ENERGY AND ENVIRONMENT CABINET

Steven L. Beshear
Governor

Leonard K. Peters
Secretary

Department for Environmental Protection
Division of Waste Management
Maxey Flats Project
2597 Maxey Flat Rd.
Hillsboro, KY 41049
606-783-8680

March 26, 2010

Ms. Pam Scully, SRPM, Kentucky/Tennessee Section
USEPA-Region IV
Sam Nunn Atlantic Federal Center
Tower-11th Floor (Mail Code: 4WD-NSMB)
61 Forsyth Street, SW
Atlanta, GA 30303-8960

Subject: Maxey Flats Project –2009 Annual Report

Dear Ms. Scully;

The Commonwealth of Kentucky is submitting the 2009 Annual Report for the Maxey Flats Project to fulfill the requirements of Section 4.0 of the Performance Verification Standard Plan (PSVP). The report was prepared by the Maxey Flats Section and summarizes information from the period of January 2009 through December 2009.

If you have any questions, please contact me at (606) 783-8680.

Sincerely,

Scott Wilburn, Project Coordinator

e-attachment

cc: Derek Matory, USEPA
Jon Richards, USEPA
Bennie Underwood, *de maximis, inc.*
Nicole Barkasi, *de maximis, inc.*
Vijendra Kothari, USDOE
Michelle Miller, USDOE
Shawn Cecil, Superfund, Division of Waste Management
Matt McKinley, Cabinet for Health Services, Radiation Health Branch

MAXEY FLATS PROJECT
ANNUAL REPORT
2009

March 26, 2010

Energy and Environment Cabinet
Department for Environmental Protection
Division of Waste Management
Superfund Branch

Maxey Flats Project
2597 Maxey Flat Road
Hillsboro, KY 41049
606-783-8680

Table of Contents

Page

Table of Contents

Page

Table of Contents

List of Acronyms

BoRP	Balance of Remedial Phase
Commonwealth	Commonwealth of Kentucky
DCSW	Drainage Channels Surface Water
IRP	Initial Remedial Phase
IMP	Interim Maintenance Period
MFP	Maxey Flats Project
O&M	Operation and Maintenance Requirement Summary
PSVP	Performance Standards Verification Plan
PSSW	Perennial Streams Surface Water
RA	Remedial Action
USEPA	U.S. Environmental Protection Agency
USGS	U.S. Geological Survey
REI	Reasonably Exposed Individual
ARARs	Applicable or Relevant and Appropriate Requirements

List of Appendices

(Files separate from Main Report)

1.0 Introduction

The Commonwealth is submitting this report in accordance with Section 4.0 of the PSVP. The report summarizes sampling and maintenance activities listed in the Interim Maintenance Period Work Plans, PSVP, and the O&M.

2.0 Scope of Work

The IMP is ongoing pursuant to the Consent Decree (Civil Action Number 95-58) signed by the USEPA, the Maxey Flats Steering Committee (Settling Private Parties), and the Commonwealth. The Commonwealth is responsible for completion of the BoRP that includes the Interim Maintenance Period, Final Closure Period and Associated Remedial Activities and Performance Monitoring.

The Interim Maintenance Period Work Plan describes the tasks to be completed including:

- Surface/ground water monitoring
- IRP cap maintenance and replacement
- Trench leachate management and monitoring
- Subsidence monitoring and surveys
- Erosion evaluation
- General site maintenance
- Contaminated liquid and waste disposal
- Data collection, analysis, and reporting
- Site drainage and erosion control features
- Installation of a horizontal flow barrier, if necessary

3.0 Surface Water Monitoring

All IMP Surface water monitoring locations are evaluated based on tritium sampling results. The 2009 annual tritium averages for all surface water locations yielded results below their specified action levels. The action level is the ARAR's screening level of 20 pCi/ml.

3.1 East Detention Basin

The first point of monitoring surface water runoff from the MFP is at the East Detention Basin (EDB). Sampling is performed at the EDB based on storm events of 2.8 inches of rainfall in a 24-hour period. In order for the sequential sampler to collect a storm event sample, the sampler is programmed to collect a sample based on 0.11 inches of rainfall per hour. A total of 41 samples were collected in 2009 and analyzed for tritium. Results ranged from 0.03 to 1.99 pCi/ml providing an average of 0.90 pCi/ml. Annual averages for 2005, 2006,

2007 and 2008 were of 0.16 pCi/ml, 0.16 pCi/ml, 0.55 pCi/ml, and 0.05 pCi/ml, respectively.

