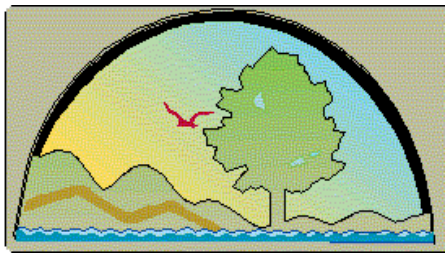
MAXEY FLATS DISPOSAL SITE
ANNUAL REPORT
2015



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Division of Waste Management
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List of Acronyms

ARARs	Applicable or Relevant and Appropriate Requirements
BoRP	Balance of Remedial Phase
Commonwealth	Commonwealth of Kentucky
DOE	U.S. Department of Energy
DCW	Drainage Channels Water
EPA	U.S. Environmental Protection Agency
FCP	Final Closure Period
IRP	Initial Remedial Phase
IMP	Interim Maintenance Period
MFDS	Maxey Flats Disposal Site
O&M	Operation and Maintenance Requirement Summary
PSVP	Performance Standards Verification Plan
PSW	Perennial Surface Water
REI	Reasonably maximally Exposed Individual
RML	Radioactive Material License
SWMF	Stormwater Management Feature
USGS	U.S. Geological Survey

List of eAppendices
Included on Disc

Appendix A **Maxey Flats Disposal Site Analytical Data 2015**
2015 MFDS Tritium Data.xlsx

Appendix B **Maxey Flats Disposal Site Well Levels 2015**
2015 MFDS Alluvial Well Levels.xlsx
2015 MFDS Perimeter Well Levels.xlsx

Appendix C **Maxey Flats Disposal Site Precipitation 2015**
2015 MFDS Daily Rainfall.xlsx

Appendix D **Maxey Flats Disposal Site Compliance Information 2015**
2015 MFDS LLRW Report.pdf
2015-16 MFDS RML.pdf

Appendix E **Maxey Flats Disposal Site Drainage Channel Erosion Monitoring 2015**
2011-2015 MFDS East Drain Erosion USGS Monuments.xlsx
2015 MFDS East Drain Erosion Shaw Monuments.pdf

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1.0 Introduction

The Commonwealth is submitting this annual report for the Maxey Flats Disposal Site (MFDS) in accordance with Section 4.0 of the Performance Standards Verification Plan (PSVP) (Appendix C of the Interim Maintenance Period (IMP) Work Plan). This report summarizes the sampling and maintenance activities listed in the 2003 IMP Work Plan, PSVP, and the Operations and Maintenance (O&M) Requirement Summary (Appendix D of the IMP Work Plan).

2.0 Scope of Work

The Final Closure Period (FCP) is ongoing pursuant to the Consent Decree (Civil Action Number 95-58) signed by the United States Environmental Protection Agency (EPA), the Settling Private Parties (represented by the Maxey Flats Steering Committee), and the Commonwealth. The Maxey Flats Steering Committee disbanded in September 2014 as the Settling Private Parties had fulfilled the responsibilities defined in the Consent Decree. With the dissolution of the Maxey Flats Steering Committee, the Balance of Remedial Phase (BoRP) became the full responsibility of the Commonwealth. This includes tasks outlined in the IMP Work Plan and FCP development as described in the Record of Decision (ROD). Relevant IMP monitoring activities will continue until they are no longer applicable or interfere with FCP remediation and will ultimately conclude upon EPA's approval of an Institutional Control Period (ICP) Work Plan, which is currently under development.

The following IMP Work Plan obligations will continue through FCP until no longer applicable:

- Surface/ground water monitoring
- Erosion evaluation
- General site maintenance
- Contaminated liquid and waste disposal
- Data collection, analysis, and reporting
- Site drainage and erosion control features

The following IMP Work Plan obligations have been suspended:

- Trench leachate management and monitoring
- Subsidence survey
- Initial Remedial Phase (IRP) cap maintenance
- Subsidence monitoring

3.0 Surface Water Monitoring

Radioactivity as a result of tritium concentration is used to evaluate the spread of contamination at MFDS. No annual average activity for any surface water location exceeded specified screening levels for 2015. The tritium activity for all surface water monitoring samples appear in Appendix A: *2015 MFDS Tritium Data.xlsx*

3.1 East Detention Basin

Surface water runoff from the Initial Remedial Phase (IRP) cap is monitored at the East Detention Basin (EDB). A sequential sampler connected to a rain gauge is programmed to collect samples at 0.11 inches per hour rainfall rate, which is the divided hourly equivalent of a two-year storm event (2.8 inches of rainfall in 24 hours). In 2015, 39 rain event samples were collected for analysis; the activity ranged from -0.14 to 1.56 pCi/mL. Figure 3-2 on page 4 provides the annual average for tritium concentrations for 2004-2015.

