DESIGN CRITERIA

WEST LAKE LANDFILL SUPERFUND SITE OPERABLE UNIT-1

Prepared For:
The United States Environmental Protection Agency Region VII

Prepared on Behalf of:
The West Lake Landfill OU-1 Respondents

Prepared By:

PARSONS
301 Plainfield Road, Suite 350
Syracuse, NY 13212

In Association With:

Engineering for a Better World
FEEZOR ENGINEERING, INC.
3377 Hollenberg Drive
Bridgeton, Missouri 63044

And

AMERIPHYSICS
9111 Cross Park Drive, Suite D200
Knoxville, TN 37923

DRAFT
AUGUST 2019

40556557

TABLE OF CONTENTS

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

List of Tables

List of Acronyms

ACRONYM	Definition
ARAR	Applicable or Relevant and Appropriate Requirements
ASAOC	Administrative Settlement Agreement and Order of Consent
BMP	Best Management Practices
C&D	Construction Demolition
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CGP	Construction General Permit
DIWP	Design Investigation Workplan
FFA	Federal Aviation Administration
FFS	Final Feasibility Study
FS	Feasibility Study
IBC	International Building Code
MDNR	Missouri Department of Natural Resources
MSW	Municipal Solid Waste
NCC	Non-Combustible Cover
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NRC	Nuclear Regulatory Agency
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
pCi/g	picoCurie/gram
PGA	Peak Ground Acceleration
POTW	Publicly Owned Treatment Work
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RDWP	Remedial Design Work Plan
RIM	Radiologically Impacted Material
RODA	Record of Decision Amendment
SMP	Site Management Plan
SPCC	Spill Prevention, Control, and Countermeasures
SOW	Statement of Work
SWPPP	Stormwater Pollution Prevention Plan
TBC	To Be Considered
UMTRCA	Uranium Mill Tailings Radiation Act
USDA	U.S. Department of Agriculture
WAC	Waste Acceptance Criteria

1.0 Introduction

1.1 PROJECT DESCRIPTION

The United State Environmental Protection Agency (USEPA) signed a Record of Decision Amendment (RODA) for Operable Unit (OU) 1 of the West Lake Landfill Site (Superfund Site ID # MOD079900932) in September 2018. The selected amended remedy in the RODA primarily includes partial excavation and off-site disposal of the radiologically impacted material (RIM) followed by installation of a final cover system with the objectives of preventing direct contact or radiation exposure from the contaminated media at the Site.

USEPA and the Respondents have agreed to the conditions under which the Respondents will design the selected amended remedy in the RODA, as set forth in the Third Amendment to the Administrative Settlement Agreement and Order of Consent (ASAOC) and associated Statement of Work (USEPA Docket No. VII-93-F-0005). The selected amended remedy in the RODA includes:

- Partial excavation of RIM from the Radiological Areas 1 and 2 of OU-1 and disposal at an off-site facility;
- Excavation of radiologically impacted soil from the Buffer Zone and/or Lot 2A2 sufficient to reduce concentrations of radionuclides to allow for unrestricted use of the property;
- Installation of a landfill cover over Radiological Areas 1 and 2;
- Design, installation, and management of maintenance/monitoring systems for surface water, groundwater (through OU-3) and gas;
- Long-term operation, maintenance and monitoring; and
- Implementation of institutional controls.

The selected amended remedy must achieve the remedial action objectives (RAOs) set forth in the RODA. RAOs are identifiable goals to protect human health and the environment.

The remedial design (RD) and the submittals will be completed in accordance with the applicable or relevant and appropriate requirements (ARARs) included in the RODA.

Several remedial investigations have been completed in OU-1 areas. Additional investigations will be conducted to support the design of the selected amended remedy.

The Respondents will design the OU-1 remedy on an accelerated basis, to the extent possible, using expedited investigations and design of the critical path components. The remedial design for OU-1 will include the preparation of the following principal design submittals:

- Remedial Design Report (which is being submitted concurrently with this Design Criteria Report);
- Preliminary Excavation Plan;
- Preliminary (30%) Remedial Design;
- Design Investigation Work Plan (DIWP);
- Design Investigation Evaluation Report;
- Revised Excavation Plan;
- Pre-Final (90%) Remedial Design; and
- Final (100%) Remedial Design.

1.2 ARARS

The Comprehensive Environmental Response, Compensation, and Liability Act (CERLCA) Section 121(d) and National Oil and Hazardous Substances Pollution Contingency Plan (NCP) Section 300.430(f)(1)(ii)(B) require that RAs at CERCLA sites should attain a level or standard of control at least equivalent to a legally applicable or relevant and appropriate federal and state requirements, standards, criteria, or limitations that are collectively referred to as ARARs, unless such ARARs are waived under CERCLA Section 121(d)(4). The ARARs for the amended remedy selected by the USEPA in the RODA (as included in Appendix D of the RODA) are presented in **Table 1**.

Many of the ARARs relate to landfill design and closure. These are "relevant and appropriate" where professional judgement is used in their application considering site-specific environmental and technical factors. Multiple federal and state regulations and guidance documents related to landfill design and closure are cited in the ARARs listed in the RODA. While there are overlapping aspects of these regulations and guidance, they were formulated for substantially different materials, challenges, and time frames. Consequently, the final cover design will be a hybrid incorporating aspects of the various ARARs.

ARARs have not been identified in the RODA or SOW for buildings, structures, or electrical/mechanical systems that may be required during the RD or Remedial Action (RA) phases. The State of Missouri does not have statewide building codes. Instead, St. Louis County or City of Bridgeton codes are expected to be relevant and appropriate for specific elements that may be required. No permanent structures or systems are expected to be installed, so the portions of the codes that are relevant to temporary facilities are expected to be appropriate for use in the RD and RA phases. Formal permit applications are not anticipated for facilities that may be constructed on site.

ARARs have not been identified in the RODA or SOW for activities that are completely off-site, such as trucking materials to and from the Site on public roads or disposal of materials at off-site landfills. These activities are governed by applicable laws, regulations, and permit requirements in the jurisdictions where those activities occur.

Water discharges to a local publicly owned treatment work (POTW) will be required to follow the rules and requirements of that specific entity.

Permitting requirements are waived under Section 121 of CERCLA for on-site activities; however, activities and discharges taking place off-site may require a permit.

1.3 ENGINEERING CODES AND STANDARDS

Various engineering and testing societies and organizations have published codes, standards, and guidelines over the years. American Society of Civil Engineers, Institute of Electrical and Electronics Engineers, American Society of Testing and Materials, and the Geosynthetic Institute are examples of organizations that maintain codes, standards, and guidelines that may be relevant to the RD and RA for this project. They will be considered on a case-by-case basis during the RD and used as a reference where appropriate and relevant.

