

2013 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 10, 2013. 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 grass covered mound at Plot M continues to be a concern. Bike traffic produces ruts which if left unfixed grow and threaten the protectiveness of the soil cover on top of the mound. In 2010 ANL personnel repaired two areas at Plot M by filling in the ruts with clean top soil and re-seeding. In 2012, additional repairs were made by ANL personnel. Three-inch deep ruts were once again filled in with clean top soil and re-seeded in one of the same areas that had been repaired in 2010. It is recommended that if Plot M cannot be off limits to bikes, that action be taken to make a more sustainable pathway for the bikes to mitigate the ongoing erosion concerns.

There are 25 groundwater monitoring wells at the site. ANL personnel visit the wells routinely when they collect water samples, and are doing a good job maintaining the security of the wells. The minor maintenance items identified in past inspections have all been addressed.

The report titled, *Surveillance of Site A and Plot M, Report for 2012*, issued by Argonne National Laboratory provides monitoring results for 2012. 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 2013 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 2012. 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 quarterly 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 quarterly 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 quarterly 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
 - 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 April 10, 2013.

Inspection participants included:

- G. Hooten, DOE Legacy Management (LM)
- L. Moos, Argonne National Lab (ANL)
- N. Visser, (ANL)
- Brent Russell, Illinois Emergency Management Agency (IEMA)
- Talon Holmes, IEMA
- Derron Robbins, IEMA, and
- Kathy Allen, 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 about 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 was no longer present in the area (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.

Site A

The tree which blocked inspectors from reaching Site A during the 2012 inspection has been removed from the access road, enabling inspectors to drive to Site A during this year's inspection. Site A and the Site A monument were in good condition (PL-2).

Monitoring wells at Site A were observed to be secured with locks and identified with a well number on the outer casing (PL-3). ANL personnel visit the wells quarterly for sampling, ensure well security, and perform required maintenance at that time.

A large drop off along 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 continue to work with the Palos Forest Preserve District to maintain the 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 observed to be unchanged from last year's inspection (PL-4). 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. All Plot M corner markers were located and observed to be in good condition (PL-5).

Erosion on top of the grass covered mound at Plot-M continues to be an issue. Repairs were made 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 in 2010 to pre-erosion conditions using top soil. It was noted during the 2012 inspection that ruts were returning to the mound cover due to continued bicycle travel across the mound. It was recommended in 2012 that ANL conduct an annual maintenance review of the area and periodically add top soil to erosion ruts as needed to keep them from expanding. Erosion north of the site monument required corrective action by ANL in 2012. Three-inch ruts across the top of the mound were filled in with clean fill and reseeded (PL-6 and PL-7). Ruts are also forming south of the site monument due to continued bicycle use (PL-8 and PL-9). It is recommended if Plot M cannot be off limits to bikes that action should be taken to make a more sustainable pathway for bikes to help mitigate the ongoing cause of the erosion.

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. ANL personnel visit the wells quarterly for sampling, ensure well security, and perform required maintenance at that time.

During the 2012 site inspection it was noted that holes were present in the protective casings of monitoring wells DH-13 and DH-15 that needed to be patched. ANL personnel did a great job patching the holes. Before and after photos for monitoring well DH-13 are provided in PL-10 and PL-11. Before and after photos for monitoring well DH-15 are provided in PL-12 and PL-13.

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 2012 are compiled in *Surveillance of Site A and Plot M, Report for 2012* (ANL-13/01, May 2013) which will be available to the public on the LM website. Monitoring results for 2012 are summarized below.

As described in the ANL annual report, very dry conditions prevailed throughout much of 2012 causing low water levels and higher than normal analytical results at several monitoring locations.

3.1 Surface Water

An intermittent stream flows past Plot M and a seep (location 0006) issues from the stream bank adjacent to the historic burial area. Due to very dry conditions in 2012, the seep and intermittent stream dried up and could not be sampled during the third and fourth quarters of 2012.

Tritium levels exceeded the State of Illinois standard of 20,000 picocuries per liter (pCi/L) at seep location 0006. Seep activities at location 0006 ranged from 103,000 to 118,000 pCi/L (Figure 1). The 118,000 pCi/L activity is the highest activity measured at this location since 1999.

