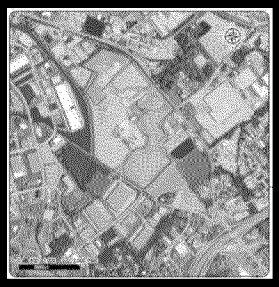

West Lake Landfill Vicinity

Radiological Survey and Sampling Plan

Hazardous Waste Program
Federal Facilities Section
November 2015

MISSOURI
DEPARTMENT OF
NATURAL RESOURCES

1.0 Site Background

The West Lake Landfill site is a parcel of approximately 200 acres in Bridgeton, Missouri and was listed on the National Priorities List (NPL) in 1990. The site consists of the Bridgeton Sanitary Landfill, which stopped receiving waste on December 31, 2004, and several old inactive areas with municipal solid waste and demolition debris. The site is divided into two Operable Units, or OUs. OU-1 consists of radiological areas and OU-2 consists of the other landfill areas, which are not known to be impacted by radionuclide contaminants.

2.0 Purpose/Scope of Work

The purpose of this plan is to provide instructions for Missouri Department of Natural Resources (MDNR) staff during radiological survey and sampling in the vicinity of West Lake Landfill. Sampling will be performed at publicly accessible locations near the perimeter of the West Lake Landfill to determine if there is evidence of potential current exposure to the public. Specific radionuclides of interest include Uranium 234, 235 and 238, Thorium 228, 230 and 232, Radium 226 and 228, and Lead 210. Levels of Gross Alpha, Gross Beta and Gamma radiation are also of interest.

Other sampling events have been completed in the vicinity of West Lake Landfill and information from those efforts has been used in the development of this plan. Data from this sampling effort will be used to better assess the site relative to radioactively impacted environmental media that could pose current potential public exposure. Media to be sampled and analyzed includes surface soil, sediment, surface water, and particulates via settled dust. Surface soil is defined as zero to 6 inches below the ground surface for this event. Field measurements of Alpha, Beta, and Gamma radiation will also be performed. Missouri Department of Health and Senior Services (MDHSS) staff will be performing air particulate and potentially other sampling. Dependent on conditions discovered in the field, other locations and/or media may be added to those specified in this plan.

2.1 Data Quality Objectives

The primary objective of this effort is to identify the activity of radionuclides of concern that can then be compared to established health-based standards. To achieve this for soil/sediment samples, analysis will be required to meet levels associated with typical background radioactivity. To help establish a range of possible background values, several reference documents and studies were reviewed from both in and near the St. Louis area and from across the state and nation. The lower end of this range was used to confirm that laboratory methods will generally achieve this level of detection. Surface water sample detection limits were reviewed against United States Environmental Protection Agency's (EPA) Maximum Contaminant Levels (MCL) for Alpha particles,

Beta particles, and photon emitters, combined Radium 226 and Radium 228, and total Uranium. The laboratory providing analytical services shall be able to provide detection levels capable of identifying values at these levels.

Samples will be collected from publicly accessible areas in the vicinity of West Lake Landfill. The intent of this effort is to further explore off-site presence, migration, and nature of radiological materials that may be associated with West Lake Landfill. Sample results may identify a need to conduct additional studies or to request an additional study be conducted by EPA.

2.2 Applicability

This plan pertains to this sampling event for the area surrounding West Lake Landfill.

2.3 Acronyms

- MDNR = Missouri Department of Natural Resources
- MDHSS = Missouri Department of Health and Senior Services
- HWP FFS = Hazardous Waste Program Federal Facilities Section
- QAPP = Quality Assurance Project Plan
- BHASP = MDNR Bridgeton Landfill Site Safety and Health Plan
- GPS = Global Positioning System
- PPE = Personal Protective Equipment
- NaI = Sodium Iodide
- DOE = Department of Energy
- EPA = Environmental Protection Agency