1.4 REPORT ORGANIZATION

A Design Criteria Report would normally be a chapter of the Basis of Design Report or 30% Design Report. However, this Design Criteria Report is being prepared concurrent with the Remedial Design Work Plan (RDWP) to provide an accelerated understanding of key technical areas that will impact the RD for this project.

This report lists specific project elements that are required to be addressed in the RD and provides basic requirements or concepts that are expected to govern the design of that element. The technical evaluations and decisions regarding these requirements will be provided in future RD deliverables.

2.0 Site Preparation

2.1 SITE SECURITY

The larger West Lake site – except for the borrow area – is enclosed by fencing, and access to the site is controlled by Bridgeton Landfill. Within the landfill, access to OU-1 Area 1, Area 2, and the Buffer Zone is also further controlled. OU-1 areas with shallow RIM are enclosed by chain-link fences that are approximately six feet in height and topped with three strands of barbed wire. Aluminum placards are posted on the fence approximately every 40 feet. These placards depict the standard radiation warning trefoil in magenta on a yellow background, with magenta lettering stating: "CAUTION. CONTROLLED AREA. AUTHORIZED ENTRY ONLY." Areas outside the OU-1 fence line with deeper RIM (such as the North Quarry Overlay) are inaccessible due to the presence of a thick overburden layer and site facilities.

The RA may require fencing and gates in different locations due to the physical activities that will be required, but it is anticipated that similar levels of security will be provided so that the OU-1 areas are secured.

2.2 SITE ACCESS AND INTERNAL ROADS

The primary foot and vehicle entrance to Area 1 is a 20-foot gate on the southern side of the area's fence line. Signage on the primary entrance gate indicates that there is no entry without proper authorization. There are also three secondary entrances at various locations: a 6-foot gate at the northwest corner; and two 20-foot gates on the north side, accessible from the larger West Lake site's main entrance and parking area. The primary and secondary gates are kept closed and padlocked when not in use.

The primary foot and vehicle entrance to Area 2 is a 20-foot gate on the southwestern side of the area's fence line. Signage on the primary entrance gate indicates that there is no entry without proper authorization. There are also five secondary entrances at various locations: a 12.5-foot gate near the southwestern corner, accessible from Boenker Lane / Old St. Charles Rock Road; a 20-foot gate at the southwest end of the Buffer Zone, accessible from Boenker Lane / Old St. Charles Rock Road; a 3-foot gate near the northern corner; a 3-foot gate on the northern side, accessible from St. Charles Rock Road; and a 6-foot gate near the northeastern corner. The primary and secondary gates are kept closed and padlocked when not in use.

The entrances may be modified to permit larger and more frequent heavy equipment and truck access during the RA. Additional potential entrance or exit locations to the site will be evaluated if they would enhance the ability to execute the RA, particularly if it would reduce traffic or left turns on major public roads. Additional access points could be temporary or permanent.

Internal construction roads will be required to execute the RA. One-way vehicle traffic without requiring backing up to turn around is the preferred construction road configuration where practicable. Separation of heavy equipment and material hauling truck routes from other on-site traffic is also preferred. Internal roadways for hauling RIM-containing waste prior to final loading into on-road transportation trucks will be maintained separately from other roadways in the Bridgeton Landfill site to reduce the potential for tracking RIM off-site and to assist in managing on-site traffic flow.

Internal roads are anticipated to change during different phases of RA. The final RD is anticipated to provide phasing of the proposed excavation, backfilling, and capping sequencing but modifications may occur during RA and road layouts may shift. In general, internal access roads developed for extended use are anticipated to be constructed with geotextile and aggregate sub-base to reduce dust and mud generation as well as to control rutting.

2.3 SITE CLEARING

Most areas in OU-1 will require clearing of vegetation and surficial debris. The timing of vegetation clearing will be shown on phasing drawings in the RD.

2.4 LAYDOWN AND SUPPORT AREAS

The proposed remediation is complex and will require laydown and support areas during the RA. Where practicable, these areas will be located within the limits of the OU-1 areas. However, it is likely that office trailer, other similar facilities, and clean material stockpiles will be located elsewhere on the Bridgeton Landfill portions of the Site. The identification of potential laydown and support areas will be identified during the RD and negotiated with Bridgeton Landfill, LLC after considering the various usage requirements in addition to the OU-1 requirements.

Laydown areas will be required for staging equipment, storing imported materials and managing excavated materials. Support areas will be required for office trailers, worker parking, RIM handling building (if necessary), and a temporary water treatment plant (if necessary).

2.5 UTILITY PROTECTION AND RELOCATION

Buried and overhead utilities will be identified and protected or relocated as necessary to execute the RA.

Specific known utilities that will likely require protection or relocation include:

- Septic system in Area 1;
- Electric service along the perimeter of Area 1 and Area 2;
- Overhead Ameren power lines along St. Charles Rock Road; and
- Landfill gas piping, leachate conveyance piping, and electric service over the North Quarry Overlay.

3.0 Environmental and Community Protection and Monitoring During Remedial Action

3.1 DUST CONTROL

Currently, the only non-negligible potential source of air impacts from routine OU-1 inspection and maintenance activities is vegetation removal performed in those areas with non-combustible cover (NCC). As described in the NCC Inspection and Maintenance Plan presented in the NCC Installation Work Plan (EMSI 2016), removal of vegetation from the NCC area is performed as needed, e.g., if deemed necessary during quarterly NCC inspections. Per the plan, dust generation is to be minimized during vegetation removal. Dust control methods described in the plan include wetting of vegetation prior to mower advancement and wetting of removed woody vegetation prior to grinding and chipping. As noted above, the inspection and maintenance program presented in the NCC Installation Work Plan will be superseded by the revised program presented in the forthcoming NCC construction completion report.

It is anticipated that RD activities may potentially include vegetation clearing within the boundaries OU-1. In such an event, dust generation from clearing vegetation will be minimized using methods that will be presented in the Design Investigation Workplan (DIWP) (Deliverable 8 on the RD Schedule present in SOW Paragraph 6.2). It is anticipated that that these dust control methods will be similar to those described in the NCC Installation Work Plan (EMSI 2016).

The currently approved air monitoring program for OU-1 provides continual monitoring of potential environmental impacts to air from OU-1. This program will continue during the performance of RD activities (subject to revisions approved by USEPA), in part to demonstrate the effectiveness of air emission controls and mitigation procedures.