3.2 Perennial Streams Surface Water

Perennial Streams Surface Water (PSSW) monitoring is conducted at five locations in three streams inside and outside the MFP's boundary. These locations are monitored using sequential samplers that collect a four aliquot, daily composite. The PSSWs are compared to an action level of 20 pCi/ml. A total of 1,798 PSSW samples were collected and analyzed for tritium during 2009 with no anomalous data reported. For 2009 all PSSW locations were below the average annual tritium concentration action limit of 20 pCi/ml; assuring that the 4 mrem/yr IMP specified dose limit has been met

Sample location 122A serves as the background sample. It is located on Rock Lick Creek up-gradient from site influence. Tritium results for 2009 at this location ranged from -0.24 to 1.42 pCi/ml and averaged 0.07 pCi/ml. Annual averages for 2005, 2006, 2007 and 2008 were 0.05 pCi/ml, 0.05 pCi/ml, 0.02 pCi/ml, and -0.10 pCi/ml, respectively.

Sample location 106 is located on No Name Branch, a tributary to Rock Lick Creek. Location 106 receives direct influence from drain 144 and exhibits seasonal tritium level fluctuation concurrent with drain 144. Tritium results for 2009 at this location ranged from 1.00 to 20.14 pCi/ml and averaged 3.39 pCi/ml. Annual averages for 2005, 2006, 2007 and 2008 were 4.23 pCi/ml, 3.41 pCi/ml, 5.24 pCi/ml, and 3.33 pCi/ml, respectively.

Sample location 122C is located on Rock Lick Creek, downstream of 106 and 143 influences. Tritium results for 2009 at this location ranged from 0.12 to 2.82 pCi/ml and averaged 0.88 pCi/ml. Annual averages for 2005, 2006, 2007 and 2008 were 1.01 pCi/ml, 0.86 pCi/ml, 1.27 pCi/ml, and 0.87 pCi/ml, respectively.

Sample location 103E is located on Drip Springs Creek and receives influence from Drain 107. Tritium results for 2009 at this location ranged from -0.08 to 1.06 pCi/ml and averaged 0.36 pCi/ml. Annual averages for 2005, 2006, 2007 and 2008 were 0.67 pCi/ml, 0.47 pCi/ml, 0.62 pCi/ml, and 0.47 pCi/ml, respectively.

Sample location 102D is the only PSSW sampler located outside the Buffer Zone. Due to its location below the confluence of three streams and its location outside the Buffer Zone, 102D is designated as the compliance point for site runoff. In addition to the action level of 20 pCi/ml this location also monitors the exposure to the REI and is compared to a 4-mrem/year dose limit. Tritium results for 2009 at this location ranged from -0.12 to 1.95 pCi/ml and averaged 0.58 pCi/ml; well below the action level thus assuring that the 4 mrem/yr dose limit has been

achieved. Annual averages for 2005, 2006, 2007 and 2008 were 0.79 pCi/ml, 0.62 pCi/ml and 0.93 pCi/ml, 0.62 pCi/ml, respectively.

3.3 Drainage Channels Surface Water

Three primary drains that produce intermittent flow are monitored and compared to a 25 mrem/year standard and a more restrictive annual 100 pCi/ml average action level. These drains are sampled on a daily composite basis by automated samplers that collect four daily aliquots. For 2009 all three drains produced monthly averages below the 100pCi/ml action level assuring that the REI is less than the *25* mrem/yr IMP standard. A total of 831 samples were collected from the drains for tritium analysis.

Sample location C107 is located at the base of the West Drain which discharges into Drip Springs Creek. For 2009 this location yielded 161 samples for tritium analysis. Results ranged from 0.89 pCi/ml to 13.91 pCi/ml and averaged 5.87 pCi/ml. Annual averages for 2005, 2006, 2007 and 2008 were 16.97 pCi/ml, 8.62 pCi/ml, 13.28 pCi/ml, and 10.42 pCi/ml, respectively.