2.4 Referenced Documents

Prior/Ongoing Studies

- Late 1980's Department of Energy (DOE) Haul Road Sampling, 28 intersections (1994 DOE Remedial Investigation)
- 2005 MDNR Formerly Utilized Sites Remedial Action Program (FUSRAP) haul road sampling St. Charles Rock Road, Taussig, Boenker
- March 2013 EPA ASPECT Gamma and Infrared Survey
- May 2013 MDNR Radiological Survey, Alpha, Beta, Gamma survey/screening
- June 2013 DHSS Air Sampling, Alpha/Beta particulates, Ambient Gamma
- May 2014 EPA BMAC radiation survey and sampling
- 2014 EPA Community Air Monitoring, Gamma, Alpha/Beta Particulates, Radon
- April 2015 MO University of Science and Technology Phyto forensics
- May 2015 Respondents Air Monitoring, VOCs, Gamma, Alpha/Beta Particulates, Radon

Plans and standard operating procedures

- HWP FFS QAPP
- MDNR Bridgeton Landfill Site Safety and Health Plan
- Radiation Detection Equipment Operation Manuals
- Ancillary Equipment Operation Manuals

2.5 Responsibilities

MDNR is conducting this sampling event. MDNR staff will comply with all applicable procedures in the HWP FFS QAPP and the MDNR Bridgeton Landfill Site Safety and Health Plan. Pertinent equipment manuals will also be followed in the operation of all equipment used. Pursuant to the BHASP, proper PPE apparel (hard hat, safety shoes, safety glasses, and safety vest) will be worn at all times during this sampling event. Additionally, appropriate gloves will be used at all times during sample collection, sample handling, and equipment decontamination activities. Staff assigned digital (or other type) dosimeters will wear and read them before and after the event.

3.0 Sampling Rationale

MDNR staff will be collecting samples of soil, sediment, surface water, and particulates via settled dust for analysis for radionuclide content. Procedures identified in the Hazardous Waste Program Federal Facilities Section Quality Assurance Project plan (HWP FFS QAPP) will be followed. Sampling for other contaminants-of-concern is not specifically included in this effort.

Soil and Sediment

A Ludlum model 2221 with Sodium Iodide detector model 44-10 will obtain preliminary measurements of gamma radiation. The results will be recorded and used to identify areas of elevated activity that might indicate the presence of site-related contamination. To the extent that elevated activity is identified, biased surface soil sample locations will be selected from the identified locations. In the absence of water, biased sediment sample locations may be identified in the same manner.

Soil samples will be collected using a slide hammer and split spoon sampler fitted with a 2-inch diameter plastic sleeve. The resulting sample, encased in a 2 inch x 6 inch plastic sleeve, will be sealed on each end with a plastic cap manufactured for that purpose. Sediment samples will be collected using a plastic or stainless steel trowel and placed in a 16 oz. wide mouth plastic jar.

The surface soil and sediment samples will be submitted to the contract laboratory, Eberline Services, for analysis. The analyte list will include Isotopic Uranium, Isotopic Thorium, Radium 226, Radium 228, Lead 210, Gross Alpha and Gross Beta.

Settled Particulates/Dust

Dust samples will be collected on standard cloth swipes that will be analyzed using a Ludlum model 2929 with a model 43-10-1 detector. The Ludlum 2929 provides results for alpha and beta/gamma radiation. Select swipe-samples may also be submitted to Eberline Services, for confirmation.

Surface Water

Available surface water samples will be collected for radionuclide analysis. Samples will be collected in 4 liter cubitainers and submitted to Eberline Services to be analyzed for Total Uranium, Radium 226 and 228, Gross Alpha and Gross Beta.

Air

MDHSS staff will collect air particulate and potentially other samples based on a sampling plan developed by their department.

3.1 Sample Locations and Frequency

Preliminary sample locations were selected during field reconnaissance on October 20, 2015, which focused on off-site areas that are accessible to members of the public, and could potentially be impacted by historic and current West Lake Landfill conditions (Tables 1, 2, and 3 and Figure 1).