Depending on the nature and scope of the OU-1 design investigation, additional air emission controls and mitigation procedures may be necessary during the investigation field activities. It is anticipated that any such procedures, if needed, will be further defined in the DIWP and executed and reported in the subsequent RD deliverables.

3.2 PERIMETER AIR MONITORING

Perimeter air monitoring during the RD will be conducted in accordance with the Site Management Plan (SMP).

3.3 STORMWATER OFF-SITE DISCHARGE

Stormwater off-site discharge monitoring during the RD will be conducted in accordance with the SMP.

4.0 Temporary Stormwater and Erosion Control

4.1 DESIGN STORM EVENT

Temporary stormwater conveyance features on the portions of the OU-1 Site that contain waste and will be disturbed or on areas that will be used to manage waste materials, including RIM, will be designed for a 25-year, 24-hour storm per Missouri solid waste regulations 10 CSR § 80-3.010(8)(B)1.F to the extent practicable. St. Louis Lambert International Airport is assumed to be the relevant weather reporting station for assessing the magnitude of these weather events. Per National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 8, Version 2, the estimated precipitation with a 90% confidence interval for the 25-year, 24-hours storm is 5.62 inches.

4.2 DISCHARGE AND DETENTION REQUIREMENTS

The Bridgeton Landfill site has multiple existing stormwater discharge locations regulated under a National Pollutant Discharge Elimination System (NPDES) permit. OU-1 also has several existing stormwater discharge locations monitored by USEPA. Where practicable, stormwater from the OU-1 RA will be directed to the existing stormwater locations. These discharge locations will be upgraded to manage increased flows If necessary. If temporary sediment basins or similar features are required prior to discharge during periods of active ground disturbance, they will be designed for a 2-year, 24-hour storm per the USEPA Construction General Permit (CGP) substantive requirements to the extent practicable. The primary purpose of a sedimentation basin is to reduce particulate solids leaving the Site. Per NOAA Atlas 14, Volume 8, Version 2, the estimated precipitation with a 90% confidence interval for the 2-year, 24-hours storm is 3.16 inches.

If additional temporary stormwater discharge points are required, they will be designed, installed, and monitored similar to the existing stormwater discharge points at the Site to the extent practicable.

If stormwater calculations indicate that temporary construction conditions will increase peak stormwater flow discharges from the Site, then the need for providing detention basin(s) in addition to sedimentation basin(s) will be evaluated and designed to the extent practicable. Since there is little existing impermeable surface and only short periods where there would be significant impermeable surface during construction (e.g., placing geomembranes in the final cover before covering with soils), the need for additional detention time or quantity is not expected.

4.3 EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

Missouri Department of Natural Resources (MDNR) provides detailed information and requirements for selecting and using appropriate erosion and sediment control best management practices (BMPs) in the guidelines for preparing Stormwater Pollution Prevention Plans (SWPPP) under 10 CSR § 20-6.200, as does USEPA for the Construction General Permit under 40 CFR Part 122.26(b). The substantive requirements of these BMPs will be used to the extent practicable.

4.4 EXCAVATION AND MATERIAL HANDLING STORMWATER MANAGEMENT

A design goal will be to reduce potential stormwater contact with waste per 10 CSR § 80-3.010(8)(C) which will likely require controlling the number and size of open areas of excavation as well as diversion of to direct

stormwater to unimpacted locations where it can be conveyed and discharged as stormwater under Sections 4.2 and 4.3 above.

Stormwater that contacts waste materials, excavated materials containing wastes, and materials containing waste will be managed as described in Sections 5 and 6.

5.0 Excavation

5.1 DEFINITION OF AREA 1 AND AREA 2 EXCAVATION BOUNDARIES

The RODA requires removal of RIM with radioactivity greater than 52.9 picoCurie/gram (pCi/g) from the upper 12 feet of the landfill below the 2005 topographic surface. EPA has defined RIM at the Site as any material containing combined Ra-226 plus Ra-228 or combined Th-230 plus Th-232 at levels greater than 5 pCi/g above background, or U-238 plus U-235 plus uranium-234 (U-234) at levels greater than 50 pCi/g above background.

The RODA defines a requirement for total radioactivity to be removed to be equivalent to the total radioactivity defined in the geostatistical model provided in the Final Feasibility Study (FFS) (EMSI 2018) for Alternative 4 (Proposed Plan version) which described excavation of combined radium and thorium down to 16 feet below the 2005 topographic surface. In order to identify the total radioactivity for removal, the total radioactivity will be computed for the Alternative 4 (Proposed Plan version) excavation description (down to 16 feet below the 2005 topographic surface) by multiplying the radioactivity by the volume and mass of survey units defined in the RD geostatistical model. The final excavation boundary for the Modified Alternative 4 (RODA selected remedy) down to 12 feet below the 2005 topographic surface will have it is total radioactivity computed using the same RD geostatistical model. This will require developing a common RD geostatistical model with common survey unit geometries for each of these two parallel excavation descriptions using the same data set.

The basic excavation to 12-feet below the 2005 topographic surface in the Modified Alternative 4 (RODA selected remedy) selected as the amended remedy is less volume, mass, and radioactivity than Alternative 4 (Proposed Plan version), which considered excavation to 16-foot below the 2005 topographic surface. Therefore, additional removals below the 12-foot depth will be required in the RD excavation design to achieve a total radioactivity equivalent to Alternative 4 (Proposed Plan version). The RODA proposes that this additional radioactivity will be removed by targeting localized deposits of higher radioactivity materials in the 12- to 20-foot deep zone, particularly materials with radioactivity greater than 1,000 pCi/g. The RD will consider practical aspects to define the excavation boundaries, including performing deeper excavation in areas where overlying materials are already planned for removal and leaving local isolated RIM in place where extensive overburden excavation would be required.

Additional radioactivity data will be collected in a design investigation to fill in data gaps identified in an analysis of the geostatistical model. This data will include both field screening (e.g., downhole gamma logging, core scans) and laboratory analysis of core samples. In order to use both types of data (e.g., “soft” downhole gamma logs and “hard” analytical laboratory results), it is expected that indicator kriging will be used for the RD geostatistical model.