Tritium levels at intermittent stream sampling location 0007 also exceeded the State of Illinois standard of 20,000 pCi/L during the first and second quarters of 2012. Activities at location 0007 ranged from 45,000 to 63,000 pCi/L (Figure 1).

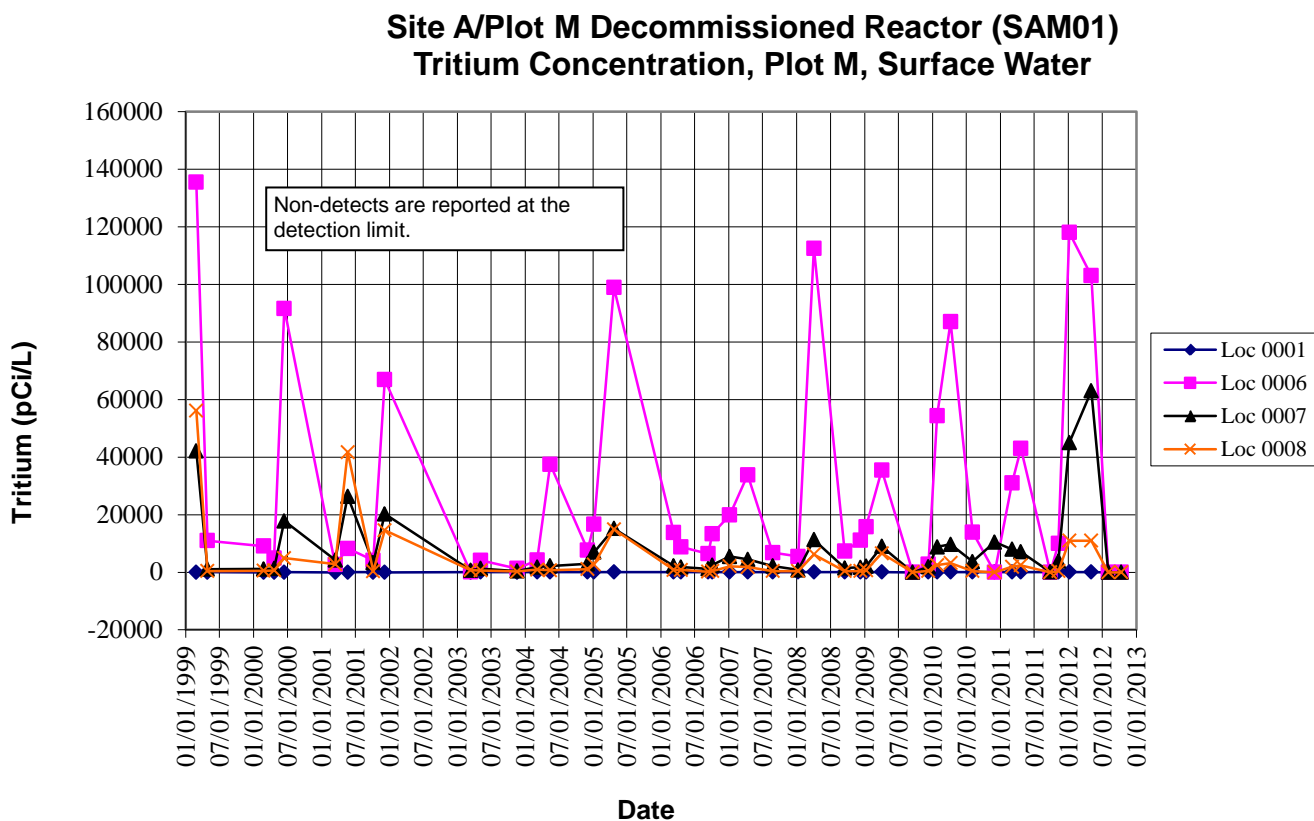


Figure 1. Tritium Activities in Surface Water at Site A/Plot M, Cook County, Illinois

Quarterly surface water samples collected from five area ponds in 2012 (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. During the third quarter of 2012, Horse Collar Slough was dry.

3.2. Groundwater—Glacial Drift

In 2012, tritium was detected in the groundwater at Site A in four of the six monitoring well locations completed in the glacial drift. Tritium was not detected in monitoring wells B51 or B52. No measured activities exceeded the standard of 20,000 pCi/L. Activities ranged from non-detect (less than 100 pCi/L) to 2,200 pCi/L (Figure 2).