Information from previously listed reference documents was evaluated prior to field reconnaissance. Specific location selection was generally based on visual examination of the overall site's geographical layout with specific consideration given to:

(a) proximity to potentially impacted areas;
(b) wind directions at the site;
(c) water drainage patterns;
(d) evidence of erosion or sediment deposition; and
(e) proximity to community.

If water is present at a soil/sediment location, staff will attempt to collect a surface water sample for total and dissolved radionuclide analysis. The lab will be instructed to filter and archive the sample collected for dissolved analysis for later evaluation, if the total sample results indicates that is appropriate.

Additional sample locations may be identified during the sampling event if deemed useful to this study. The final number of samples collected will depend on actual field conditions encountered.

A GPS instrument will be used to record the location of collected samples. Recorded GPS coordinates will be exported to ArcView and a final map will be generated of actual sample locations and the location of any pertinent identifying land-marks.

3.2 Field Screening

The Ludlum model 2221 with Sodium Iodide detector model 44-10 will be used to obtain preliminary results for gamma radiation in general areas pre-selected for sample collection. These results will be recorded and may also be used in final biased location selection for surface soil samples. Other areas may be scanned with this instrument dependent on actual field conditions encountered.

The Ludlum model 19A will be used in the field to measure exposure to gamma and x-ray radiation. This meter with built in detector has a fixed analog scale and gives feedback as a rate in uR/hr. It is meant to give fast and easy dose estimates in areas of low activity and to provide an alarm as activity begins to approach a preset action level. The 19A will be used as a measure of personnel safety and as an aid to sample location selection. The instrument needle is constantly moving in response to activity such that visual precision is a range of several uR/hr.

The Ludlum model 2221 with Model 43-5 Alpha Scintillator will be used to screen areas for dust sample collection. It will also be used as a measure of personnel safety to scan staff members and equipment to determine if any removable alpha radiation has been encountered.

4.0 Field Equipment Quality Control

- Ludlum model 2221 with 44-10 NaI detector will undergo response checks consistent with Standard Operating Procedure to document that the equipment is functioning properly.
- Ludlum model 2929 with 43-10-1 detector will undergo response checks consistent with Standard Operating Procedure to document that the equipment is functioning properly
- Ludlum model 19A equipment functionality will be checked consistent with Standard Operating Procedure prior to beginning the investigation.
- Ludlum model 2221 with 43-5 ZnS Scintillator detector will undergo response checks consistent with Standard Operating Procedure to document that the equipment is functioning properly.

5.0 Sample Packaging and Handling

Chains-of-custody and custody seals will be used to track possession of the samples and protect against tampering. Care will be taken to ensure that information on sample labels

and chains-of-custody is accurate. Samples sent to Eberline Services will be packed in a plastic cooler provided by the laboratory and shipped by United Parcel Service.

6.0 Equipment Decontamination

Efforts will be utilized to minimize contaminating equipment and cross contaminating samples. The split-spoon sampler and non-disposable hand trowels will be decontaminated after collection of each soil or sediment sample. Staff will first remove any large debris or soil clinging to the equipment. Damp paper towels will then be used to wipe the equipment until it is visibly clean.

7.0 Reporting

An interim report will be produced that describes the sampling event and reports field measurements along with immediately available sampling results. An addendum or final report will be produced that will report laboratory results, discuss any findings, and provide recommendations if necessary.