5.2 DEFINITION OF BUFFER ZONE/LOT 2A2 EXCAVATION BOUNDARIES

Per the RODA, the impacted soils on Lot 2A2 and portions of the Buffer Zone will be remediated to levels that allow unlimited exposure and unrestricted use. Since radium and thorium are naturally occurring elements that are ubiquitous in soils and rock (both undisturbed and fills), the RODA requires evaluating background radium and thorium levels to define the vertical and horizontal remediation boundary in these areas. Background sampling will be conducted in areas that appear to have the same general characteristics of the Buffer Zone and Lot 2A2. The background samples will provide a range of results that will be assumed to represent

naturally occurring activities. Samples from the investigation area in survey units of 2,000 square meters or less will be compared to the range of background values to define materials that are distinctly elevated above the background range that will require removal. The mean of the background samples plus three standard deviations is expected to be used to define the background range.

5.3 CONFIRMATION SAMPLING

The final boundaries of excavation will be confirmed through a combination of field screening and soil sample collection within survey units no larger than 2,000 square meters. Soil samples will be collected and shipped to the analytical laboratory as described in the RDWP. Confirmation sampling will be performed to confirm that the total radioactivity removal required in the RODA will be achieved at the completion of the RA. The confirmation sampling will be input into the RD geostatistical model to confirm the model accuracy.

Sampling methodologies and strategies will be evaluated to identify techniques and locations most likely to prevent false positives and false negatives that could lead to inaccurate results during confirmation sampling. The confirmation sampling strategy will also be evaluated to identify an approach that is most likely to minimize open excavations and delays. We anticipate that the confirmation sampling will be best executed during the RD and additional confirmation sampling would not be required in the RA.

Additional soil borings will be drilled, downhole logged, and sampled during the RD phase to define the outer boundary of remaining RIM in Areas 1 and 2 to define the boundary of engineered cover.

5.4 EXCAVATION SAFETY

The Occupational Safety and Health Administration (OSHA) defines an excavation as any man-made cut, cavity, trench, or depression in the earth's surface formed by earth removal. The RODA requires excavations for RIM removal generally to be 12 feet below the 2005 topographic surface. In some locations the RIM excavations may extend down to 20 feet below the 2005 topographic surface. Typically, additional overburden removal will be required as other materials have been placed over the RIM during construction of the NCC and other Site activities.

OSHA 1926.651(g) requires atmospheric testing in excavations where oxygen deficiency or hazardous atmosphere can be reasonably expected. Precautions to prevent worker exposure to oxygen deficient or hazardous atmospheres is required as well as providing attended emergency rescue equipment.

OSHA 1926.651(h) requires precautions to protect workers from accumulated water or accumulating water. At the OU-1 excavations, this could include both precipitation and leachate.

OSHA 1926.652(b) requires that excavations in fill materials be sloped at 1.5H:1V or flatter unless structural shoring is provided or alternative configurations of sloping and benching are approved by a registered professional engineer.

For this project, excavation safety will be a continuous process until the completion of the RA and will be considered during RD. The final responsibility for excavation safety will be that of the RA contractor by law. An RD goal is to design the excavation boundaries to be efficient for the RA contractor to execute the excavation without substantive changes for excavation safety.

A general project goal will be to minimize or eliminate the need for people to enter the excavation areas. This would include surveying, water management, drilling, and sampling/testing activities.

5.5 CONTACT WATER AND LEACHATE MANAGEMENT

Contact water and leachate removed from the excavation will be conveyed to the on-site construction water treatment plant for treatment prior to approved discharge.

Contact water and leachate will be removed from the excavation as needed to provide a safe working environment and reduce dewatering of excavated materials outside the excavation areas. It is expected that pumping equipment would be lowered into the excavation area using equipment rather than having people enter the excavation. Excavation dewatering requirements will be considered during development of excavation phasing, potentially incorporating low points in excavation phases where leachate and contact water can be efficiently removed.

The RD will seek to reduce contact water and leachate quantities by limiting the open excavation area during each excavation phase and reducing the number of multiple excavation phases open simultaneously.

Preventing run-on into an excavation from surrounding terrain will be a design objective during phasing development. Similarly, preventing run-off from exposed waste in an excavation area onto surrounding clean ground or into unimpacted stormwater will be a design objective while developing phasing.

5.6 AIR QUALITY AND ODOR

A significant portion of the excavations will be conducted in aged municipal solid waste. These materials have the potential to generate odors. The design will develop tiered response actions to address management of odors and other air quality issues if they arise. These measures are anticipated to be quickly implemented as flexible responses and may include a variety of techniques including misting, odor suppressant foams, masking agents, and temporary covers.

5.7 WILDLIFE MANAGEMENT

A portion of OU-1 fall within 10,000 feet of a runway end for turbojet aircraft which triggers a requirement for sanitary landfills to demonstrate that they are designed and operated so that the landfill does not pose a bird hazard to aircraft per 10 CSR § 80-3.010 (4)(B)(1). This runway opened in 2006 long after OU-1 had ceased accepting waste. The RODA requires re-opening the landfill surface and exposing aged municipal solid waste (MSW). The proposed remediation will not bring new putrescible waste on site but will require exposing the aged MSW which creates a potential for birds and other vectors to visit the Site. Past activities at the North and South Quarry areas of the Bridgeton Landfill (such as drilling and smaller scope disturbances) have not been observed to present a significant attraction to birds, notwithstanding the associated exhumation of aged MSW.

The Bridgeton Landfill has an active Bird Hazard Monitoring and Mitigation Plan (CEC, 2016) for its current site maintenance operations. Bridgeton Landfill performs bird monitoring and deterrence on a regular basis under this plan. U.S. Department of Agriculture (USDA) has performed independent wildlife monitoring from 2015 through the present for the Bridgeton Landfill Site.

The OU-1 design team will work closely with USDA, the City of St. Louis/St. Louis Lambert International Airport and the Federal Aviation Administration (FAA) to research and develop a wildlife hazard monitoring and mitigation plan for the proposed OU-1 work.

Active excavation areas will be phased to reduce the areas of MSW exposed at any time. Specifications for using temporary (daily or intermediate) covers of the (e.g., soil, foam, or geosynthetics) will be developed in the event that exposed waste demonstrates attraction to birds or other vectors. Temporary and permanent stormwater retention basins will be designed to hold water for less than 48 hours for typical storms per the recommendations in FAA Circular 150/5200-33B “Hazardous Wildlife Attractants On or Near Airports).

Detention basins that hold water for long periods will be avoided to the extent practicable due to the increased attraction for birds and other wildlife.

Provisions to deter or cull persistent birds will be developed in conjunction with the USDA, Lambert-St. Louis International Airport, and FAA.

Vectors other than birds will be managed per Missouri Solid Waste Regulation 10 CSR § 80-3.010(15).

