

2012 Inspection and Annual Site Status Report for the Site A/Plot M, Cook County, Illinois Decontamination and Decommissioning Program Site

Summary

The annual site inspection for Site A/Plot M was conducted on May 9, 2012. The former reactor site was found to be in good condition and as a result, no follow-up inspection was deemed necessary.

Erosion on top of the vegetative cover at Plot M was repaired in 2010, and the cover remains in good condition. However, bicycle traffic is still occurring across the top of the cover and new ruts are beginning to form. It is recommended that as erosion occurs due to bicycle pathways the resulting ruts be monitored then filled with top soil and seeded accordingly.

There are 25 groundwater monitoring wells at the site. Argonne National Laboratory (ANL) personnel monitor and maintain the wells routinely when they collect water samples. The minor maintenance items identified in past year's inspections have all been addressed. A couple new minor maintenance items were identified during this year's inspection. The protective casings at monitoring wells DH13 and DH15 have holes in them where wires used to protrude from the casings. It is recommended that these holes be covered to maintain proper security of the wells.

The report titled, *Surveillance of Site A and Plot M, Report for 2011*, issued by Argonne National Laboratory provides monitoring results for 2011. The report states that the results of the surveillance program continue to indicate that the radioactivity remaining at Site A/Plot M does not endanger the health or safety of the public visiting the site, using the picnic area, or living in the vicinity.

1.0 Introduction

This report presents the findings of the 2012 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 reported by ANL for 2011. 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 monitor 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 for surface water locations at Plot M
 - The long-term surveillance plan (LTSP) objective could be met with all other monitoring being performed on an annual schedule.

An official decision concerning monitoring changes recommended in the 2011 assessment has not been issued.

2.0 Inspection Results

M. Miller (Chief Inspector) and K. Broberg (Assistant Inspector) with S.M. Stoller Corporation, the Legacy Management (LM) contractor, conducted the inspection on May 9, 2012. Inspection participants included:

- G. Hooten, DOE LM
- B. Quirke, DOE Chicago Office

- L. Moos, Argonne National Lab (ANL)
- N. Visser Argonne National Lab (ANL)
- T. Davis, Argonne National Lab (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-1). 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 could not drive to Site A this year due to a recently downed tree blocking the access road (PL-2, PL-3). ANL will work with forest preserve personnel to have the tree removed from the access road. Inspectors walked to Site A, examined the site marker, and walked around the perimeter of the site. The site and marker were in good condition (PL-4).

Monitoring wells at Site A were observed to be secured with locks and identified with a well number on the outer casing (PL-5). ANL personnel monitor the wells quarterly, ensure well security, and perform required maintenance.

A large drop-off present 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 the inspection last year. It was in good condition, with the exception of some minor vandalism that occurred several years ago. Some words on the marker are chiseled off (PL-6). All Plot M corner markers were located and were in good condition (PL-7).

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. 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. The erosion was caused by visitors riding their bicycles across the grass covered mound. Both areas were restored to pre-erosion conditions using top soil. It was noted during this year's inspection that ruts are returning to the mound cover due to continued bicycle travel across the mound (PL-8). It is recommended that as erosion occurs due to bicycle pathways the resulting ruts be monitored then filled with top soil and seeded accordingly.

Monitoring wells at Plot M and north of Plot M were observed to be secured with locks and identified with a well number on the outer casing (PL-9). ANL personnel monitor the wells quarterly, ensure well security, and perform required maintenance.

Some minor well maintenance items from previous inspections had been addressed. Specifically, at monitoring wells DH15 and DH14 some exposed wires were removed; a metal grate tripping hazard was removed from monitoring well DH14. Addressing these items though, inadvertently led to some additional minor maintenance needs at these wells. The openings through which the wires protruded from the well casing left holes in the casings that allow access to the wells even when the well heads are locked. These holes need to be patched. They are present at monitoring wells DH13 and DH15 (PL-10, PL-11, and PL-12). It is recommended that these holes be patched to maintain well head security.

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 2011 are compiled in *Surveillance of Site A and Plot M, Report for 2011* (ANL-12/01, May 2012) which will be available to the public on the LM website. Monitoring results for 2011 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 10,000 to 43,000 pCi/L (Figure 1). Seep locations 0006 and 0008 were dry on September 26, 2011.