Sample location 143 is located near the base of the South Drain which discharges into Rock Lick Creek. For 2009 this location yielded 330 samples for tritium analysis. Results ranged from -0.17 pCi/ml to 1.11 pCi/ml and averaged 0.10 pCi/ml. Annual averages for 2005, 2006, 2007 and 2008 were 0.10 pCi/ml, 0.10 pCi/ml, 0.07 pCi/ml, and -0.11 pCi/ml, respectively.

Sample location 144 is located at the base of the East Drain which discharges into No Name Branch. For 2009 this location yielded 340 samples for tritium analysis. Results ranged from 1.59 pCi/ml to 136.04 pCi/ml and averaged 44.34 pCi/ml. Annual averages for 2005, 2006, 2007 and 2008 were 40.03 pCi/ml, 43.35 pCi/ml, 70.03 pCi/ml, and 33.76 pCi/ml, respectively.

3.4 Sampling Equipment Status

Samples were collected in accordance with the PSVP unless problems occurred beyond the site's control such as freezing lines, washouts, equipment failure, no flow, or power outages.

4.0 Groundwater Monitoring

4.1 Alluvial Wells

Alluvial well samples for 2009 were collected as outlined in the PSVP and the 2007 US EPA Five Year Review. Five wells were sampled in 2009; AW-6, 10 and 12 are sampled on an annual basis and AW-1 and 7 are sampled on a quarterly basis. During this reporting period, a total of 11 alluvial well samples

were collected and analyzed for tritium, yielding results typical of historic range. For 2009, AW-7 yielded the highest tritium analysis; 5.98 pCi/ml. Comparison of this analysis to the 20 pCi/ml ARAR screening level indicates compliance of the Action Level.

Access to the alluvium within the buffer zone is controlled by the Commonwealth, therefore the alluvial wells are not considered a drinking water source and do not represent a potential radiological dose to the public.

4.2 USGS Monitoring Wells

Six monitoring wells known as the USGS Monitoring Wells are located along the west perimeter fence with the exception of one well located within the restricted area north of the burial trenches and EMC bunker. Prior to July 2009, these wells were maintained by the USGS with continuous level data loggers and hand measured on a quarterly basis. Due to budgetary constraints, the Commonwealths' contract with USGS was renegotiated. The automated level monitoring equipment was removed and quarterly hand measurements and sampling activities are now conducted by Maxey Flats Project staff. A table with current year and IMP historic data appears in the electronic file, Appendix D.

The 2009 tritium results for the USGS wells were all typical of historical data and trends. Contamination monitoring of the USGS Monitoring Wells is not a requirement of the IMP Work Plan.

5.0 Data Management

A data package is prepared for each group of samples analyzed on site. The data package contains the tritium instruments' QC charts (efficiency and background), chain of custody forms, raw data sheets, and data reduction sheets. Data is reviewed and validated by Denuke, Inc., a third party contractor that specializes in radiation services. Following data validation, the data is entered into the site's database and transmitted to USEPA, USDOE, *de maximis, inc*. and the Commonwealth. These packets are available on site for review. Results are contained in the electronic file, Appendix A.

6.0 Rainfall Data

Presently there are three rain gauges associated with the MFP; East Detention Basin (EDB), sampling location 102D, and the main office. The official annual rainfall data is obtained primarily from the EDB rain gauge. This rain gauge was chosen because of its conjunction with the sampler at the EDB. Rainfall data from the other two rain gauges may be used to determine the official annual rainfall if the EDB rain gauge is nonfunctioning. A total of 45.52 inches of

rainfall was measured at the EDB gauge during 2009, this is compared to an annual average area precipitation of 45.55 inches (see electronic file, Appendix B).

7.0 Initial Remedial Phase Cap Maintenance

7.1 Geomembrane Liner and Boots

The liner covering the trench cap was inspected monthly as part of the monthly inspection and a comprehensive visual and air lancing inspection was completed in June as part of the annual inspection.

The trench sump boots were inspected during the monthly liner inspections and during the collection of trench sump liquid level measurements. The IMP inspections have revealed no defects to the liner material but deterioration of the extrusion welds was widely observed. An increased deterioration rate of the welds has been documented in the annual reports since 2006.

