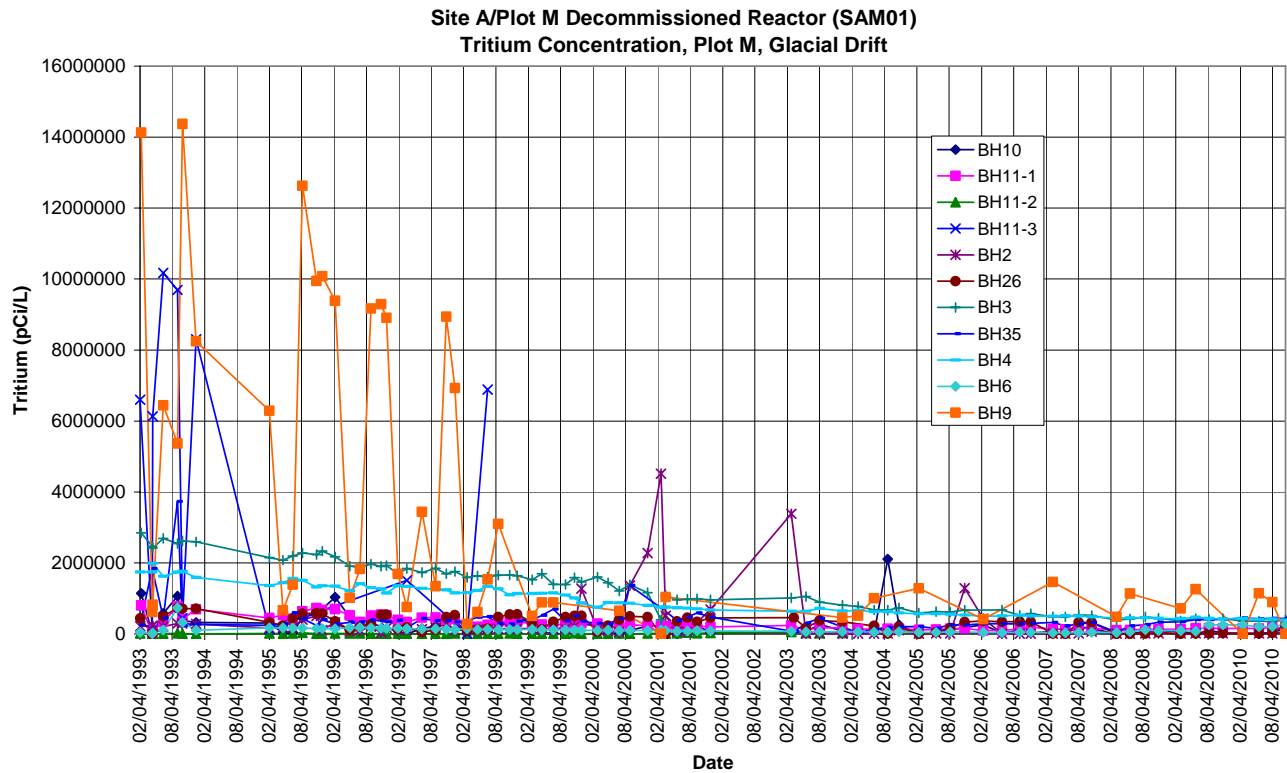


Figure 4. Tritium Activities in Groundwater in the Glacial Drift at Plot M, Cook County, Illinois

In 2010, strontium-90 was detected in the groundwater at Plot M at five of the nine groundwater monitoring wells. Activities ranged from non-detect (less than 0.25 pCi/L) to 6.66 pCi/L, but none exceeded the State of Illinois standard of 8 pCi/L.

### 3.3. Groundwater—Dolomite Bedrock

In 2010, tritium was detected in the groundwater at the picnic wells at the Red Gate Woods picnic area. Activities ranged from non-detect (less than 100 pCi/L) to 510 pCi/L (Figure 5). None exceeded the standard of 20,000 pCi/L.



