2010 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 27, 2010. 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.

There are 25 groundwater monitoring wells at the site. ANL personnel visit the wells routinely when they collect water samples. ANL is doing a good job securing the wells with locks and maintaining the outer casings of the wells. A couple of minor well maintenance issues were identified at two of the ten monitoring wells located north of Plot M. A panel on the well head of monitoring well DH–15 is missing, and wires are exposed to the public. It is recommended that the cover be replaced or the wires removed. Metal grating is present around monitoring well DH–14 that could present a tripping hazard to the public and some wires also are exposed at the wellhead. It is recommended that the metal grating and wires be removed.

The holes in the ground surface of Site A (a finding of the 2009 Site Inspection) have been properly filled in with top soil, eliminating them as potential trip hazards to the public.

Erosion on top of the mounded earth cover at Plot M is progressing. It is recommended that the erosion be addressed as soon as possible.

The Draft report titled, *Surveillance of Site A and Plot M, Report for 2009*, issued by Argonne National Laboratory, indicates that tritium and strontium-90 contamination remains in groundwater, and tritium remains in surface water, with concentrations generally consistent with previous results.

1.0 Introduction

This report presents the findings of the 2010 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 2009. 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, placed 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 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.

2.0 Inspection Results

M. Miller (Chief Inspector) and K. Broberg (Assistant Inspectors) both with S.M. Stoller Corporation, the Legacy Management (LM) contractor, conducted the inspection on April 27, 2010. Inspection participants included:

- A. Kleinrath, DOE–LM
- L. Moss, Argonne National Lab (ANL)
- A. Fracaro 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 was in place (PL–1). The handles were removed from the pump to prevent exposure to tritium detected in the dolomite aquifer as well as fecal coliform detected in the groundwater. 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 (PL–2) and the monitoring wells. The site marker was in good shape.

All monitoring wells at Site A (with the exception of monitoring well BH–41) were inspected and observed to be secured with locks and identified with a well number on the outer casing. ANL personnel stated that monitoring well BH–41 was locked and in good shape so inspectors decided not hike back to it this year. 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.

The holes identified last year during the 2009 inspection at Site A have been properly filled in with topsoil eliminating them as tripping hazards (PL–3).

A large drop off on the access road leading to Site A (at the point where the old asphalt connects with the dirt road) remains. Noted in the 2009 inspection, the drop off is present toward one side of the road, so the road remains passable at this time. 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

Inspectors drove from Site A to an area leading back to Plot M, and then walked back to 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. Some words on the marker are chiseled off. All of the Plot M corner markers were located and were in good shape, but as discussed below, erosion is beginning to undercut some of the markers and unless the erosion is corrected soon the markers will be further impacted.

Erosion on top of the grass covered mound at Plot M (identified in previous inspections) has not been repaired. Two areas are present, one north of the site marker and one west of the site marker. Efforts by ANL to secure a subcontractor to repair the erosion are underway. The area north of the site marker has grown in size to be approximately 31 feet by 12 feet by 2-feet deep (PL–4, PL–5, and PL–6). The erosion in this area is impacting monitoring well BH–9 (PL–7) and also the area around one of the Plot M corner markers (PL–8). The erosion west of the site marker has grown to be approximately 13 feet by 3 feet by 1-foot deep (PL–9). The erosion in this area is also getting close to one of the Plot M corner markers (PL–10). It is recommended that both areas be restored to pre-erosion conditions using top soil to fill in the areas and perhaps honeycomb baffles to decrease the cutting power of future water flows in the areas.

All nine monitoring wells at Plot M and ten monitoring wells north of Plot M were inspected and found to be 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 were identified in two of the ten wells north of Plot M. A panel on the well head of monitoring well DH–15 is missing, and wires are exposed to the public (PL–11). It is recommended that the cover be replaced or the wires removed. Metal grating is present around monitoring well DH–14 that could present a tripping hazard to the public and some wires also are exposed at the wellhead (PL–12). 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 are compiled in *Surveillance of Site A and Plot M, Report for 2009* (ANL-10/01, April 2010) which will be available to the public on the LM website. Monitoring results for 2009 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.