During 2009 a total of 55 repairs were made to the liner and boots. For comparison 89 repairs were completed in 2008, 43 in 2007, 54 in 2006, 47 in 2005 and 26 in 2004. Repair numbers for 2004-2008 will appear to vary from previous annual reports due to multiple reasons: previous reports tracked defects. Not all defects required repair and sometimes multiple defects could be fixed with a single repair. Also, some previous reports only accounted for defects found during the annual inspection. This report documents the annual total number of repairs made to the liner requiring completion of a liner repair form.

7.2 Headwall Maintenance

Headwall maintenance includes the four headwalls and associated items along the North Channel and the northeast corner piping, geomembrane liner batten and the liquid collection system.

During this reporting period, debris/leaves were removed numerous times from the trash grate and restricting plate of the upstream headwall of the northeast corner piping. Removal of the leaves/debris will be a continuous maintenance issue for the site.

7.3 Subsidence Monitoring and Repair

Subsidence inspections were conducted monthly in accordance with the O&M, Section 3.3.3, and Subsidence Monitoring. No areas requiring subsidence repair were identified in 2009. Two areas are being closely monitored for subsidence criteria on Trench 32. The potential exists for these two areas to develop into one subsidence thus meeting subsidence criteria.

Curd Surveying, Inc. performed the annual engineering subsidence survey of the trench cap in May 2009. Elevations were obtained for the 28 subsidence control points established during the remedial work and six additional points established in 2008. The measured variations between the 2008 and 2009 subsidence control points ranged from +0.03 feet to -0.13 feet. The variations between the 2004 (baseline) and the 2009 subsidence control points ranged from 0.0 feet to -0.32 feet. No particular area of significant subsidence was indicated.

7.4 Diversion Berms

The diversion berms were inspected twice a month as required by the O&M. Excluding possible liner repairs, all were found to be in satisfactory condition.

7.5 Anchor Trenches

The anchor trenches were inspected twice a month as required by the O&M. A significant hole was located during the 2008 annual inspection on LP 363 between the restricted area fence and the north perimeter channel. This hole has not been permanently patched. There is an excessive amount of moisture in the soil which renders the welding process ineffective. Due to the hole's location, the inability to effectively patch this hole does not impact the protectiveness of the liner to prevent infiltration.

7.6 Drainage Channels

All drainage channels were inspected during this period as required by the O&M. Control of weeds and vegetation in the Articulating Block mats and at the gabions was performed by spraying the areas with weed killer and/or manually removing the vegetation.

7.7 Articulating Concrete Block Mat (AB Mat) System

The AB mat system was inspected monthly as required by the O&M. Buildup of sediment within the AB mats has reduced their ability to reduce velocity of water flowing to the EDB and increased the need for vegetation control. This buildup of sediment should be expected as this is an inherent design feature of AB mats. This sediment buildup does not appear to impact the EDB's ability to control flow. In various locations the cable linking the blocks is showing signs of stress; this has been observed for several years and will continue to be closely monitored. The signs of stress on the cable indicate movement which could impact liner integrity. One section of blocks in the east drainage channel on LP-191ext is eroding at an accelerated rate but has not impacted performance.

7.8 Former Leachate Storage Facility Area

The covered area of the former leachate storage facility was found to be in satisfactory condition. The area shows no signs of subsidence or any damage to the geomembrane liner or boots around the tank extensions.

7.9 Inspections

A total of 95 inspections were performed during the period of January 2009 through December 2009. Excluding the item discussed in Section 7.5, no unsatisfactory notations were recorded that presented a major problem. All unsatisfactory items either received actions to return them to satisfactory status or were designated for monitoring.

7.10 Equipment Status

One of the two extrusion guns is temporally out of service. It has been determined that factory repairs are required and expected to be completed prior to the 2010 annual inspection. An additional vacuum box was purchased due to discoloration of the Plexiglas impacting visibility. The liner repair cart was replaced due to general wear and tear. All other liner repair equipment remains in good working condition.

8.0 Trench Leachate Management and Monitoring

Trench sump liquid level measurements were obtained in accordance with the PSVP, Section 2.3, Sump Measurement and the 2007 US EPA Five Year Review. The purpose of collection and evaluation of the trench sump leachate levels is to detect recharge conditions that may require leachate management and provide data for future evaluation of the horizontal flow barriers.