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

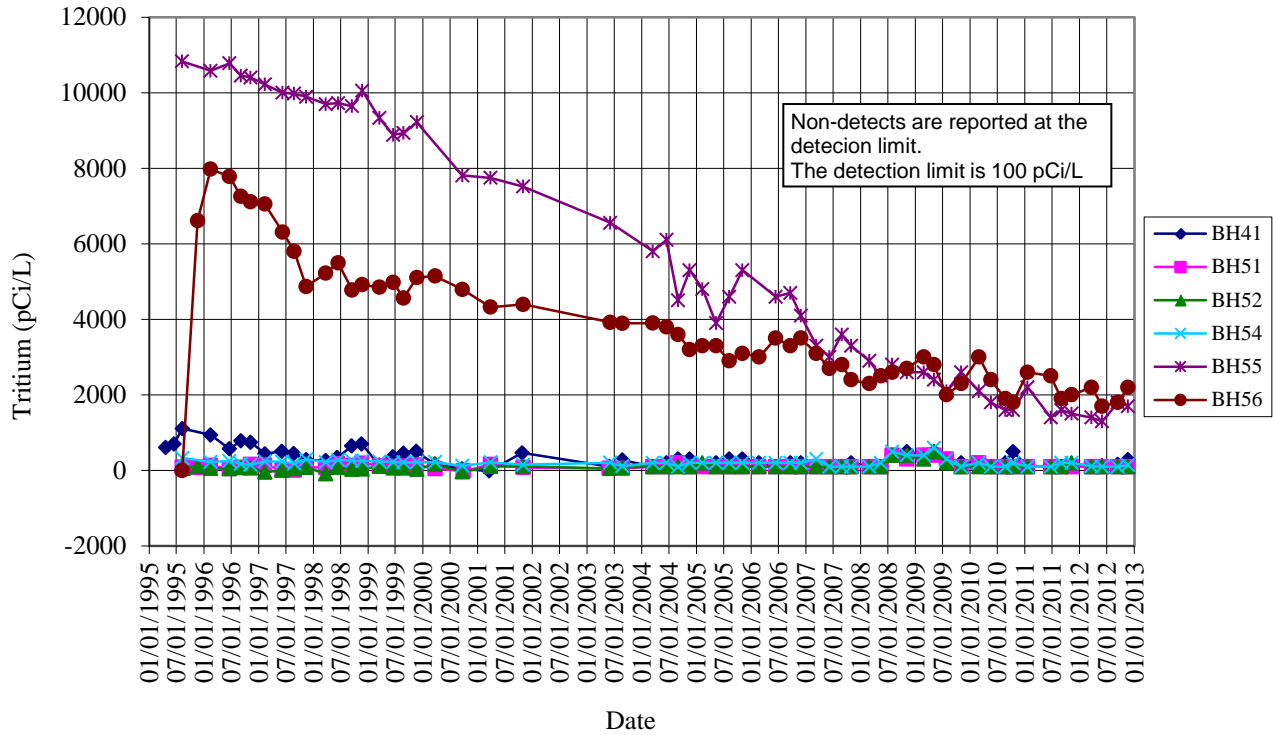


Figure 2. Tritium Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2012, 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 1.30 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**