**Site A/Plot M Decommissioned Reactor (SAM01)  
Tritium Concentration, Picnic Wells, Dolomite Bedrock**

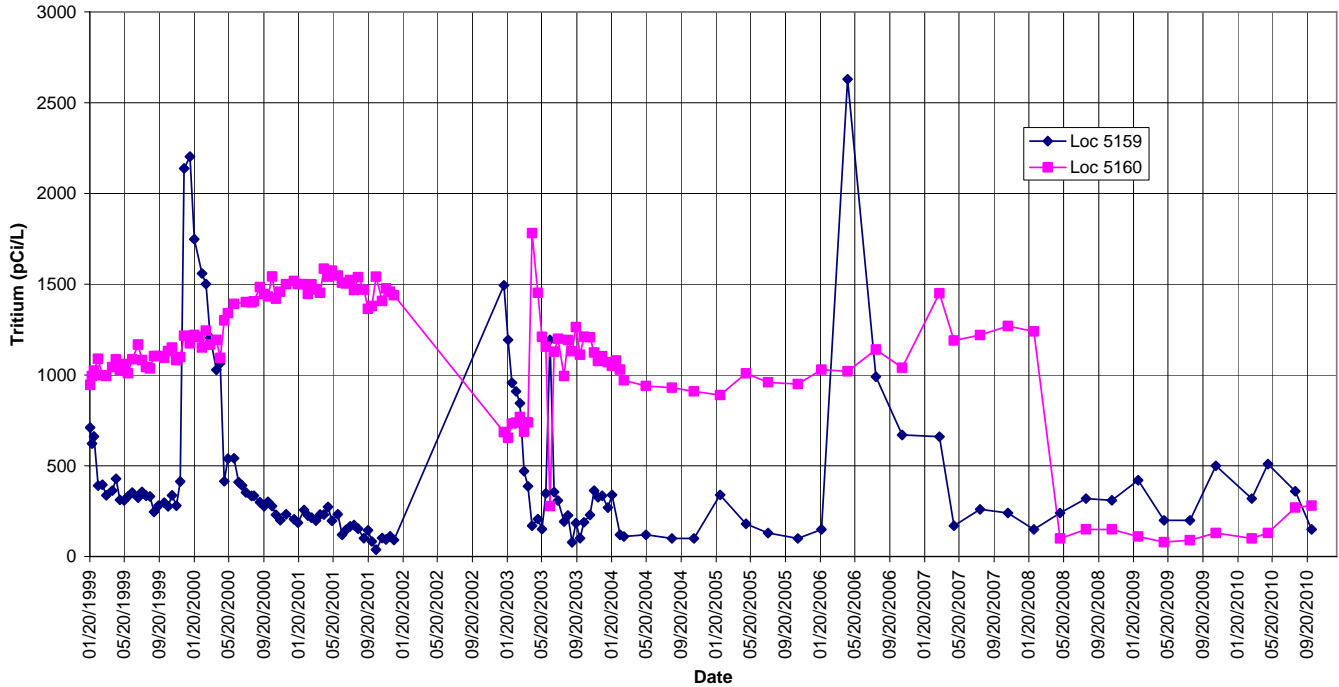


Figure 5. Tritium Activities in Groundwater in the Picnic Wells, Site A/Plot M, Cook County, Illinois

In 2010, tritium was detected in the groundwater at all ten monitoring wells completed in the dolomite bedrock north of Plot M. Activities ranged from 100 pCi/L to 2,400 pCi/L (Figure 6). Tritium is no longer sampled for in the dolomite bedrock beneath Site A. Monitoring stopped in 2004 after approximately 30 years of sampling failed to detect tritium

Site A/Plot M Decommissioned Reactor (SAM01)  
Tritium Concentration, Plot M, Dolomite Bedrock