A comparison of the baseline to the manual measurements collected in October 2009 indicates little change in site wide freeboard. The average loss of freeboard for all sumps is 1.1 percent. Three sumps have a greater than 10% loss of freeboard. Sumps 7-4, 46-1 and 46-2 have a freeboard percentage loss of 63%, 17% and 10% respectively.

A leachate management engineering evaluation of Sump 7-4 was completed and submitted to US EPA in August of 2008. The results of the evaluation initiated quarterly monitoring of the sump until it stabilizes at or exceeds pre-pump level. If the sump stabilizes near pre-pump levels, monitoring will continue with additional attention focused on the other two sumps within trench 7. If the sump liquid level significantly exceeds pre-pump levels, a leachate management plan will be developed. As of October 2009 the liquid level within 7-4 was 1.14 feet below pre-pump water level.

9.0 Contaminated Liquid and Solid Waste

Contaminated liquid and waste generated on-site will be disposed of in accordance with the IMP Work Plan; Section 3.2, Treatment of Other Contaminate Liquids and Section 3.3, Waste Burial.

One gallon of the approximately 12 gallons of liquid removed from the trench cap area required management during this reporting period. No solid waste was disposed of on-site during this reporting period. Solid and liquid waste generated from laboratory, radiological activities and site maintenance is temporarily stored in a secured area.

Twelve cubic feet of Class A Waste at 47 mCi and three cubic feet of tritium liquid waste at less than 25 mCi is stored on site. Disposal will occur once sufficient quantities are accumulated to warrant the effort.

10.0 Erosion Monitoring

Erosion monitoring consists of obtaining elevation measurements and observations of the east drainage channel. The USGS staff monitored the East Main Drainage Channel twice during the reporting period. The results were reported to USEPA. Tables for the 2005-2009 East Drain erosion measurements and the calculated areas are presented in the electronic file, Appendix C.

There was no major water erosion or mud/rock slides evident in any of the channels during this reporting period.

11.0 IMP Work Plan Revisions, Changes and Correspondence

Revisions and changes to the IMP Work Plan are required to be submitted in writing to USEPA for approval.

One change request was submitted in 2009. The request, dated December 15, 2009 included the update to the Maxey Flats Project (MFP) Interim Maintenance Period Health and Safety Plan (HASP). This included requirements contained within the MFP Radioactive Material License HASP. This allows MFP to operate under one HASP preventing confusion between two plans.

12.0 Custodial Care Activities

12.1 Vegetation

All vegetation was maintained below required height limits to allow for leachate monitoring.

12.2 Building and Grounds Maintenance

In addition to the established buildings receiving routine maintenance, a furnace was installed in the garage and extensive repairs were completed on the garage roof to prevent leaking.

Three major construction projects were completed during 2009; the garage was insulated, a sampling house at EDB was replaced and a new HVAC was installed in the office annex.

12.3 Security Fence

The security fence surrounding the site remains in satisfactory condition with minor maintenance required. An operator upgrade for the East Perimeter Gate was set during December but installation will not be completed until 2010.

12.4 Roadway Maintenance

Routine maintenance was performed on all facility owned roadways.

13.0 Cathodic Protection

Tom Stewart, Certified Cathodic Protection Tester, completed the annual inspection for the underground waste disposal tank Cathodic Protection System on March 06, 2009. The system received a passing score with results indicating the cathodic protection system is functioning as designed. The cathodic protection systems operation is also checked monthly. All readings were within the accepted range according to the operating instructions up until August. The August inspection revealed the amperage had fallen to zero. A Certified Cathodic Protection Engineer has been scheduled to perform a site check during early 2010. The contractor will be able to verify that the tank's integrity has not been impacted during this time frame of amperage loss.

14.0 Conclusion

This concludes the textual outlining of the IMP activities at the Maxey Flats Project for 2009. Appendix D is included along with this report which contains miscellaneous data relating to MFP. This data includes: Monthly Reports, Annual Low-Level Waste Report, U-Well Monitoring Data, Potentiometric Surface Map, and Trench Freeboard Data. If you would like to receive copies of inspections or deliverables not included in this report, please contact the MFP office.