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

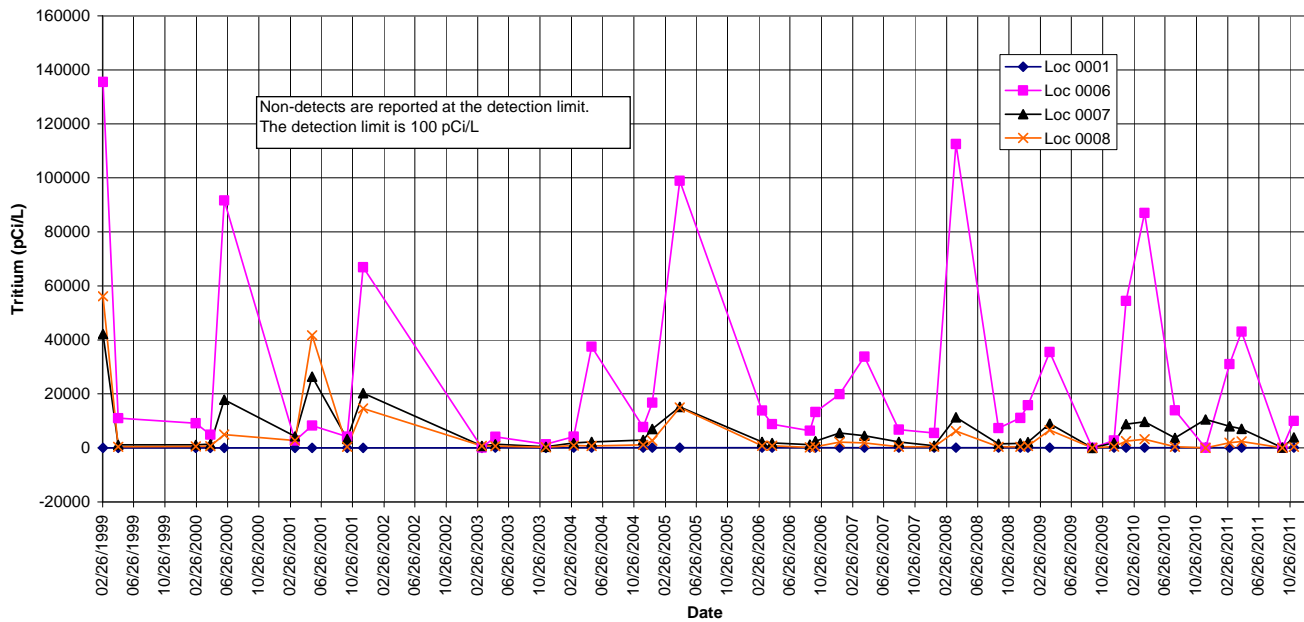


Figure 1. Tritium Activities in Surface Water at Site A/Plot M, Cook County, Illinois

Quarterly surface water samples collected from five area ponds in 2011 (NW Site A, SE Site A, Bull Frog Lake, Horse Collar Slough, and Tomahawk Slough) were all less than the detection limit of 100 pCi/L.

3.2. Groundwater—Glacial Drift

In 2011, tritium was detected in the groundwater at Site A in five of the six monitoring well locations completed in the glacial drift. Tritium was not detected in monitoring well B51. None exceeded the standard of 20,000 pCi/L. Activities ranged from non-detect (less than 100 pCi/L) to 2,600 pCi/L (Figure 2).