Table 1 Soil/Sediment Sample Locations

LOCATION_ID	EASTING	NORTHING	DESCRIPTION
S01	721522	4294847	Depression in drainage path at SE corner of 4628 Crossroads Industrial
S02	721663	4294914	Depression in drainage path at NE corner of 4628 Crossroads Industrial
S03	721643	4294970	Drainage path along St Charles Rock Road at NW Corner of OU1 Area 2
S04	722326	4294468	Tree Core Area North East Cluster
S05	721850	4292831	Spanish Village park
S06	721685	4293731	Old St Charles Rock Road service road, landfill drainage path, and traffic area with tire ruts in soil
S07	721523	4293803	Tree Core Area South West cluster
S08	721439	4293921	Sediment in Lakefront pond from drainage path from wooded area southwest of landfill
S09	721514	4294440	Southwest corner of landfill
S10	721539	4294583	AAA Trailer Service Lot adjoining OU1 Area 2

Table 2 Dust Swipe Sample Locations

LOCATION_ID	EASTING	NORTHING	DESCRIPTION
D01	722758	4293960	Hussmann lot - DNR trailer vents/roof/top of cabinets/where ever dust collects
D02	722838	4293570	Former Gas Station by Terrisan mobile home park, where ever dust might collect
D03	722482	4293322	Boenker barn
D04	721886	4292874	Spanish Village park pavilion
D05	721829	4293619	MSD Lift Station
D06	721394	4294330	Lakefront Drive, Keefe Supply, Across pond south of OU1 Area 2
D07	721534	4294583	AAA Trailer Service Lot adjoining OU1 Area 2, dust on old trailers, etc.
D08	721361	4294998	4670 Crossroads Industrial Drive Roland Machinery building (high bay doors /cross ventilation), rafters, cabinet tops, etc.

Table 3 Soil/Sediment and Dust Swipe Location Criteria

Location_ID	Selection Criteria		Location_ID	Selection Criteria
S01	a		D01	b
S02	a, c, d		D02	b, e
S03	a, c, d		D03	b
S04	a		D04	b, e
S05	e		D05	b
S06	c		D06	a, b
S07	a, c		D07	a, b
S08	c, d		D08	b
S09	a, c			
S10	a, c			

Criteria Legend
(a) proximity to potentially impacted areas;
(b) wind directions at the site;
(c) water drainage patterns;
(d) evidence of erosion or sediment deposition; and
(e) proximity of community.

Table 4 Supplies & Equipment Checklist

Check	Item
	Ludlum Model 2929 and Model 43-10-1 Detector for counting Swipe Samples
	Ludlum Model 2221 and Model 44-10 NaI Detector for Gamma Survey
	Ludlum Model 19A (Micro R Meter) for Measurement of Exposure
	Ludlum Model 2221 and Model 43-5 (Alpha Scintillator)
	GPS instrument
	Trowels
	Slide hammer split-spoon sampler
	Supply wagon to transport supplies to sample location
	Coolers
	2 x 6 inch plastic sleeves for split-spoon sampler
	16-ounce wide mouth poly jars for sediment samples
	4 liter cubitainers for surface water & rinse water samples
	Cloth sampling smears for dust samples
	Labels for samples
	Chain-of-custody in Ziploc bag
	Flags
	Plastic sheeting for work surface
	Ziploc bag with damp paper towels
	Ziploc bag with dry paper towels
	Bag(s) for trash
	Permanent marker
	Cubitainer of DI water
	ANSI certified hardhat, reflective vest, safety glasses, hard toe safety boots.
	Spare sample containers
	Field Sampling Plan
	Gloves and liners: nitrile, cotton, work gloves, etc.
	Boot covers
	Waders for water and/or sediment samples
	Extendable pole for dust swipe samples
	Digital dosimeter

Figure 1
West Lake Landfill
Vicinity
Proposed sampling Locations
Legend
MDNR Soil/Sediment
MDNR Dust Swipe
West Lake Landfill Boundary
OU1 - Area 1 (defined by ROD)
OU1 - Area 2
OU2 - Closed Demolition Landfill
OU2 - Inactive Landfill
OU3 - Former Active Sanitary Landfill
Operable Unit 1 = Radiological Areas
Operable Unit 2 = Nonradiological Areas
Note: Boundaries are approximate and are subject to change.
Missouri River
Feet
0
500
1,000
2,000
4,000
N
S
E
W
D01
D02
D03
D04
D05
D06
D07
D08
S01
S02
S03
S04
S05
S06
S07
S08
S09
S10