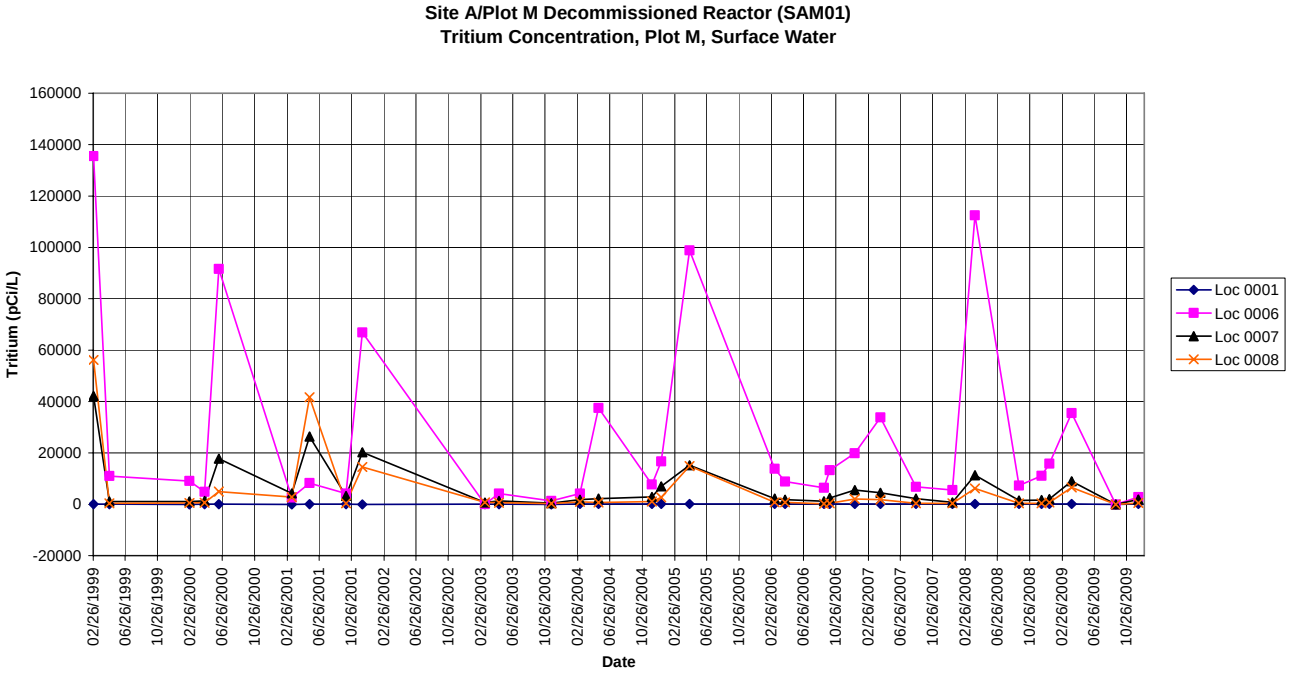

Figure 1. Tritium Activities in Surface Water at Site A/Plot M, Cook County, Illinois

Quarterly surface water samples collected from five area ponds in 2009 (NW Site A, SE Site A, Bull Frog Lake, Horse Collar Slough, and Tomahawk Slough) ranged from non detect (< 100 pCi/L) to 120 pCi/L.

3.2. Groundwater—Glacial Drift

In 2009, tritium was detected in the groundwater at Site A in all six monitoring wells 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).