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

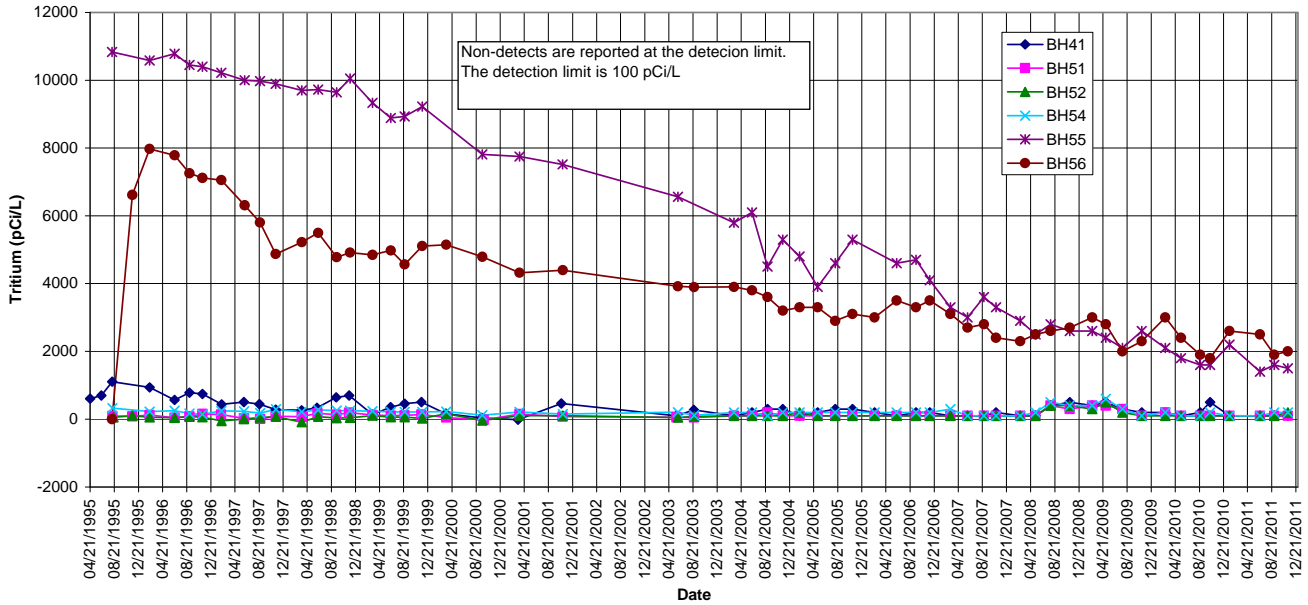


Figure 2. Tritium Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2011, 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 1.54 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**