Pursuant to the ROD and Initial Remedial Phase (IRP) design, discharge from the East Detention Basin is released into the East Main Drainage Channel at a rate not to exceed predevelopment flow conditions. Following a 2.8 inch, two year storm event or greater, the Commonwealth is required to conduct an inspection of the interim cap and all three drainage channels, and report findings. The East Drain rain gauge recorded a two year storm event on April 3rd with a rainfall depth of 2.9 inches. A comparison of the discharge flow at the EDB flume to a predevelopment flow rate of 11 cfs confirms the predevelopment rate was not exceeded. Figure 3-1 details the 4/3/15 storm event.

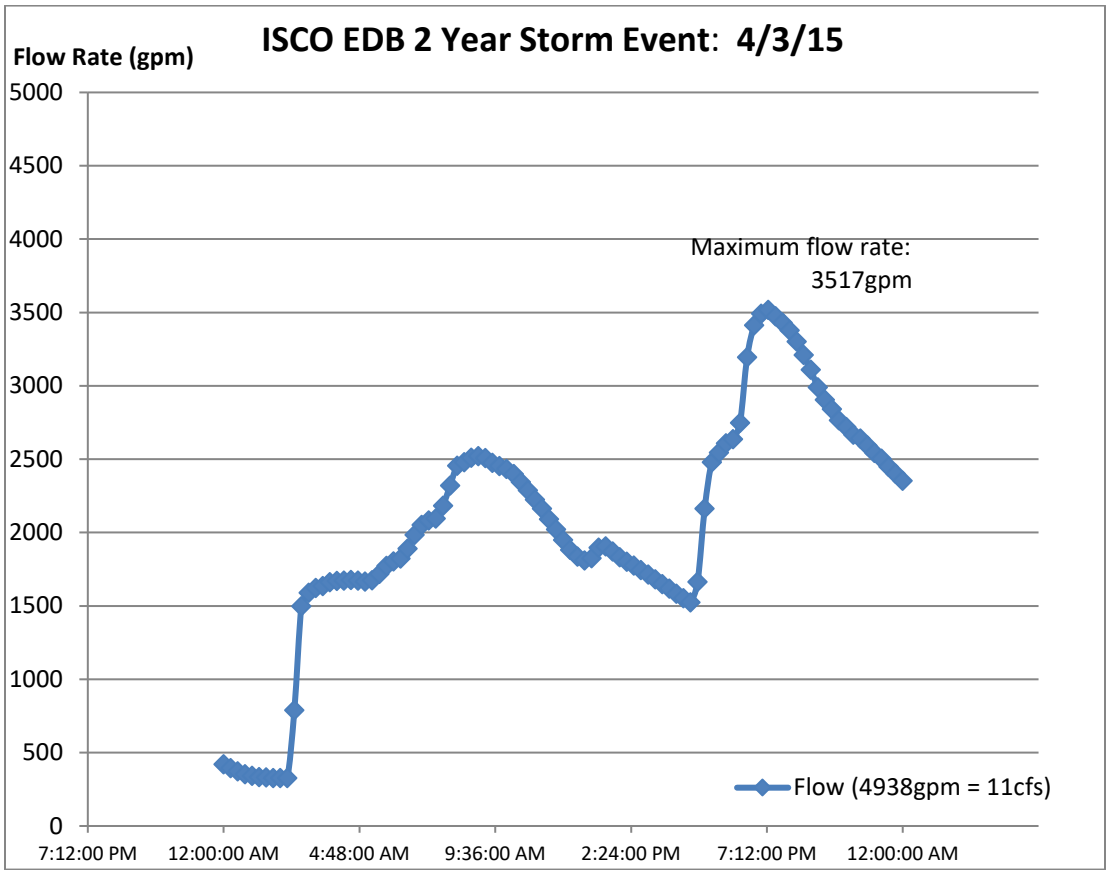

Figure 3-1

3.2 Perennial Surface Water

Perennial Surface Water (PSW) monitoring is conducted at five locations in three streams influenced by surface water runoff from the MFDS. These locations are monitored using sequential samplers that collect a four aliquot daily composite. The PSW samples are compared to an action level of 20 pCi/mL and a screening level of 10 pCi/mL. During 2015, 1,755 PSW samples were collected for analysis with no anomalous data reported. All PSW location averages were below the screening level of 10 pCi/mL. Figure 3-2 on page 4 provides the IMP Annual Average Tritium Activity for 2004-2015.