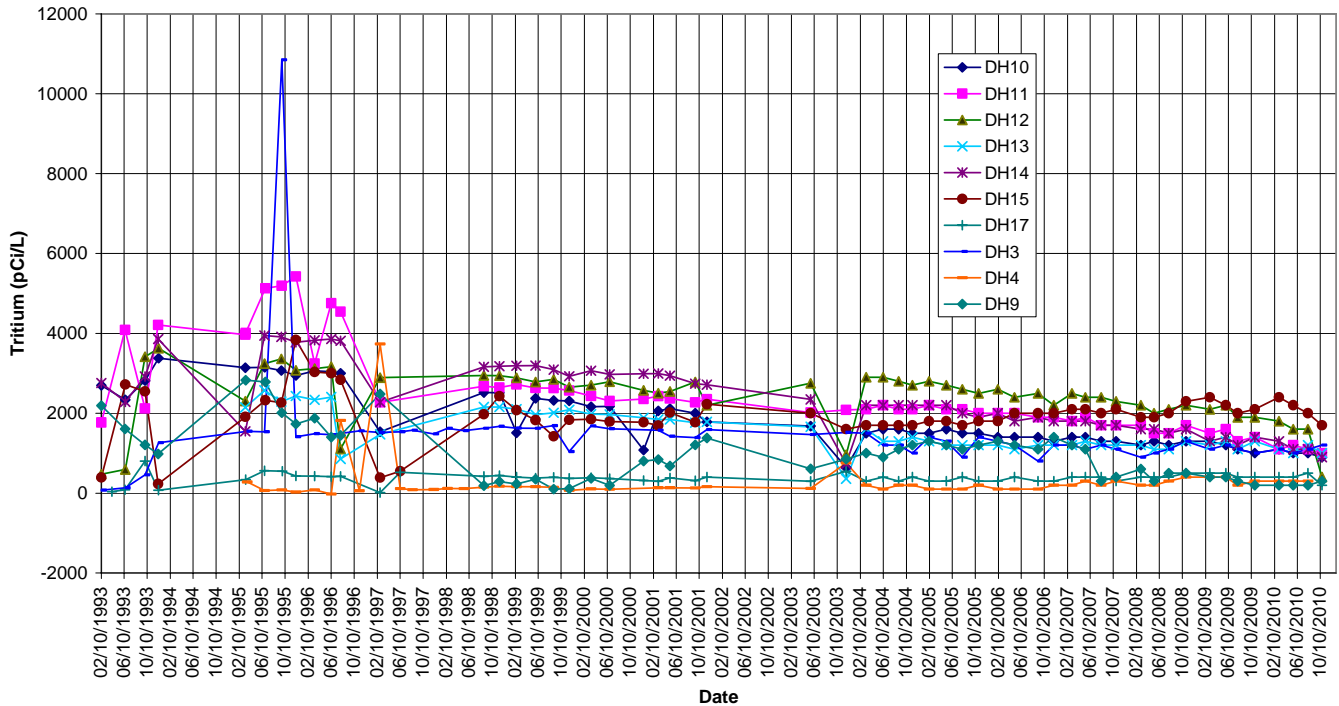


Figure 6. Tritium Activities in Groundwater in the Dolomite Bedrock, Site A/Plot M, Cook County, Illinois

### 3.4. Risk Assessment

All exposure pathways to contaminated groundwater are incomplete (handles have been removed from the picnic wells because of fecal coliform contamination and the groundwater beneath Site A/Plot M is not used for any purpose). The seep and stream flow in the spring does not pose a risk to human health or the environment because of low volume and intermittent flow (see the risk assessment summary in *Evaluation and Recommendation for Environmental Monitoring at Site A and Plot M, Palos Forest Preserve, Cook County, Illinois*, GJO-2003-462-TAC, August 2003).

### 4.0 Recommendations

1. Erosion on top of the mounded earth cover at Plot M has been repaired, and the earth cover is in good condition (PL-1 and PL-2). The apparent cause of the erosion (bikers and pedestrians) has yet to be resolved (page 1).

**Recommendation:** It is recommended that DOE work with ANL and the Forest Preserve to find a solution to eliminate the apparent cause of the erosion.

2. A large drop off is present on the access road leading to Site A at the point where the old asphalt connects with the dirt road. The drop off is present toward one side of the road, so the road remains passable at this time (page 3).

**Recommendation:** It is recommended that ANL work with the Palos Forest Preserve District to repair the drop off on the Site A access road.

3. Vegetation growth along the lower portion of the access road to Site A (near the Archer Avenue turn-off) is an on-going issue. ANL is doing a good job working with the Palos Forest Preserve District to maintain control the encroaching vegetation (page 3).

**Recommendation:** It is recommended that ANL continue to work with the forest preserve to keep the road passable from encroaching vegetation.

4. A panel on the well head of monitoring well DH15 is missing, and wires are exposed to the public (page 4).

**Recommendation:** It is recommended that the cover be replaced, or the wires removed.

5. Metal grating is present around monitoring well DH14 that could present a tripping hazard to the public, and some wires are also exposed at the wellhead (page 4).

**Recommendation:** It is recommended that the metal grating and exposed wires be removed.

## 5.0 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	190	Erosion repair at Plot M.
PL-2	225	Erosion repair at Plot M.
PL-3	NA	Wires protruding from monitoring well DH15.
PL-4	NA	Wires and grate at monitoring well DH14.
PL-5	135	Disabled drinking water well at Red Gate Woods.
PL-6	NA	Site marker for Site A.
PL-7	90	Site marker for Plot M.
PL-8	NA	Erosion repair at Plot M, near Monitoring Well BH9.
PL-9	135	Erosion repair next to corner marker at Plot M.



SAM 4/2011. PL-1. Erosion repair at Plot M.



SAM 4/2011. PL-2. Erosion repair at Plot M.