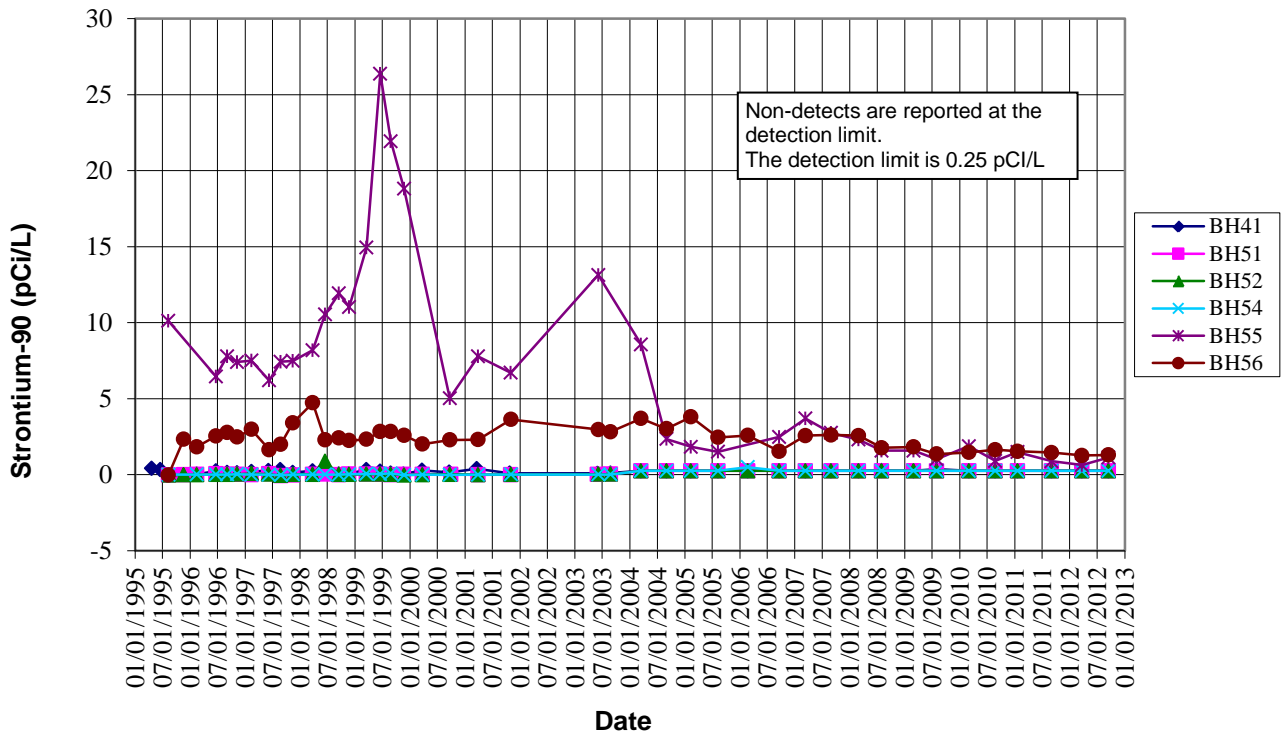


Figure 3. Strontium-90 Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2012, tritium was detected in the groundwater beneath Plot M at all nine of the monitoring wells completed in the glacial drift. Tritium concentrations ranged from 9,100 pCi/L to 822,000 pCi/L (Figure 4). Locations BH9 and BH10 were both dry during third and fourth quarters of 2012.