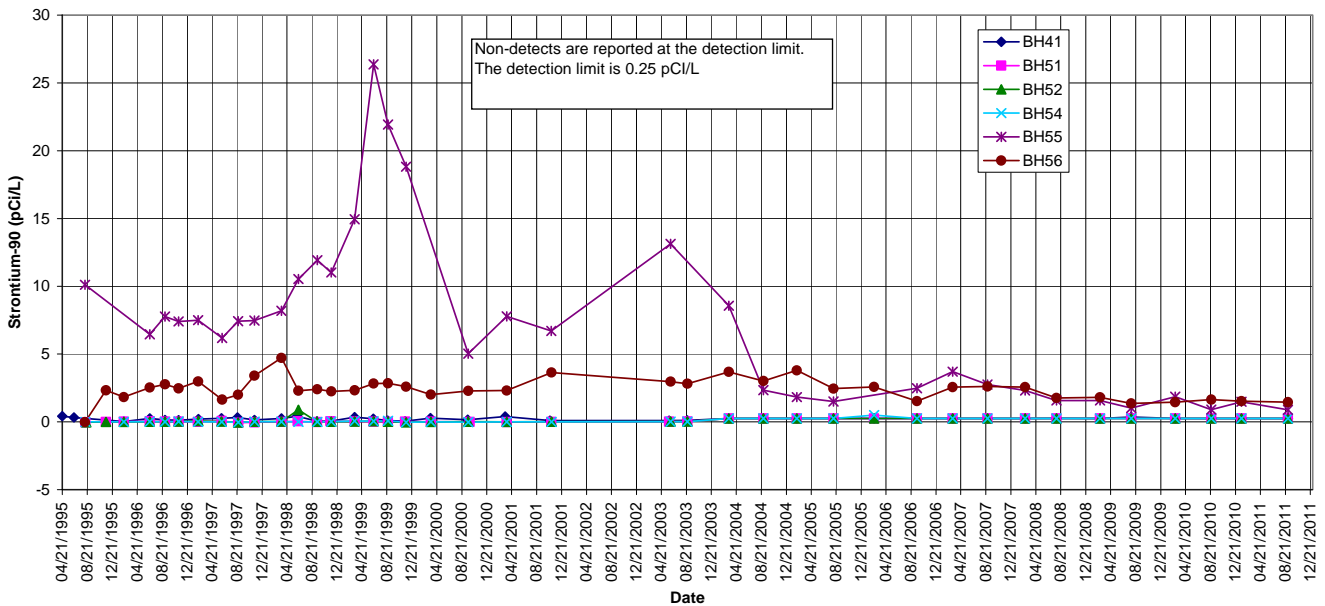


Figure 3. Strontium-90 Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2011, tritium was detected in the groundwater at Plot M at all nine monitoring wells completed in the glacial drift. Tritium concentrations ranged from 7,200 pCi/L to 1,534,000 pCi/L (Figure 4). The highest concentration was at BH6 on August 24th. Well BH9 was dry during one of the four sampling attempts in 2011 (August 24th).

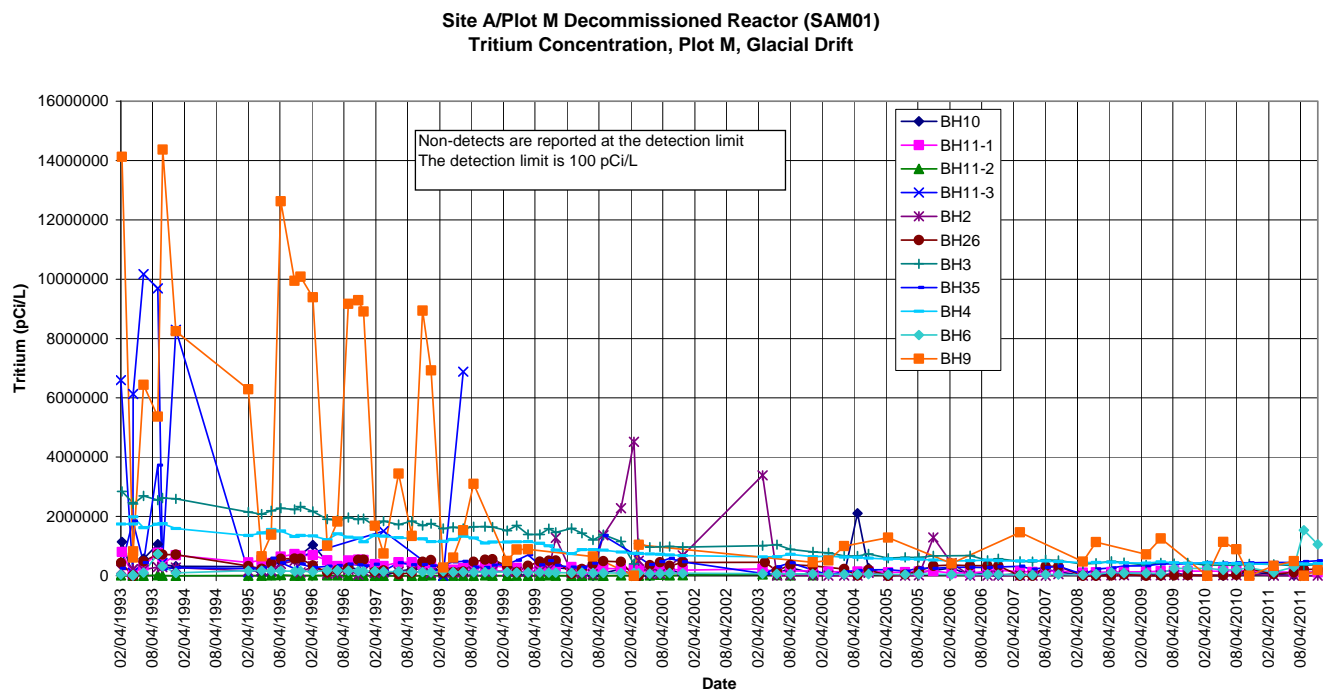


Figure 4. Tritium Activities in Groundwater in the Glacial Drift at Plot M, Cook County, Illinois

In 2011, 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 3.02 pCi/L, but none exceeded the State of Illinois standard of 8 pCi/L.