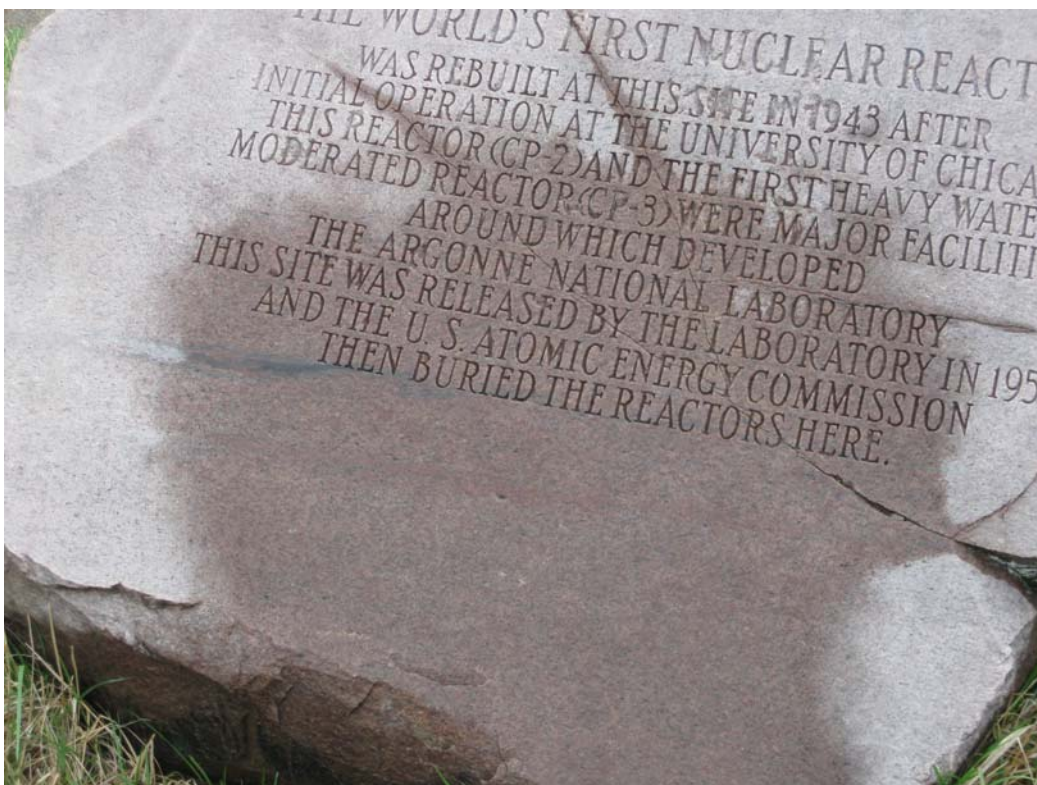
SAM 4/2011. PL-3. Wires protruding from monitoring well DH15.



SAM 4/2011. PL-4. Wires and grate at monitoring well DH14.



SAM 4/2011. PL-5. Disabled drinking water well at Red Gate Woods.



SAM 4/2011. PL-6. Site marker for Site A.



SAM 4/2011. PL-7. Site marker for Plot M.