Sample location 122A serves as the source for background samples. It is located on Rock Lick Creek up gradient from site influence. During 2015, 344 samples were collected at this location for analysis. The activity ranged from -0.47 to 6.33 pCi/mL.

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 activity fluctuation consistent with location 144. During 2015, 348 samples were collected from this location for analysis. The activity ranged from -1.12 to 9.89 pCi/mL.

Sample location 122C is located on Rock Lick Creek, downstream of 106 and 143 influences. During 2015, 356 samples were collected from this location for analysis. The activity ranged from -1.15 to 2.57 pCi/mL.

Sample location 103E is located on Drip Springs Creek and receives influence from Drain 107. During 2015, 353 samples were collected from this location for analysis. The activity ranged from -0.56 to 1.79 pCi/mL.

Sample location 102D is the only sampling station outside the established buffer zone at the MFDS. It is deliberately located below the confluence of the three streams influenced by surface water from the MFDS and is the designated EPA compliance point for site runoff. During 2015, 360 samples were collected from this location for analysis. The activity ranged from -1.11 to 2.15 pCi/mL. The 2015 annual average at 102D was 0.52 pCi/ml. In accordance with the IMP Work Plan, the Reasonably maximally Exposed Individual (REI) comparison indicated that the annual average did not exceed the 4 mrem/year dose limit (equivalent to 20 pCi/mL).

3.3 Drainage Channels Water

Drainage Channels Water (DCW) monitoring is conducted at the three primary drains that receive intermittent flow from the IRP cap using automated samplers that collect a four aliquot daily composite. The activity at these monitoring locations is compared to a 25 mrem/year Total Effective Dose Equivalent (TEDE) standard, an annual average action level of 100 pCi/mL, and an additional screening level of 50 pCi/mL. In 2015, 869 samples were collected at the DCW locations for analysis. No location exceeded the 50 pCi/mL screening level. No additional

investigation was required. Figure 3-2 provides the IMP Annual Average Tritium Concentrations for 2004-2015.

Sample location C107 is located at the base of the West Drain, which discharges into Drip Springs Creek. During 2015, 224 samples were collected from this location for analysis. Activity ranged from 1.56 pCi/mL to 18.00 pCi/mL.

Sample location 143 is located near the base of the South Drain, which discharges into Rock Lick Creek. During 2015, 308 samples were collected from this location for analysis. Activity ranged from -1.18 pCi/mL to 0.65 pCi/mL.

Sample location 144 is located at the base of the East Drain, which discharges into No Name Branch. During 2015, 337 samples were collected from this location for analysis. Activity ranged from 1.52 pCi/mL to 128.23 pCi/mL.

Maxey Flats Disposal Site
Annual Average Tritium Activity (pCi/mL)
2011-2015

		Perennial Surface Water					Drainage Channels Water		
	EDB	**122A**	**106**	**122C**	**103E**	**102D**	**C107**	**143**	**144**
2011	0.38	0.06	3.21	0.91	0.37	0.61	8.63	0.03	56.43
2012	0.72	0.05	3.88	1.19	0.51	0.82	12.96	0.06	67.85
2013	0.94	0.05	3.61	1.00	0.44	0.67	10.42	0.07	59.34
2014	0.59	0.07	3.80	1.12	0.43	0.80	11.01	0.06	46.01
2015	**0.37**	**0.07**	**2.79**	**0.77**	**0.39**	**0.52**	**8.81**	**0.03**	**46.49**

Figure 3-2

3.4 Sampling Equipment Status

A reliable ISCO sampler is in operation at each sampling location. Samplers perform in accordance with the PSVP, except during events beyond control such as: freezing lines, washouts, equipment failure, lack of flow, or power outages. In the spring of 2015, the sampler at 107C was damaged by a falling tree and replaced with the back up unit. Multiple replacement units will be purchased at the completion of FCP.