3.3. Groundwater—Dolomite Bedrock

In 2011, tritium was detected in the groundwater at the picnic wells at the Red Gate Woods picnic area. The January 19th sample from Picnic Well 5159 had the highest concentration of tritium ever measured at the well (3,600 pCi/L). Activities for the two picnic wells ranged from non-detect (less than 100 pCi/L) to 3,600 pCi/L (Figure 5). None exceeded the State of Illinois standard of 20,000 pCi/L.

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

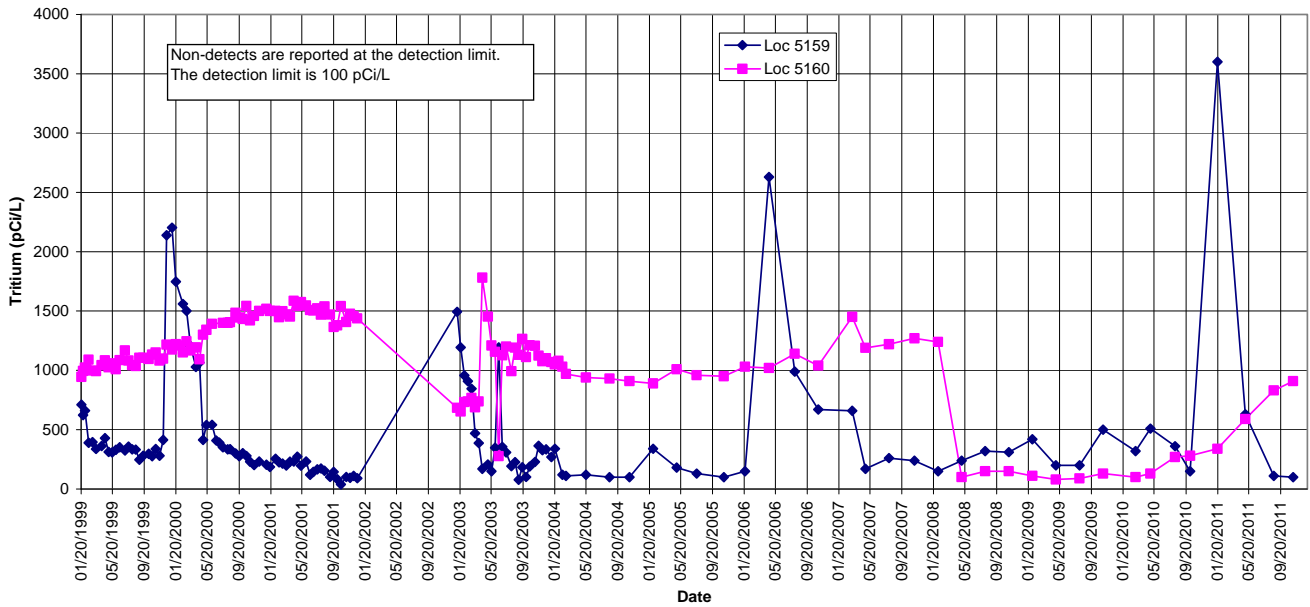


Figure 5. Tritium Activities in Groundwater in the Picnic Wells, Site A/Plot M, Cook County, Illinois

In 2011, tritium was detected in the groundwater at all ten monitoring wells completed in the dolomite bedrock north of Plot M. Activities ranged from 200 pCi/L to 2,400 pCi/L (Figure 6). Tritium is no longer a constituent of concern in the dolomite bedrock beneath Site A. Monitoring was 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**