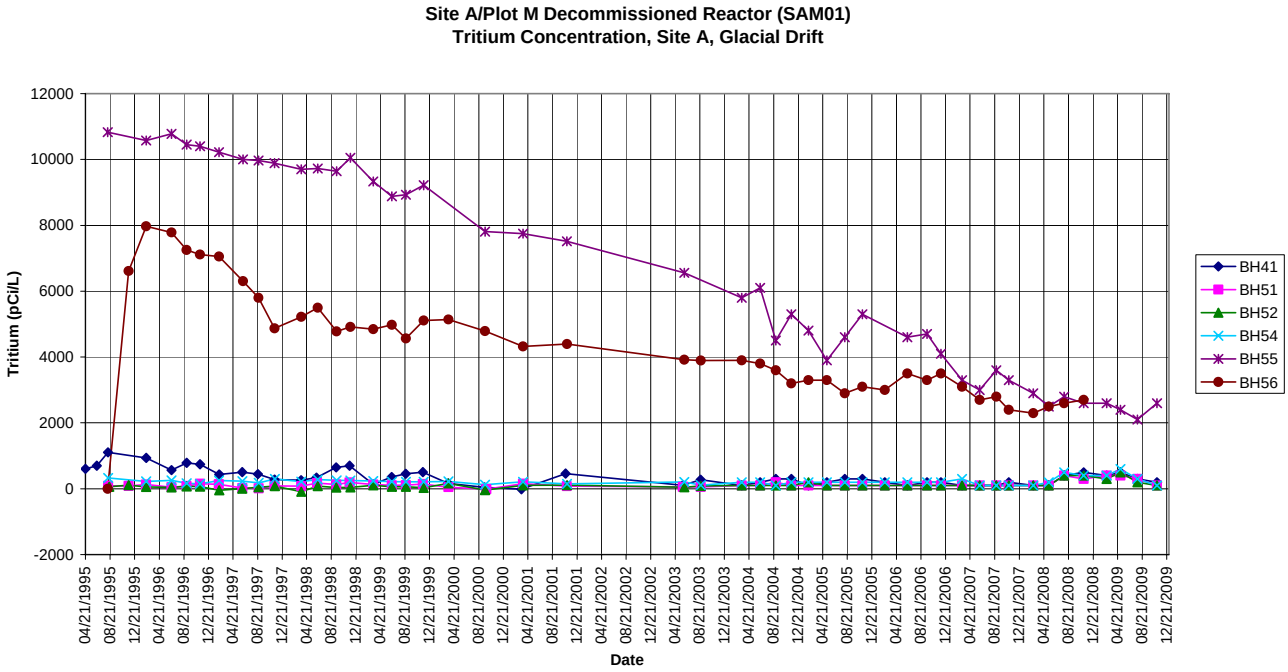

Figure 2. Tritium Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2009, strontium-90 was detected in the groundwater at Site A in three of the six monitoring wells completed in the glacial drift. Activities ranged from non-detect (less than 0.25 pCi/L) to 1.82 pCi/L, but none exceeded the State of Illinois standard of 8 pCi/L (Figure 3).