4.0 Groundwater Monitoring Wells

Groundwater monitoring at the MFDS is conducted at alluvial and perimeter monitoring wells. The alluvial wells, located in the buffer zone, were installed during the IRP to satisfy the requirements of the Statement of Work (SOW). The perimeter monitoring wells located along the west perimeter fence of the restricted area were installed as investigative monitoring points prior to the Consent Decree. The 16 perimeter wells are maintained for water level monitoring which satisfies an IMP Work Plan requirement and sampled to satisfy the tritium monitoring requirements in the RML. Multiple perimeter wells are scheduled for removal to accommodate FCP construction requirements. Analytical results for all groundwater samples are contained in Appendix A: *2015 MFDS Tritium Data.xlsx.* Water level monitoring tables for both alluvial and perimeter wells are contained in Appendix B: *2015 MFDS Alluvial Well Levels* and *2015 MFDS Perimeter Well Levels.xlsx.*

4.1 Alluvial Wells

4.1.1 Tritium Evaluation 2015

Alluvial well (AW) samples were collected for analysis as outlined in the PSVP and the 2007 EPA Five Year Review. Five wells were sampled in 2015: annual samples were collected from AW-6, 10, and 12, and quarterly samples were collected from AW-1 and 7. Construction of Storm Water Management Feature (SWMF) 3 necessitated the removal of AW-1 in February. During 2015, 7 alluvial well samples were collected for analysis. Results were typical of historical ranges. The Commonwealth reports a lapse in AW-7 sample collection for the third quarter, a result of overwhelming FCP demands, specifically the slope failure in borrow area 4A.

The maximum activity at AW-7 was 6.36 pCi/mL. Comparison of this value to 50 percent of the 20 pCi/mL applicable or relevant and appropriate (ARAR) requirement indicated that additional analysis was not necessary.

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. The county road extending through the buffer zone has been closed and a gate was installed to further limit access.

4.2 Perimeter Monitoring Wells

Water levels were measured in the 16 perimeter monitoring wells on a quarterly basis. The 2015 measurements indicate water levels typical of historic data.

The RML required tritium analysis for the perimeter wells in 2015 were typical of historical data and trends.

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. ATL, a radiation service contractor, completes third party data validation for the MFDS. Following data validation, the results are entered into the MFDS electronic database and transmitted to EPA, United States Department of Energy (DOE), and multiple groups within the Commonwealth. These packets are available on site for review.

6.0 Rainfall Data

Presently, there are three rain gauge locations associated with the MFDS: the East Detention Basin (EDB), sampling location 102D, and the main office. The official annual rainfall data for the MFDS is collected at the EDB rain gauge. Rainfall data from the main office rain gauge can be used for official rainfall totals in the event of an EDB rain gauge malfunction. The measured rainfall at the EDB gauge during 2015 was 50.34 inches. This is compared to an annual average precipitation of 47.33 inches (NOAA, National Climatic Data Center; Farmers, KY.). Annual precipitation data appears in Appendix C: *2015 MFDS Daily Rainfall.xlsx.*

7.0 Initial Remedial Phase Cap Maintenance

7.1 Geomembrane Liner and Boots

The liner covering the trench cap was inspected monthly. The comprehensive visual and air lancing (annual) inspection was suspended for 2015 to accommodate FCP activities. The integrity of the IRP was evaluated during the placement of leveling fill and every effort was made to maintain that integrity.

7.2 Headwall Maintenance

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

During this reporting period, debris and leaves were removed numerous times from the trash grate and restricting plate at the upstream headwall of the northeast corner inlet pipe. FCP construction activities focused on the North Channel through September 2015, including completion of leveling fill placement in this area.

7.3 Subsidence Monitoring and Repair

Subsidence inspections were conducted monthly in accordance with the O&M, Section 3.3.3; Subsidence Monitoring. Areas near trenches 15, 21, 36, 37, and 46 were visually monitored monthly for subsidence qualification until these areas were covered with leveling fill. The annual engineering subsidence survey of the IRP cap has been suspended as a result of FCP.

7.4 Diversion Berms

The diversion berms were inspected twice a month as required by the O&M until leveling fill was placed over them. 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 until leveling fill was placed over them. All anchor trenches functioned as designed.