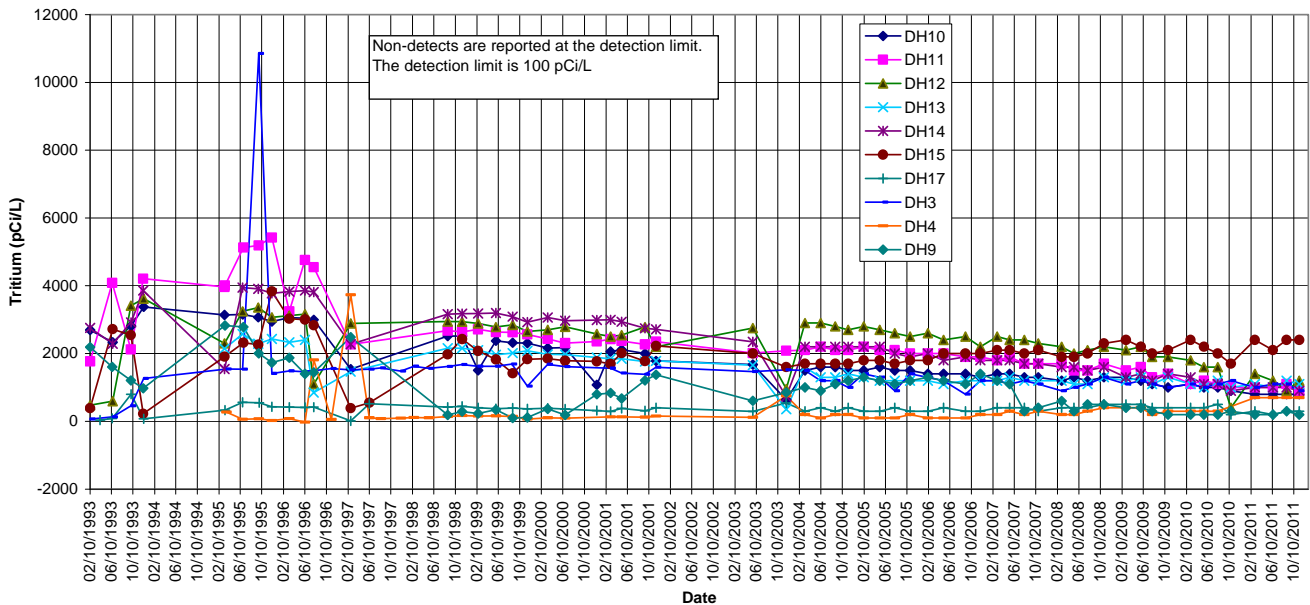


Figure 6. Tritium Activities in Groundwater in the Dolomite Bedrock, Site A/Plot M, Cook County, Illinois

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. The protective casings at monitoring wells DH13 and DH15 have holes in them where wires used to protrude from the casings (pages 1 and 4).

Recommendation: It is recommended that these holes be covered to maintain proper security of the wells.

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 4).

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 4).

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

4. It was noted during the inspection this year that ruts are returning to the Plot M mound cover due to continued bicycle travel across the cover (pages 1 and 4).

Recommendation: It is recommended that as erosion occurs due to bicycle pathways the resulting ruts be monitored then filled with top soil and seeded accordingly.

5.0 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	NA	Picnic well 5160.
PL-2	NA	Fallen tree blocking access road to Site A.
PL-3	180	Fallen tree blocking access road to Site A.
PL-4	NA	Site marker at Site A.
PL-5	NA	Monitoring well BH56.
PL-6	NA	Site marker at Plot M.
PL-7	NA	One of six corner markers at Plot M.
PL-8	225	New ruts on top of Plot M due to bicycle traffic.
PL-9	NA	Monitoring well BH35.
PL-10	NA	Hole in casing of monitoring well DH15.
PL-11	Na	Hole in casing of monitoring well DH15.
PL-12	NA	Hole in casing of monitoring well DH13.