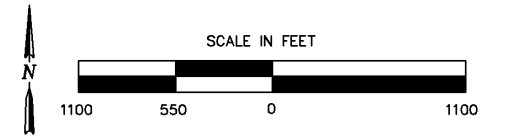
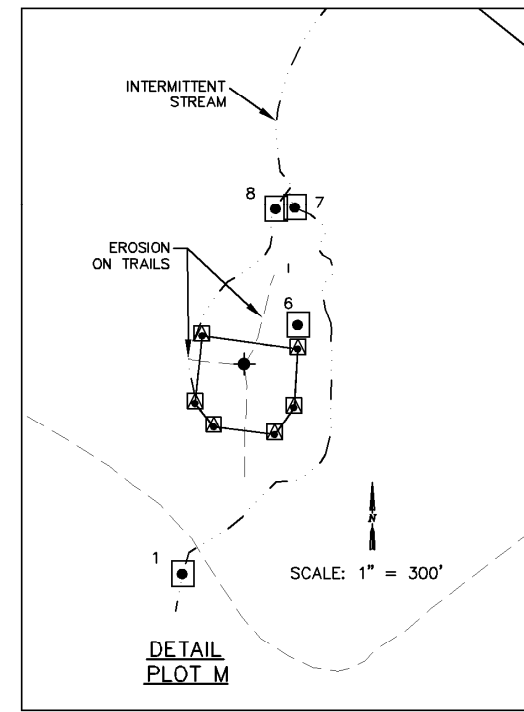
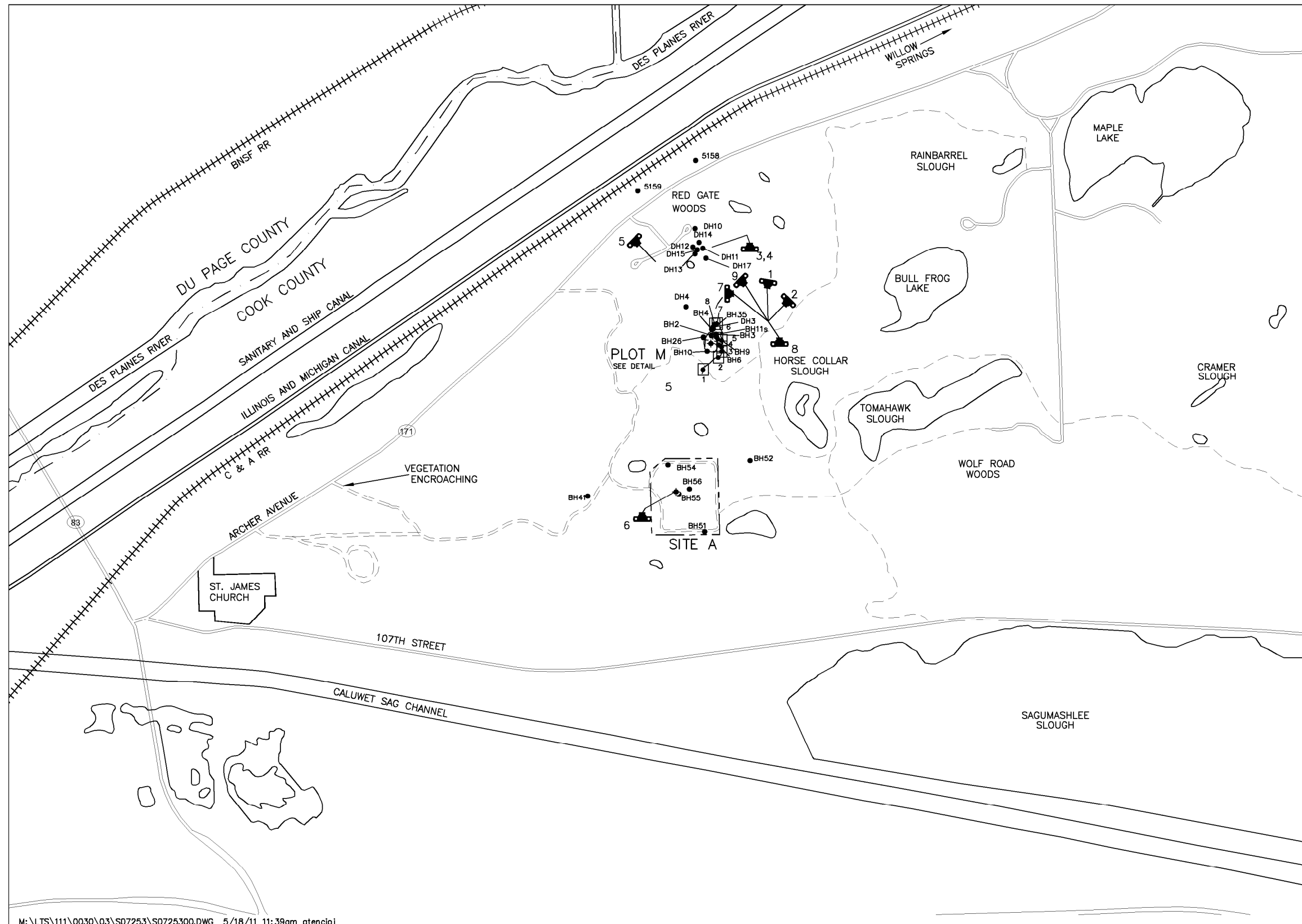


SAM 4/2011. PL-8. Erosion repair at Plot M, near Monitoring Well BH9.



SAM 4/2011. PL-9. Erosion repair next to corner marker at Plot M.





**EXPLANATION**

	CORNER MARKER
	PICNIC WELL
	DOLOMITE WELL
	BOREHOLE
	SURFACE SAMPLE LOCATION
	SITE MARKER
	SITE BOUNDARY
	DIRT ROAD
	PAVED HIGHWAY OR STREET
	NON-MOTORIZED TRAIL
	RAILROAD
	RIVER, CANAL, LAKE, POND, SLOUGH
	COUNTY LINE
	PHOTO LOCATION, DIRECTION, AND NUMBER

ANNUAL INSPECTION CONDUCTED  
APRIL 26, 2011

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00060
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2011 ANNUAL INSPECTION DRAWING  
SITE A/PLOT M DECOMMISSIONED REACTOR  
COOK COUNTY, ILLINOIS

DATE PREPARED: MAY 18, 2011	FILENAME: S0725300
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