5.8 DAILY AND INTERMEDIATE COVERS

Daily and intermediate covers may be required during the RA to reduce precipitation contacting exposed waste, odors and other emissions, and attractiveness to birds and vectors. The excavation will be into a combination of cover soils and aged MSW with no new putrescible waste being added. Therefore, the need for daily and intermediate covers will be defined by sequencing and actual conditions encountered during the work. The design will develop criteria based on these categories to define the requirement for and types of cover that are appropriate.

The purpose of the cover will dictate which type of cover(s) is selected (e.g., odor reducing foams versus temporary geomembrane to shed water). The RD will describe alternative daily covers and their intended uses with criteria for selection of appropriate daily and intermediate covers if necessary.

5.9 CONTINGENCY FOR "ATYPICAL ITEMS" ENCOUNTERED DURING EXCAVATION

It is expected that atypical MSW will be encountered during the RA. The RD will address procedures for handling and disposal of these materials, if encountered. Below is a list of materials that could be encountered and a preliminary outline of how each will be addressed in the RD.

5.9.1 INTACT DRUMS

A procedure will be developed in the RD to address discovery of an intact drum during RA.

5.9.2 TIRES

Based on previous work conducted at the site it is expected that vehicle tires will be encountered during the remedial actions. The tires will be disposed back into the landfill in an intact state as part of the backfill. The RD will address procedures for removing RIM above threshold levels from tires prior to placement, specifically considering whether they were found in a RIM impacted zone or not. Efforts will be made to minimize tire-to-tire contact and void space during placement and to preferentially place tires in the base of the excavations to the extent practicable.

5.9.3 WHITE GOODS

White goods are defined as large appliances (e.g., refrigerators). White goods will be disposed intact back into the landfill as part of the backfill. The RD will address procedures for removing RIM above threshold levels from white goods prior to placement, specifically considering whether they were found in a RIM impacted zone or not. Efforts will be made to minimize void space during placement and to place white goods separate from each other in deeper backfill materials.

5.9.4 OTHER OVER-SIZE MATERIALS

Over size material could include things like vehicles and old construction equipment. The intent is to keep these materials on-site and either leave them unexcavated or place them back in deeper backfill materials. The RD will outline an approach to address these materials in a case by case basis.

5.9.5 CONSTRUCTION DEMOLITION DEBRIS MATERIALS

Construction and demolition (C&D) debris is noted on the surface of many areas of Area 1 and Area 2 and is expected to be encountered at subsurface during the RA. C&D debris will be disposed back into the landfill. The RD will address procedures for removing RIM above threshold levels from C&D debris prior to placement, specifically considering whether they were found in a RIM impacted zone or not. Efforts will be made to minimize void space during placement, which could include a reduction in size of the debris and to place C&D debris with deeper backfill materials.

5.9.6 REGULATED ASBESTOS CONTAINING MATERIALS

Regulated asbestos containing materials will be managed per 40 CFR 61.150 and 154(j) if encountered and disturbed during excavation, to the extent practicable.

6.0 Material Handling and Segregation

6.1 SEGREGATE MATERIAL FOR REUSE AS BACKFILL

Section 12.2.2 of the RODA specifies that excavated RIM-impacted waste with radioactivity less than 52.9 pCi/g will be preferentially placed in the base of the excavations to the extent practicable after waste with radioactivity greater than 52.9 pCi/g is removed to depth. An RD goal is that these materials will be segregated during excavation and returned to the excavation for backfilling as soon as practicable. It is expected that the RD geostatistical model will be used to identify the zones of materials between 7.9 and 52.9 pCi/g as well as the zones greater than 52.9 pCi/g so they can be segregated during excavation.

RIM-containing materials from the Buffer Zone and Lot2A2 excavation areas that are less than 52.9 pCi/g can be placed as backfill within the footprint of the engineered cover in Areas 1 and 2.

Non-RIM impacted overburden and waste will be segregated from RIM-containing waste to the extent practicable. These materials may be stockpiled for use in backfilling the excavations above backfilled RIM-containing waste as discussed above. These (non-MSW) materials may also be used as daily or intermediate cover.

The segregation of these materials will occur during the excavation process where specific three-dimensional zones will be designated using the final geostatistical model developed during RD. The RD will be developed so the coordinates will be programmed into survey equipment used to control the excavation process and each zone will be excavated and placed in a segregated stockpile or haul truck directly by the excavator for management for reuse. Where possible, these materials will be returned immediately into excavation backfill to avoid ex-situ double-handling and stockpiling.

Segregated stockpiles will be protected from the elements to prevent dust or contact water generation to the extent practicable. Stockpiles with aged MSW will also be covered if they exhibit attractiveness to birds or vectors.

6.2 SEGREGATE RIM BY DISPOSAL SITE

RIM materials with radioactivity above 52.9 pCi/g will be transported and disposed of off-site at approved regulated facilities. Each facility will likely have different requirements defining which wastes they can receive. This may require specific testing of stockpiled RIM-containing waste. To the extent practicable, the segregation of these materials will occur during the excavation process and each zone will be excavated and placed in a segregated stockpile. Disposal site specific testing would then occur prior to loading the shipping containers if the disposal sites require pre-disposal testing beyond the prior in situ testing.

6.3 CONTAINMENT REQUIREMENTS

RIM-containing waste removed from the excavation area for processing, stockpiling, and/or loading will be stored on lined containment pads designed to contain dewatering fluids, including leachate and contact water from precipitation. The lining system will be designed to withstand construction and operating loads for the duration of the work. The containment areas will be designed with sumps for pumping of the water for conveyance to the construction water treatment plant.

The use of an enclosed structure will be evaluated for containing RIM-containing waste stockpiles. If the use of additives (e.g., cement) are likely to be necessary to reduce water content of RIM-containing materials prior to off-site disposal, then an enclosed structure may be considered for that processing.

6.4 CONTACT WATER AND LEACHATE MANAGEMENT

Contact water and leachate from MSW and RIM materials handled outside of the excavation areas will be contained and conveyed to the on-site construction water treatment plant for treatment prior to approved discharge.

The RD will seek to reduce contact water and leachate quantities by limiting the area and quantity of RIM-containing waste and other materials located outside of the excavations.

Preventing run-on into materials handling areas from surrounding terrain will be a design objective during pre-excavation site development. Similarly, preventing run-off from exposed waste in waste handling locations outside of the excavations onto adjacent clean ground or into unimpacted stormwater will be a design objective during pre-excavation site development and phasing during the RA. Lined containment areas will be designed as discussed in Section 6.3.