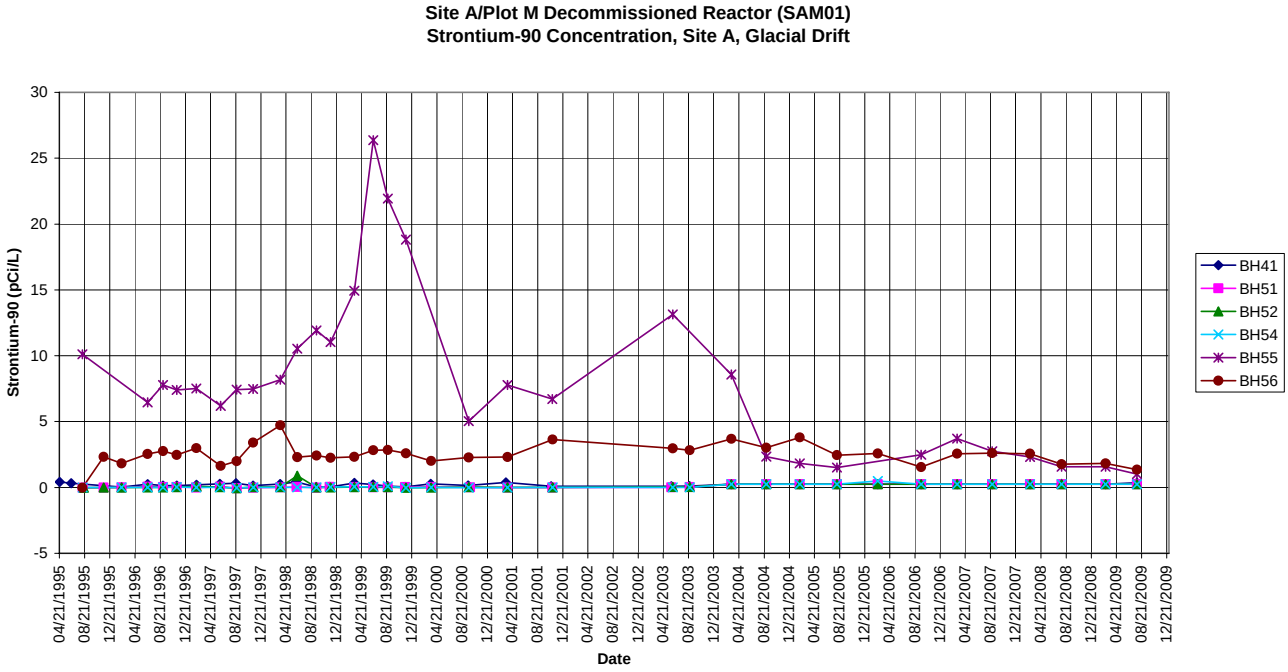

Figure 3. Strontium-90 Activities in Groundwater in the Glacial Drift at Site A, Cook County, Illinois

In 2009, tritium was detected in the groundwater at Plot M at all nine monitoring wells completed in the glacial drift. Tritium concentrations ranged from 600 pCi/L to 1,256,000 pCi/L (Figure 4). The highest reading was taken at BH–9 on May 26, 2009. BH–9 was dry for the remainder of 2009.