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

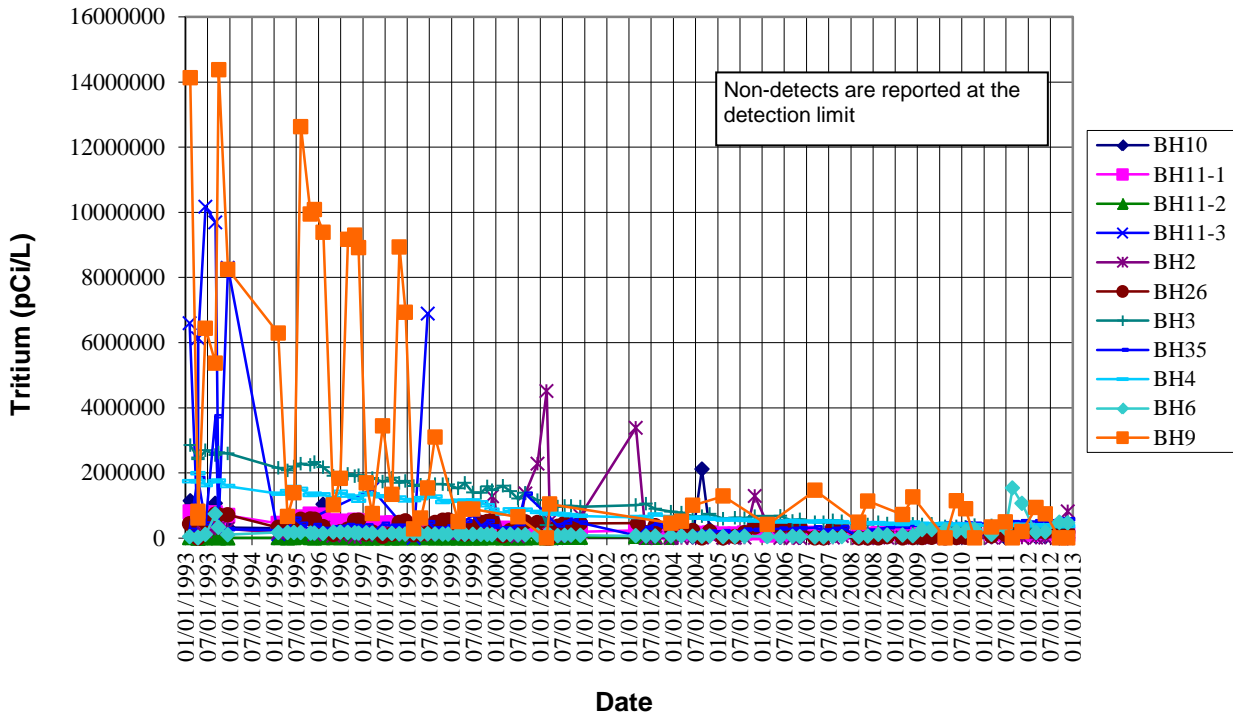


Figure 4. Tritium Activities in Groundwater in the Glacial Drift at Plot M, Cook County, Illinois

In 2012, 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 2.962 pCi/L, but none exceeded the State of Illinois standard of 8 pCi/L.

3.3. Groundwater—Dolomite Bedrock

In 2012, tritium was detected in the groundwater at the picnic wells at the Red Gate Woods picnic area. As reported last year, in 2011 Picnic Well 5159 had its highest tritium activity ever (3,600 pCi/L). The activity at Picnic Well 5159 was much lower in 2012; the highest activity measured was 740 pCi/L (Figure 5). The tritium activity measured at Picnic Well 5160 increased in 2012 up to 2090 pCi/L. This is the highest activity measured at this well since 1999. Activities for the two picnic wells in 2012 ranged from 120 pCi/L to 2,090 pCi/L (Figure 5). No activities measured in 2012 exceeded the State of Illinois standard of 20,000 pCi/L.