7.6 Drainage Channels

All drainage channels were inspected during 2015 as required by the O&M until leveling fill was placed over them. Unrestricted flow through the articulating block mats and gabions was maintained using herbicides and/or manual removal of vegetation.

7.7 Articulating Concrete Block Mat (AB Mat) System

The AB mat system was inspected monthly as required by the O&M until leveling fill was placed over them.

7.8 Former Leachate Storage Facility Area

The former leachate storage facility (LFS) area was grouted in place during the Sump Abandonment construction in 2014. The storage tank was used for the disposal of the generated waste during construction. A complete list of disposed waste will be available in the FCP Final Report.

7.9 Inspections

A total of 95 inspections were performed in 2015. No unsatisfactory notations were recorded that present a persistent problem. All unsatisfactory items either received actions to return them to satisfactory status or were designated for monitoring.

7.10 Equipment Status

All liner repair equipment remains in good working condition.

8.0 Trench Leachate Management and Monitoring

Sump abandonment was completed by RECON in 2014. Trench leachate management and monitoring is no longer performed. The sump abandonment final report will be available upon certificate of completion of FCP.

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 Contaminated Liquids, and Section 3.3: Waste Burial.

Solid and liquid waste generated from laboratory, radiological, and maintenance activities is stored in a secured area in the on site Radiological Laboratory. All radiological waste is transferred to 55 gallon drums and will accumulate until space restrains require contracted, off site disposal. One 55 gallon drum was accumulated during 2015.

The Annual Low Level Radioactive Waste Report is included in Appendix F: *2015 MFDS LLRW Report.pdf*.

10.0 Erosion Monitoring

MFDS staff completed the annual evaluation of the East Main Drainage channel in December of 2015. The monuments at cross section 3.5 were damaged during FCP construction; this area was not surveyed for 2015. All other cross-sectional area data was consistent with historical data. New monuments will be placed for all survey points as part of FCP construction. A new erosion monitoring plan will be developed at the conclusion of FCP.

Curd Surveying & Land Consulting was contracted to complete erosion monitoring and to produce a cross-sectional profile of the East Drain using IMP methodology. This survey was conducted in May and November of 2015. The cross-sections and tables for the 2011-2015 East Drain erosion measurements and the calculated areas are presented in Appendix G: *2015 MFDS East Drain Erosion Shaw Monuments.pdf.*

Seasonal visual erosion monitoring of the east, south, and west drainage channels was completed in compliance with IMP Work Plan requirements. These inspections revealed no erosion concerns.

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 EPA for approval. No revisions were submitted in 2015.

12.0 Custodial Care Activities

12.1 Vegetation

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

12.2 Building and Grounds Maintenance

All routine building and grounds maintenance was performed according to IMP Work Plan requirements. The former tank storage/restricted area access building surveyed for unrestricted use by ATL in 2014 has since undergone major renovation for beneficial reuse. This building can now be used as a conference/meeting room, interpretive center, or open house location.

12.3 Security Fence

The security fence surrounding the site has been dramatically changed. All of the previous galvanized fencing was removed for cap construction. The office complex fencing has been replaced with a more aesthetic aluminum fence. The restricted area fence was removed and replaced with temporary rope and signage to facilitate cap construction. Discussion regarding the restricted area fencing will ensue after cap construction completion.

12.4 Roadway Maintenance

Routine maintenance was performed on all facility-owned roadways. Upper Rock Lick Road that traversed the buffer zone was removed from County maintenance. The Commonwealth has assumed maintenance responsibilities and installed a gate at the site boundary to restrict public access.

13.0 Cathodic Protection

The cathodic protection system installed on the 20,000 gallon Underground Storage Tank (UST) within the restricted area was removed during sump abandonment activities in 2014. No further annual evaluation of the cathodic system will be performed.

14.0 Other Activities and Developments

The main purpose of this document is to summarize the requirements of the IMP Work Plan. Other activities and developments in 2015 include:

- The Walker Company completely covered the existing cap with leveling fill before demobilizing for the winter.

- The development of several landslides above Borrow Area 4 occurred in September. Repairs were completed in 2015; but resurgence will require continued monitoring.

15.0 Conclusion

This concludes the textual outlining of the IMP activities at the MFDS for 2015. If copies of inspections or deliverables not included in this report are required, please contact the MFDS office.