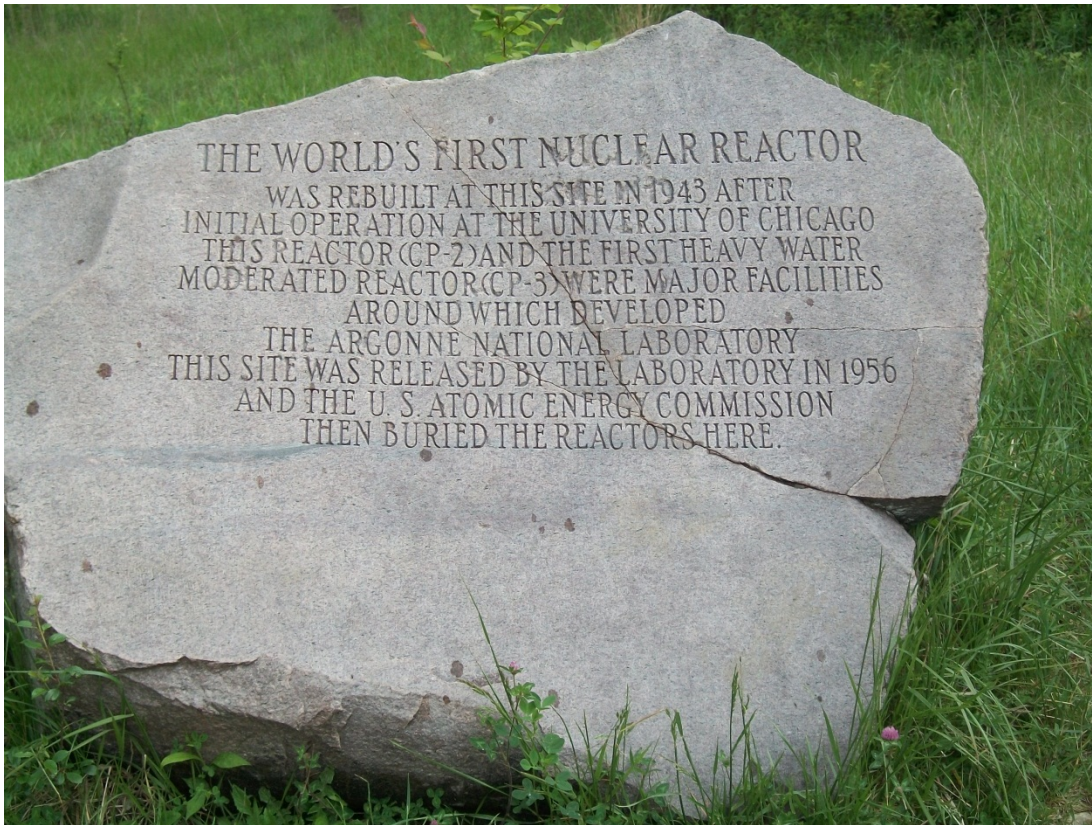
SAM 5/2012. PL-1. Picnic well 5160.



SAM 5/2012. PL-2. Fallen tree blocking access road to Site A.



SAM 5/2012. PL-3. Fallen tree blocking access road to Site A.



SAM 5/2012. PL-4. Site marker at Site A.



SAM 5/2012. PL-5. Monitoring well BH56.



SAM 5/2012. PL-6. Site marker at Plot M.



SAM 5/2012. PL-7. One of six corner markers at Plot M.



SAM 5/2012. PL-8. New ruts on top of Plot M due to bicycle traffic.



SAM 5/2012. PL-9. Monitoring well BH35.