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

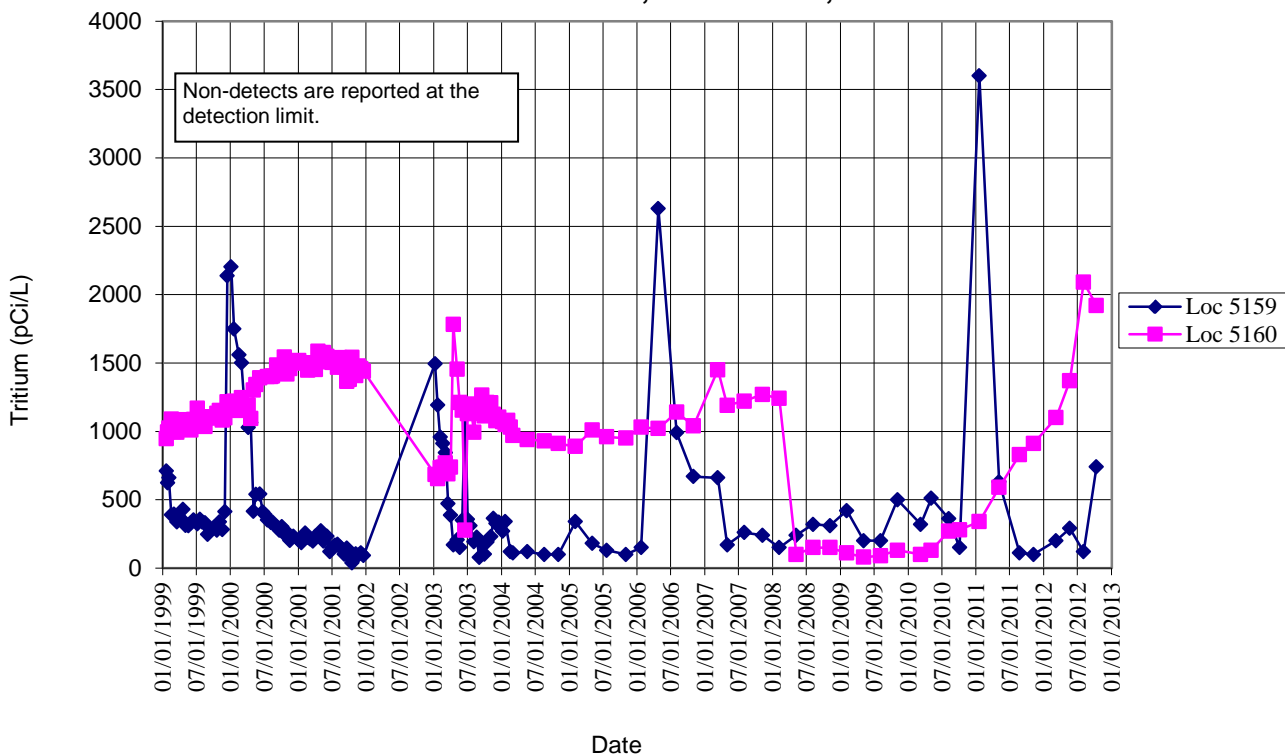


Figure 5. Tritium Activities in Groundwater in the Picnic Wells, Site A/Plot M, Cook County, Illinois

In 2012, 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 2,800 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**

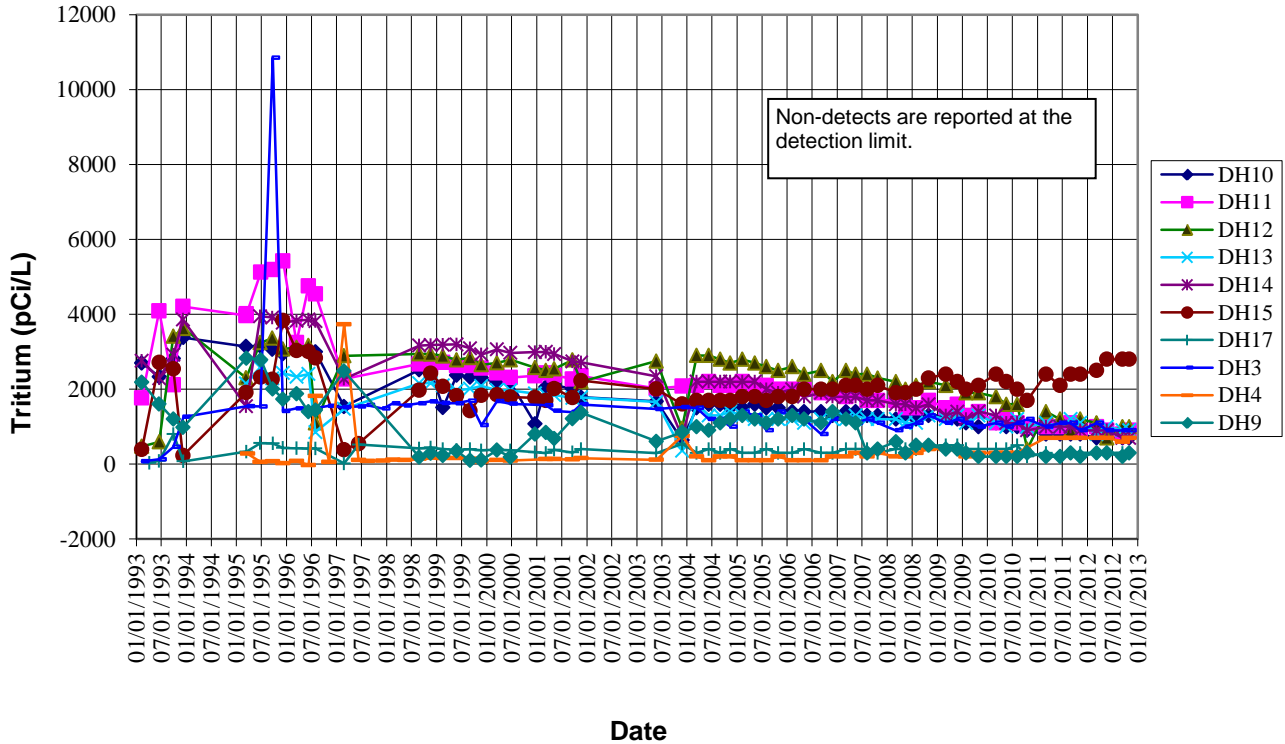


Figure 6. Tritium Activities in Groundwater in the Dolomite Bedrock, Site A/Plot M, Cook County, Illinois

3.4. Risk Assessment

As reported by ANL, 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. 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.