6.5 AIR QUALITY AND ODOR

A significant portion of the materials that will be handled outside of the excavations will contain aged MSW. These materials have the potential to generate odors. The RD will develop tiered response actions to address management of odors and other air quality issues if they arise. These measures are anticipated to be quickly implemented as flexible responses and may include a variety of techniques including misting, odor suppressant foams, masking agents, and temporary covers. Materials stockpiled for several days may dry, which could create a dust generation potential. Prevention of dust generation may include the use of covers or spraying with water.

6.6 WILDLIFE MANAGEMENT

Wildlife will be managed during material handling and segregation as part of the wildlife management procedures discussed in Section 5.7.

6.7 TRUCK LOADING

Trucks will be loaded for off-site transport of RIM-containing waste. The loading may take various forms depending on the containers that the waste will be transported in. Truck loading procedures may include loading a filled container onto the truck or a flatbed truck receiving landfill containers (e.g., Super Sack®). These container/sacks may be filled near the excavation site and brought to the truck loading area to be put on the highway truck and taken directly to a disposal facility or to a rail transfer yard.

RIM may also be loaded directly into a truck without prior containerization. This truck loading area would be designed to maintain on-road highway trucks on an unimpacted surface that does not receive traffic from vehicles travelling in the excavation or material handling and segregation areas. The RIM to be loaded would likely be placed onto a lined and contained pad and then scooped and placed in the on-road truck. The truck would be inspected and cleaned as necessary prior to departure to prevent RIM from being tracked off-site.

This truck loading area may be outside or in a building. The need for a building to load trucks and generally process materials will be evaluated during the design.

6.8 STRUCTURES AND MECHANICAL/ELECTRICAL SYSTEMS

Temporary structures and systems are expected to be designed and constructed for use during the RA excavation, material handling, and backfilling phases. These include a potential building for handling RIM and a water treatment system for fluids encountered during the excavation, material handling, and backfilling processes. These facilities are anticipated to be temporary and will be deconstructed and demobilized at the end of the RA.

Design of the structures and other facilities will follow the substantive requirements of the technical building codes for the locality that are appropriate and relevant for temporary facilities. Design board permitting, review, and approval ordinances are not applicable or appropriate and relevant to these temporary facilities.

The State of Missouri does not have a state building code or related codes. The City of Bridgeton administers the Building Code for structures within the City limits, including the vicinity of the site. Ordinance No. 06-35 adopted specific chapters of the International Building Code (IBC) 2003 with amendments in Article 2 Sections 500.120 through 500.230. The technical requirements in Article 2 are generally appropriate and relevant and will be considered during RD.

St. Louis County has adopted the following codes with technical requirements that are relevant and appropriate:

- Electrical Code (Ch. 1102 – 2014 NEC);
- Energy Conservation Code (Ch. 1115.13-2009 IBC/IMC);
- Fuel Gas Code (Ch. 1108.21-2009 IMC);
- Mechanical Code (Ch. 1108-2009 IMC); and
- Plumbing Code (Ch. 1103-2015 UPC).

7.0 Transportation

7.1 USDOT AND MISSOURI DOT REQUIREMENTS

Transportation of materials related to the RA will be conducted under the requirements of 49 CFR Transportation.

Transportation of waste materials from the Site will be conducted in accordance with the requirements of 49 CFR Subchapter C – Hazardous Materials Regulations. These include regulations on hazardous materials communications, emergency response information, training requirements and security plans (49 C.F.R. Part 172) which address special provisions, preparation and retention of shipping papers, packaging and conveyance marking, labelling, placarding, emergency response, and security planning. The regulations contain specific requirements associated with shipment of radioactive materials (e.g., 49 C.F.R. §§ 172.310, 172.403, 172.436, 172.438, 172.440, and 172.556). Other regulations (49 C.F.R. Part 173) describe requirements for shipment and packaging that are applicable to shippers, including specific requirements for shipment of radioactive materials. Regulations set forth in 49 C.F.R. Part 174 address shipment by rail and include special handling requirements for radioactive materials (49 C.F.R. § 174.700). Required emergency response information is described in 49 C.F.R. Subpart G (49 C.F.R. § 173.602). The NRC, through a Memorandum of Understanding with DOT, also has promulgated regulations related to transport of radioactive materials (10 C.F.R. Part 71 and Part 177).

Missouri Section 260.392 RSMo will be evaluated during RD to assess if it is applicable to the transport of RIM-containing waste from the site.

7.2 SITE ACCESS

Site access for all construction deliveries and contractors will be evaluated during the RD. Access evaluations will assess impacts to local and Site traffic patterns, safety and feasibility of implementation.

In addition to the general U.S. Department of Transportation (DOT) transportation requirements, Parsons will consider state and local requirements; specifically these requirements will be applied to our assessment of site entrances and exits. These requirements include the following:

- AASHTO - A Policy on Geometric Design of Highways and Streets, 2018;
- Missouri Department of Transportation – Engineering Policy Guide (MoDOT Maintained Roads);
- St. Louis County – Design Criteria Manual (St. Louis County / Local Maintained Roads);
- Missouri Department of Transportation – Engineering Policy Guide (Design Criteria, Traffic Analysis and Access Permit Information for MoDOT Maintained Roads); and
- St. Louis County – Access Management Guidelines, June 2008 (Design Criteria, Traffic Analysis and Access Permit Information for St. Louis County / Local Maintained Roads).

7.3 TRUCK ROUTES

Trucking of earthen materials to and from the Site will be required to implement the selected remedy. This will include trucking of import material to the Site for backfill, landfill grading and cover materials. This may include trucking of RIM off-site.

Development of truck routes will be for the entire truck route. A primary objective will be to route the trucks on interstate and major state highways designed for heavy truck traffic for as much of the route as possible. As part of this objective, the truck routes will be developed to direct the trucks onto these major roads as early as practicable. These local truck routes will also consider reducing left turns which can cause traffic delays and have higher accident potential.

7.4 RAILROAD TRANSPORTATION

The RD will assess railway transportation of waste. This will include two aspects: (1) installing a new rail spur directly at the Site; and (2) identifying and assessing the feasibility of using an existing off-site truck-to-rail transfer facility for transportation of RIM to a disposal facility.

To assess the feasibility of developing a rail spur directly to the Site, the guidance provided in the documents below will be evaluated. Based on an initial review the feasibility of this option is unlikely, but it will still be evaluated in detailed design.