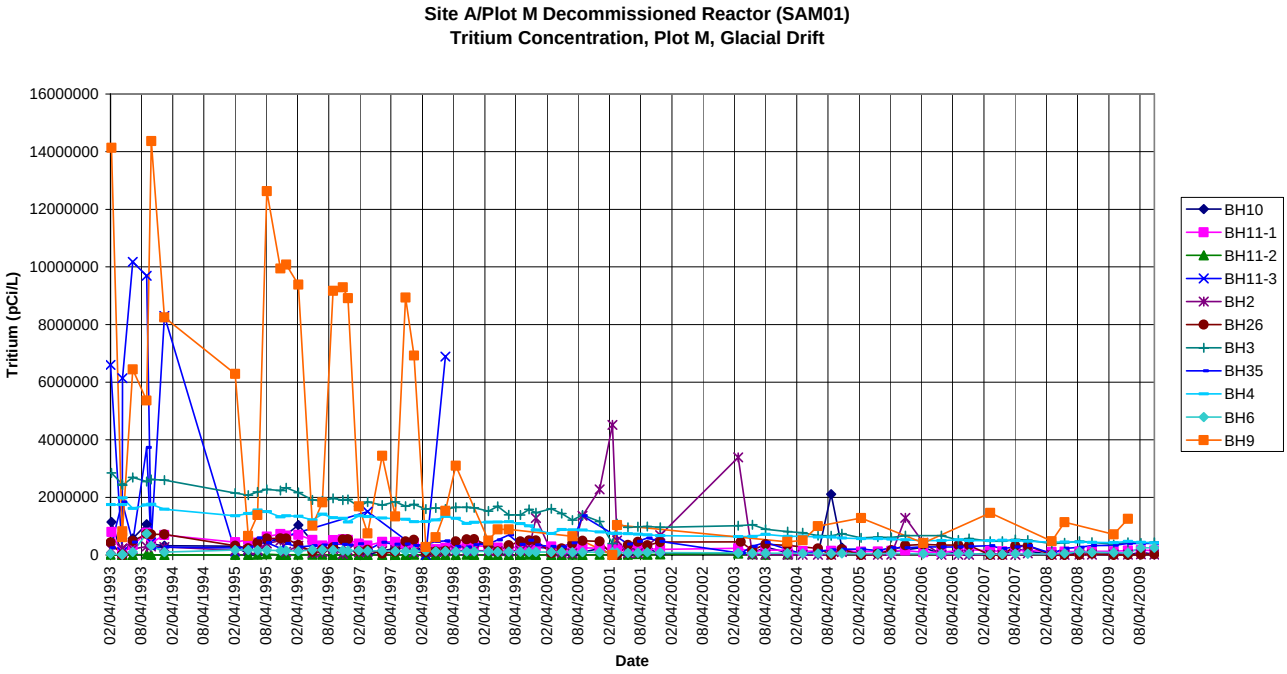

Figure 4. Tritium Activities in Groundwater in the Glacial Drift at Plot M, Cook County, Illinois

In 2009, 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 6.26 pCi/L, but none exceeded the State of Illinois standard of 8 pCi/L.

3.3. Groundwater—Dolomite Bedrock

In 2009, tritium was detected in the groundwater at the picnic wells at the Red Gate Woods picnic area. Activities ranged from 80 pCi/L to 500 pCi/L (Figure 5). None exceeded the standard of 20,000 pCi/L.

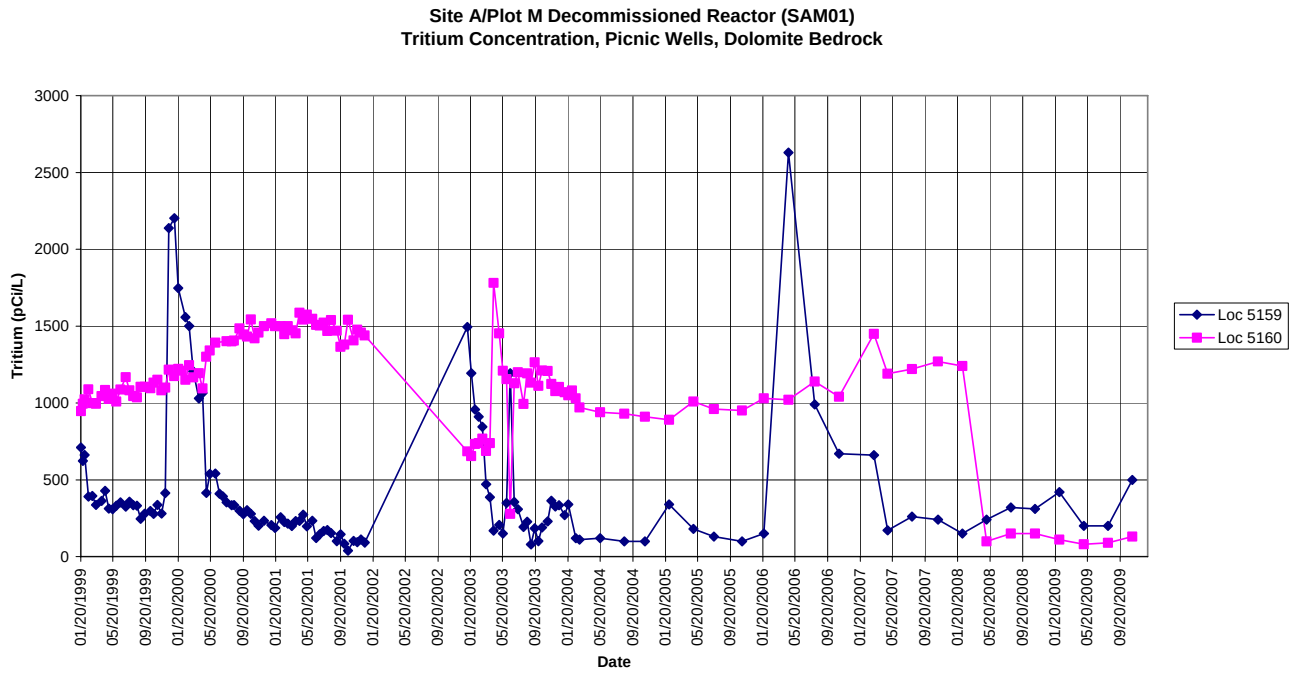

Figure 5. Tritium Activities in Groundwater in the Picnic Wells, Site A/Plot M, Cook County, Illinois