2. 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 (page 3).

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

3. Additional erosion repair work was conducted by ANL at Plot M in 2012. The area was one of the areas that had been repaired in 2010. Ruts will continue to develop as long as bike traffic moves across the top of the mound (page 4).

Recommendation: It is recommended that if Plot M cannot be off limits to bikes, that action be taken to make a more sustainable pathway for the bikes to mitigate the ongoing erosion concerns.

5.0 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL-1	NA	Picnic well 5160.
PL-2	NA	Site A Monument.
PL-3	180	Monitoring well BH-51.
PL-4	NA	Plot M monument, and ruts next to monument.
PL-5	NA	Plot M corner marker next to recent rut repair.
PL-6	NA	Recent rut repair work on top of Plot M.
PL-7	NA	Recent rut repair work on top of Plot M.
PL-8	360	Ruts on top of Plot M.
PL-9	360	Ruts on top of Plot M.
PL-10	NA	2012 photo of monitoring well BH-13.
PL-11	Na	Repair on monitoring well BH-13.
PL-12	NA	2012 photo of monitoring well BH-15.
PL-13	NA	Repair on monitoring well BH-15.



SAM 4/2013. PL-1. Picnic well 5160.



SAM 4/2013. PL-2. Site A Monument.



SAM 4/2013. PL-3. Monitoring well BH-51.



SAM 4/2013. PL-4. Plot M monument, and ruts next to monument.



SAM 4/2013. PL-5. Plot M corner marker next to recent rut repair.



SAM 4/2013. PL-6. Recent rut repair work on top of Plot M.



SAM 4/2013. PL-7. Recent rut repair work on top of Plot M.



SAM 4/2013. PL-8. Ruts on top of Plot M.



SAM 4/2013. PL-9. Ruts on top of Plot M.



SAM 4/2013. PL-10. 2012 photo of monitoring well BH-13.