Regulating Organization	Document Title
AREMA	Manual for Railway Engineering
AREMA	Portfolio of Trackwork Plans
FHWA	Railroad-Highway Grade Crossing Handbook
FRA	49 CFR 213 - Track Safety Standard
FRA	49 CFR 214 Subpart C - Roadway Worker Protection
MoDOT	State Railroad Regulations
NS	Public Projects Manual for Projects that May Impact Norfolk Southern Railway Company
NS	Norfolk Southern Railway Company Specifications for Design and Construction of Privately Owned Industry Tracks

8.0 Waste Disposal

8.1 WASTE CLASSIFICATION

Waste that requires removal from the Site has been defined in the RODA, as discussed in Section 5.1 of this Design Criteria Report. Classification of this waste will be based on the specific permit requirements of the off-site disposal sites that will be receiving these materials. In general, the presence of mixed waste, including MSW, soil, and RIM may be a specific classification category for one or more disposal sites. Each disposal site has specific permit limits on the nature and level of radioactivity that it is permitted to receive. These limits may be different from the internal excavation segregation RODA definitions used in the RD the geostatistical analysis. Therefore, once the disposal sites have been defined (possibly at the beginning of RA instead of in the RD), the excavation internal segregation boundaries defined by the geostatistical analysis may be sub-divided by additional analysis using disposal site criteria in addition to the RODA criteria as discussed in Section 6.

If suspected hazardous waste is encountered during excavation, it will be evaluated for RCRA hazardous characteristics per 40 CFR 261.21 through 262.24. If the waste is determined to be a characteristic hazardous waste, then it will be disposed of off-site at a RCRA Subtitle C landfill if the waste is not above that facility's permit limits for radioactivity. If the radioactivity is in excess of the Subtitle C facility permit limits, then it will be disposed at a landfill permitted to receive both radioactive and hazardous waste materials.

8.2 DISPOSAL SITE REQUIREMENTS AND COMMUNITY ACCEPTANCE

The LBSR and soil mixture that was disposed of in West Lake Landfill did not require an AEC license at the time of its disposal. The LBSR from the Latty Avenue site that was blended with soil and ultimately disposed of at West Lake Landfill constituted "unimportant quantities of source material" that were exempt from the AEC's licensing requirements, as set forth in 10 CFR § 40.13(a). In addition, the AEC had contemporaneous knowledge that the LBSR and soil mixture had been disposed of at the landfill, and still found that Cotter's source material license for the Manhattan Project residues (including the LBSR) that had been stored at Latty Avenue could be terminated (and did in fact terminate that license). An analysis may nonetheless be required for some disposal facilities if disposal of regulated materials above a certain threshold at a non-NRC-licensed facility is anticipated. This analysis would require evaluation of the design of the disposal facility, safeguards and controls, and community involvement. The analysis would need to demonstrate that disposal of the waste at a non-NRC-licensed facility would meet the protectiveness criteria established by CERCLA (i.e., constraining excess cancer risk to 10^{-4} to 10^{-6} and a hazard index of less than 1). This analysis would also look at the measures used to protect the health and safety of workers at the off-site disposal facility and the surrounding community. It would also examine the facility's ability to protect groundwater. This analysis would be conducted by the proposed facility to the satisfaction of its permitting agencies in order to demonstrate that it meets the technical and community acceptance criteria required for disposal of RIM-containing waste from this site.

8.3 WASTE ACCEPTANCE AND CRITERIA

Waste Acceptance Criteria (WAC) are established for each disposal site based on their federal and state permit or license requirements. These permit and license requirements can change over time and may change during the RD and RA processes. Current requirements for each potential facility will be obtained during the RD and evaluated against the existing data set. Additional data may be obtained during the DI to aid in screening

materials for evaluation by potential disposal facilities. Additional testing may be required on excavated materials during the RA prior to shipping for disposal.

9.0 Construction Water Treatment

9.1 DEFINITIONS

Construction water is defined as water that has been in direct contact with materials characterized as waste on the Site. Collected construction water will be treated prior to discharge from the Site.

Construction water includes leachate from the MSW materials in Areas 1 and 2, and stormwater that falls on or flows on or through MSW or RIM-containing waste.

Water that falls on and flows on non-waste materials, such as clean soils used for daily cover, temporary geomembranes, or spray-on foams and coating, is not considered construction water if it is diverted or collected prior to contacting waste materials. This water can be discharged as surface water through the stormwater discharge system or allowed to percolate into the ground in non-waste areas.

9.2 TREATED WATER DISCHARGE REQUIREMENTS

Treated water discharge will meet the requirements of Missouri Water Quality Standards per 10 CSR § 20-7.031 if discharged directly to waters of the state.

Discharge to a POTW or a private industrial wastewater treatment facility will be treated to the limits set by that facility.

9.3 SLUDGE AND TREATMENT MEDIA DISPOSAL

To the extent practicable, sludge and treatment media from the water treatment process will be placed in Areas 1 and 2 excavation backfill and regrading fills below the cover system during the RA.

9.4 PUMPING, TREATMENT, TRANSMISSION, AND STORAGE

Construction water will be pumped directly from its collection points to either storage for later treatment or a temporary on-site construction water treatment facility. Where the untreated construction water transmission lines crosses unimpacted ground, it will be conveyed in a double-walled pipe. The water will be treated in a temporary on-site construction water treatment plant designed to achieve the required discharge limits.

10.0 Backfilling

10.1 EXCAVATED MATERIAL RE-USE

Section 12.2.2 of the RODA specifies that excavated RIM-impacted waste with thorium or radium radioactivity less than 52.9 pCi/g will be preferentially placed in the base of the excavations. Other excavated overburden materials will be placed over these materials.

10.2 PLACEMENT AND GRADING

To the extent practicable and safe, the backfill materials will be placed in horizontal lifts and compacted with a landfill trash compactor per Missouri Solid Waste Rule 10 CSR § 80-3.010(18) and general industry standards.

The final stages of backfilling will be integrated into the regrading fill required to achieve acceptable final grades for the site.

The RD will evaluate phasing of the backfilling and regrading for temporary stormwater management as discussed in Section 4 of this Design Criteria Report.

11.0 Final Cover

11.1 FINAL COVER BOUNDARY DEFINITION

The location of the landfill toe defining the outer boundary of Areas 1 and 2 will be defined in the RD. This will define the edge of the final cover in those areas.

Along the interior boundary of Areas 1 and 2, investigation data will be evaluated to identify the furthest extent of RIM-containing waste beyond the excavation to define the edge of the engineered cover in those areas. Additional investigation may be necessary in the DI to provide this data.