In 2009, 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 2,200 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

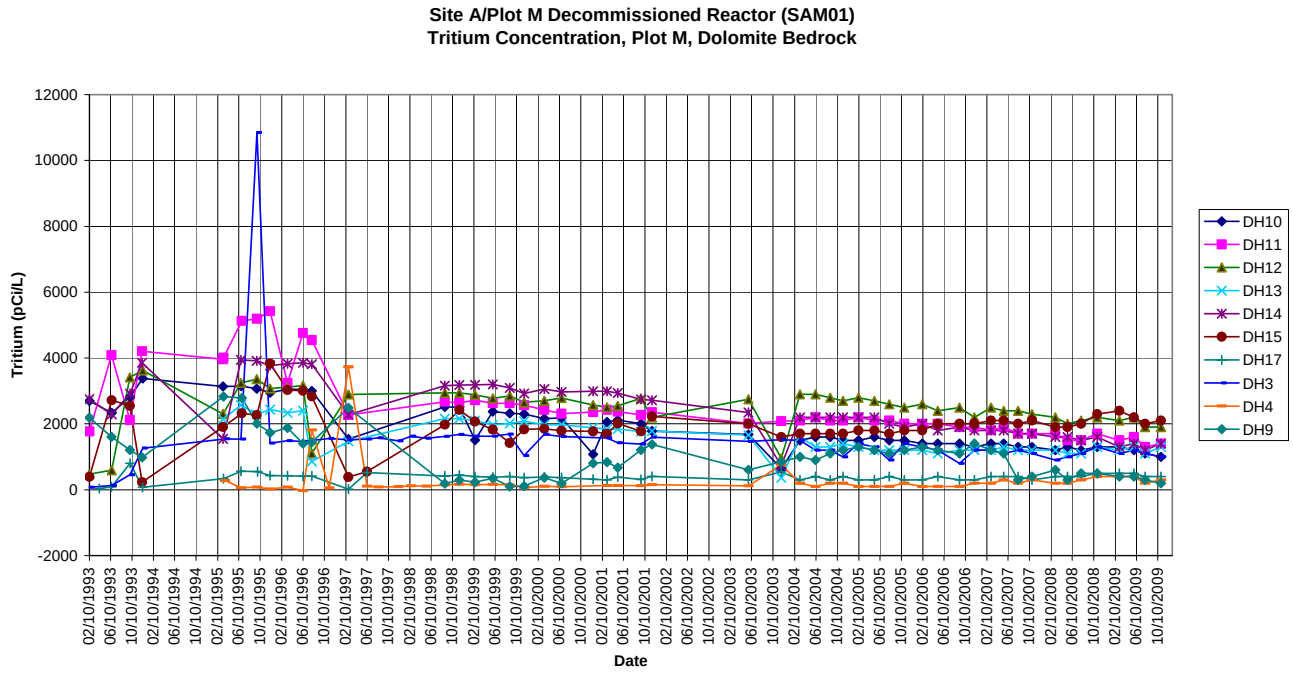

Figure 6. Tritium Activities in Groundwater in the Dolomite Bedrock, Site A/Plot M, Cook County, Illinois

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. 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 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. A panel on the well head of monitoring well DH–15 is missing and wires are exposed to the public (page 4).

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

4. Metal grating is present around monitoring well DH–14 that could present a tripping hazard to the public, and some wires are exposed at the wellhead (page 4).

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

5. Erosion on top of the mounded earth cover at Plot M is progressing (page 4).

   Recommendation: It is recommended that the erosion be addressed as soon as possible.