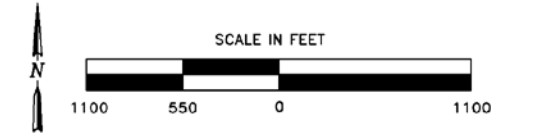
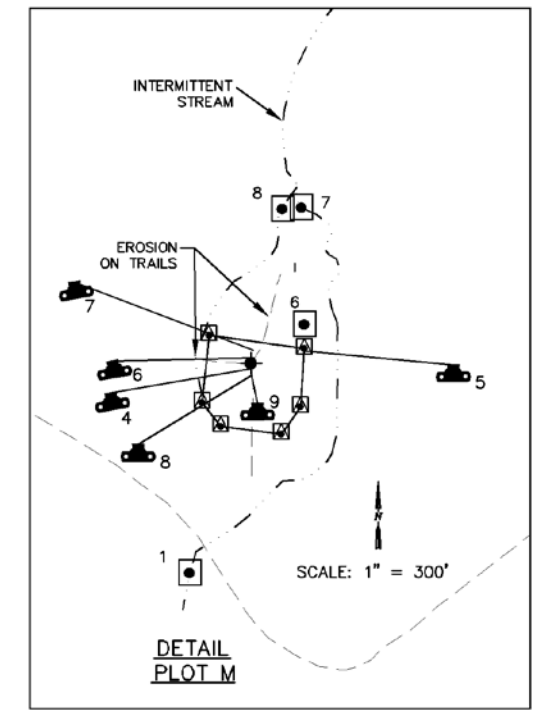
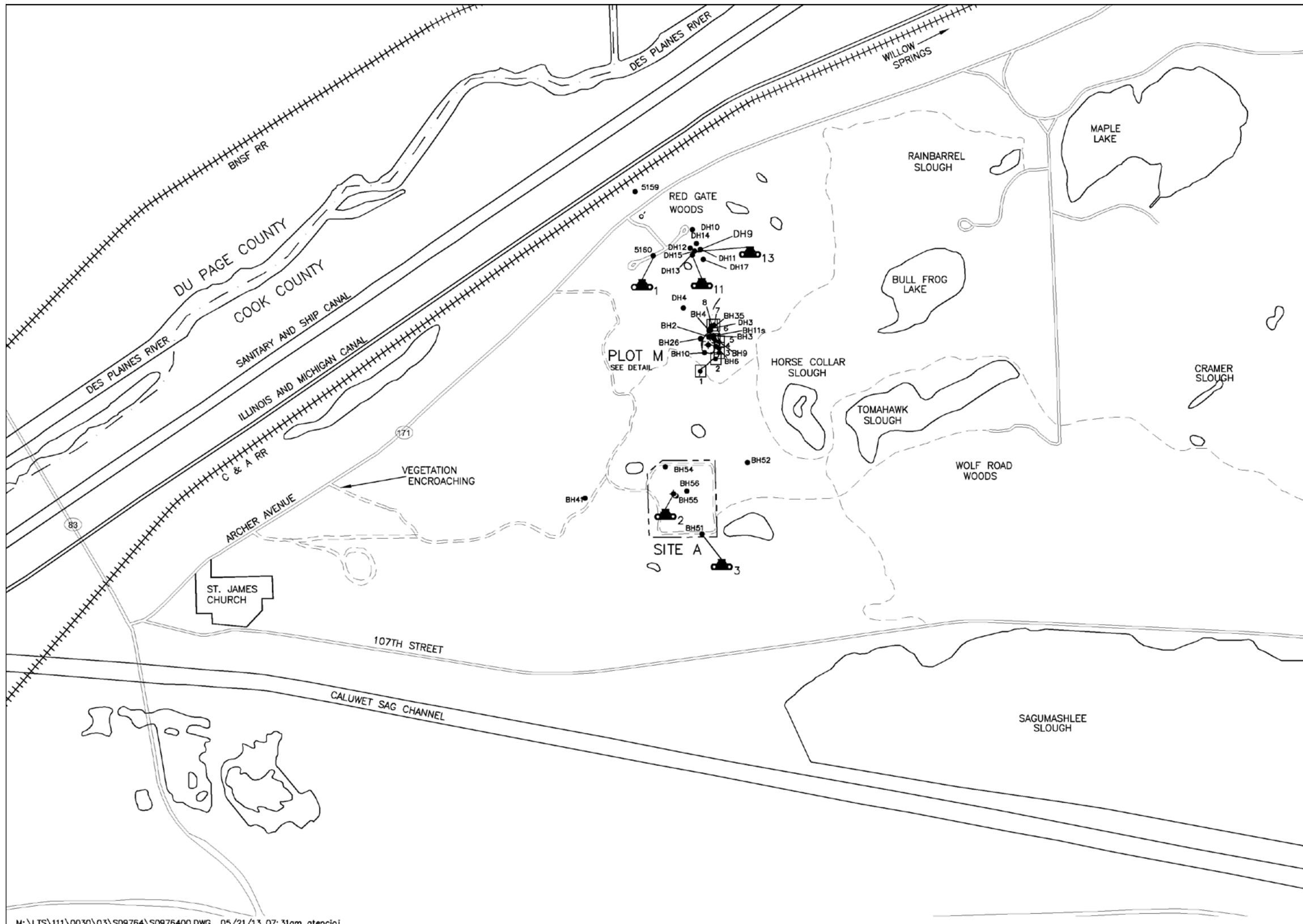
SAM 4/2013. PL-11. Repair on monitoring well BH-13.



SAM 4/2013. PL-12. 2012 photo of monitoring well BH-15.



SAM 4/2013. PL-13. Repair on monitoring well BH-15.



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 10, 2013

U.S. DEPARTMENT OF ENERGY GRAND JUNCTION, COLORADO	Work Performed by S.M. Stoller Corporation Under DOE Contract No. DE-AM01-07LM00080
2013 ANNUAL INSPECTION DRAWING SITE A/PLOT M DECOMMISSIONED REACTOR COOK COUNTY, ILLINOIS	
DATE PREPARED: MAY 14, 2013	FILENAME: S0976400