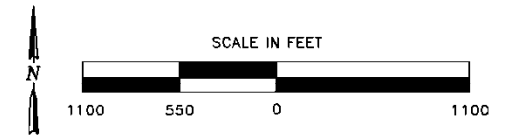
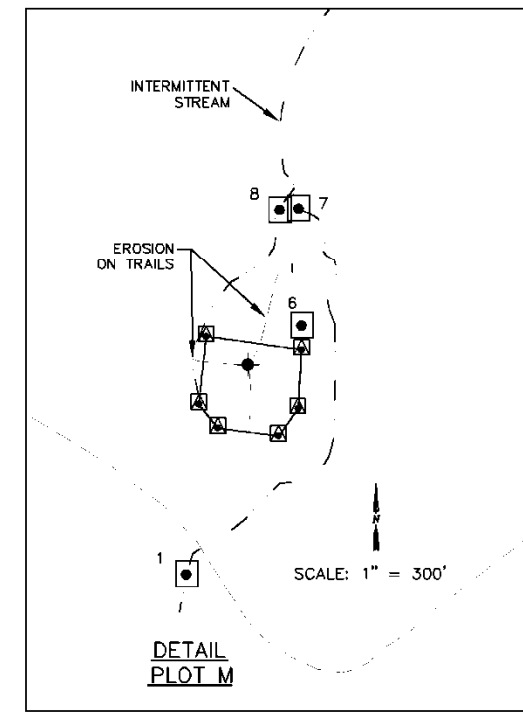
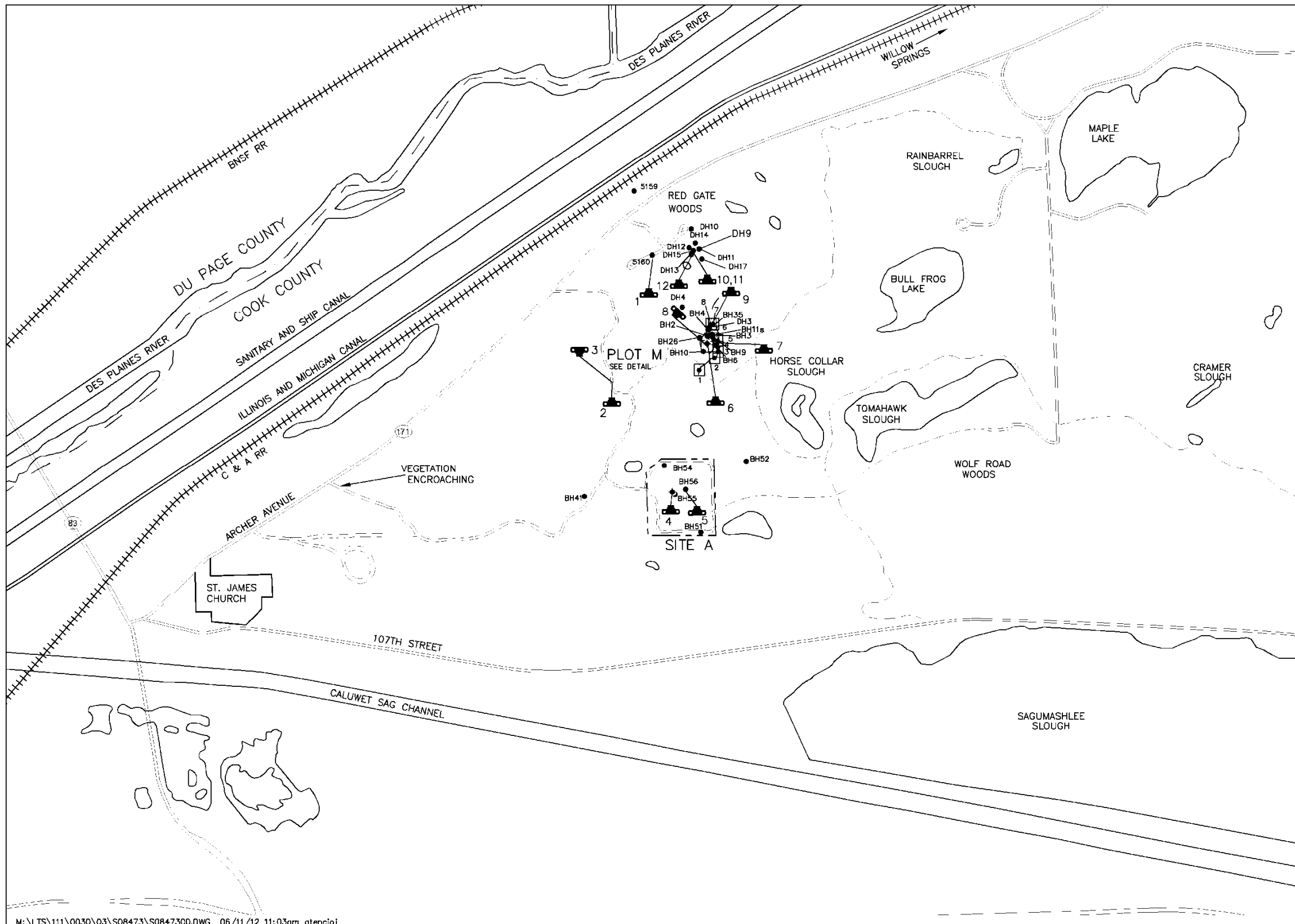
SAM 5/2012. PL-10. Hole in casing of monitoring well DH15.



SAM 5/2012. PL-11. Hole in casing of monitoring well DH15.



SAM 5/2012. PL-12. Hole in casing of monitoring well DH13.



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
MAY 9, 2012

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00060
---	--

2012 ANNUAL INSPECTION DRAWING
SITE A/PLOT M DECOMMISSIONED REACTOR
COOK COUNTY, ILLINOIS

DATE PREPARED: MAY 30, 2012	FILENAME: S0847300
--------------------------------	-----------------------