5.0 Photographs

Photograph Location Number	Azimuth	Photograph Description
PL–1	135	Public drinking water well at Red Gate Woods is inoperable because the handle has been removed.
PL–2	45	Site Marker at Site A.
PL–3	NA	Filled in hole at Site A.
PL–4	180	Erosion at Plot M, north of site marker.
PL–5	90	Erosion at Plot M, north of site marker.
PL–6	90	Erosion at Plot M undercutting the corner marker north of site marker.
PL–7	135	Monitoring well BH–9 impacted by erosion north of the Plot M site marker.
PL–8	NA	Erosion on Plot M north of the site marker is undercutting a corner marker.
PL–9	NA	Erosion at Plot M west of the site marker.
PL–10	NA	Erosion at Plot M west of the site marker.
PL–11	NA	Back panel on protective casing at monitoring well DH–15 is missing. Wires are exposed to the public.
PL–12	NA	Grate around monitoring well DH–14.

SAM 4/2010. PL–1. Public drinking water well at Red Gate Woods is inoperable because the handle has been removed.

SAM 4/2010. PL–2. Site Marker at Site A.

SAM 4/2010. PL–3. Filled in hole at Site A.

SAM 4/2010. PL–4. Erosion at Plot M, north of site marker.

SAM 4/2010. PL–5. Erosion at Plot M, north of site marker.

SAM 4/2010. PL–6. Erosion at Plot M undercutting the corner marker north of site marker.

SAM 4/2010. PL–7. Monitoring well BH–9 impacted by erosion north of the Plot M site marker.

SAM 4/2010. PL–8. Erosion on Plot M north of the site marker is undercutting a corner marker.

SAM 4/2010. PL–9. Erosion at Plot M west of the site marker.

SAM 4/2010. PL–10. Erosion at Plot M west of the site marker.

SAM 4/2010. PL–11. Back panel on protective casing at monitoring well DH-15 is missing. Wires are exposed to the public.

SAM 4/2010. PL–12. Grate around monitoring well DH–14.

DES PLAINES RIVER
BNSF RR
WILLOW SPRINGS
DU PAGE COUNTY
COOK COUNTY
DES PLAINES RIVER
SANITARY AND SHIP CANAL
ILLINOIS AND MICHIGAN CANAL
C & A RR
5158
5159
RED GATE WOODS
DH10
DH14
DH12
DH15
DH13
DH11
DH17
12
11
1
RAINBARREL SLOUGH
MAPLE LAKE
BULL FROG LAKE
DH4
BH4
BH2
BH26
BH10
BH35
DH3
BH11s
BH3
BH9
BH6
PLOT M
SEE DETAIL
HORSE COLLAR SLOUGH
CRAMER SLOUGH
TOMAHAWK SLOUGH
WOLF ROAD WOODS
171
83
VEGETATION ENCROACHING
ARCHER AVENUE
BH52
BH54
BH56
BH55
BH41
BH51
SITE A
ST. JAMES CHURCH
107TH STREET
CALUWET SAG CHANNEL
SAGUMASHLEE SLOUGH

INTERMITTENT STREAM
EROSION ON TRAILS
SCALE: 1" = 300'
DETAIL PLOT M

SCALE IN FEET
1100 550 0 1100

EXPLANATION

- CORNER MARKER
- 5153 PICNIC WELL
- DH2 DOLOMITE WELL
- BH28 BOREHOLE
- 5 SURFACE SAMPLE LOCATION
- SITE MARKER
- SITE BOUNDARY
- DIRT ROAD
- PAVED HIGHWAY OR STREET
- NON-MOTORIZED TRAIL
- RAILROAD
- RIVER, CANAL, LAKE, POND, SLOUGH
- COUNTY LINE
- 1 PHOTO LOCATION, DIRECTION, AND NUMBER

ANNUAL INSPECTION CONDUCTED
APRIL 27, 2010

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

2010 ANNUAL INSPECTION DRAWING
SITE A/PLOT M DECOMMISSIONED REACTOR
COOK COUNTY, ILLINOIS

DATE PREPARED:	FILENAME:
JUNE 2, 2010	S0605600

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