11.2 REGRADING AND FINISHED GRADE

The Missouri Solid Waste Rules 10 CSR § 80-03010(17)(B)(3) and (7) contain minimum and maximum side and top slope requirements. The object of these slope requirements is to promote maximum runoff without excessive erosion and to account for potential differential settlement of the waste and engineered cover. Because landfilling of Areas 1 and 2 was completed many years ago, much of the compaction of the refuse has already taken place and differential settlement may no longer be a significant concern. Therefore, the 5% minimum sloping requirement may be greater than necessary and may not be optimal for the Amended Remedy. Sloping specifications will be designed to promote drainage and reduce infiltration of precipitation while minimizing the potential for erosion. It is anticipated that a 2% to 3% slope may be sufficient to meet drainage requirements while resulting in a lower potential for erosion. This approach could increase the life of the cover and overall longevity of the remedy compared to a steeper slope, which would be subject to increased erosion potential. The optimal slope for the remedy will be further evaluated during the RD. The maximum sloping requirement of 25% will be met at elevations above perimeter or starter toe berms.

11.3 ENGINEERED COVER REQUIREMENTS

11.3.1 USEPA AND MDNR

The final cover will consist of at least two feet of compacted soil and overlaid by at least one foot of soil capable of sustaining vegetative growth as described in Missouri Solid Waste Rule 10 CSR § 80-3.010(17)(C)4(A). The final cover system will address the requirement for minimizing precipitation infiltration by designing it for the equivalent performance of the liner cross-section described in Missouri Solid Waste Rule CSR § 80-3.010(17)(C)4(B). Placement of soils cover addresses the requirements for minimization of fire hazards, odors, blowing litter, control of gas venting, and scavenging. Placement of soil and establishment of a vegetative cover will meet the requirement of providing a pleasing appearance. The final cover will prevent direct contact with the waste material.

The engineered cover component of the Amended Remedy will consider criteria set forth in the guidance that has been identified as To Be Considered (TBC). Specifically, these include the USEPA's July 1989 *Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments* and the April 2004 *(Draft) Technical Guidance for Resource Conservation and Recovery Act (RCRA) / CERCLA Final Covers*. The 1989 Technical Guidance Document provides design guidance on final cover systems for hazardous waste landfills and surface impoundments. This guidance addresses multilayer cover design to provide long-term protection from infiltration of precipitation. The 2004 Draft Technical Guidance provides design information

regarding cover systems for municipal solid waste and hazardous waste landfills being remediated under CERCLA, RCRA Corrective Action, and sites regulated under RCRA. This guidance includes updated information related to development of design criteria and provides a wide array of traditional and alternative approaches that may be used to accomplish the short- and long-term objectives of the Missouri Solid Waste Rules and the Uranium Mill Tailings Radiation Control Act (UMTRCA) to create a hybrid cover system.

11.3.2 UMTRCA

The UMTRCA standards at Title 40 of the Code of Federal Regulations (CFR) § 192.02(b)(1) state that control of residual radioactive materials and their listed constituents shall be designed to provide reasonable assurance that release of Rn-222 from residual radioactive material to the atmosphere will not exceed an average release rate of 20 pCi/m^2s. The Amended Remedy will meet the radon emission standard promulgated under UMTRCA through partial excavation of RIM greater than 52.9 pCi/g to a target depth of 12 feet and construction of the engineered landfill cover. The landfill cover system will be designed to provide sufficient radon attenuation to limit future maximum surface emissions from Areas 1 and 2 of OU-1 to meet the UMTRCA performance standard.

The remedy will also meet the longevity standard presented in 40 CFR § 192.02(a) in that it will be designed to be effective for up to 1,000 years, as far as reasonably achievable, but at a minimum, 200 years. This will likely include the addition of a bio-intrusion barrier. Alternative cover concepts, such as evapo-transpirative covers, are often used to provide protection for periods of indefinite length after the geosynthetics are likely to have declined in effectiveness. Incorporating alternative cover elements into the hybrid final cover will be considered. Part of the evaluation of alternative cover systems for long-term stability will be to differentiate performance requirements of steeper side-slopes versus the comparatively flatter top plateaus. Infiltration performance is more important in the flatter areas (e.g. less than 15% slope) while slope stability is more important on the steeper side slopes. Therefore, the hybrid design may consider different cover cross-sections on the steeper side slopes and flatter plateau areas.

11.3.3 NORTH QUARRY OVERLAY

The hybrid final cover system used to accomplish the short- and long-term objectives of the Missouri Solid Waste Rules and UMTRCA will be installed within the defined boundaries of OU-1 Areas 1 and 2 except for the portion of Area 1 covered with the Bridgeton Landfill North Quarry Overlay. A different final cover system will be proposed for the portion of the North Quarry overlying RIM which will use the thick non-RIM refuse over the RIM as an UMTRCA radon attenuation barrier, and a classical solid waste final cover meeting the standards of 10 CSR § 80-3.010(17)(C)4 over the non-RIM waste. This will allow the unimpeded operation and maintenance of the North Quarry leachate and landfill gas infrastructure while providing long-term protectiveness.

11.4 SEISMIC

The peak ground acceleration (PGA) for the Site is 0.199g for a return period of 2,475 years (2% probability of occurrence in 50 years) according to the U.S. Geological Survey Unified Hazard Tool. Pseudo-static slope stability analyses will be performed for the side slopes and final cover system per the procedures outlined in EPA 600-R-95-051 "RCRA Subtitle D (258) Seismic Guidance for Municipal Solid Waste Landfill Facilities" (USEPA 1995). If the pseudo-static slope stability analyses have a factor of safety of 1.0 or greater, no additional analyses will be required per the guidance. If the factor of safety is less than 1.0, then additional analyses will be conducted per the guidance recommendations.

11.5 LANDFILL GAS

Decomposition gases generated within the MSW will be managed on-site per Missouri Solid Waste Rule 10 CSR § 80-3.010 (14). Areas 1 and 2 contain aged MSW that is well beyond peak gas generation, and gas generation is expected to decline in the coming years. Over the time frame required by the UMTRCA regulations, landfill gas generation in Areas 1 and 2 is expected to be minimal.

The primary challenge posed by landfill gas at the Site is a gradual build-up of pressure below an impermeable cover material (e.g., geomembrane) which could cause the membrane to inflate upward locally pushing cover soils to the side (colloquially known as a "whale" or "hippo"). Landfill gas can also cause vapor pressure gradients that can accelerate radon's migration to the ground surface during the first years after closure until landfill gas production is minimal. It should be noted that radon gas is naturally-occurring and is generally present in landfill gases. The RD will evaluate passive gas management to address these circumstances.

11.6 RADON

Radon's most stable isotope, Rn-222, has a half-life of 3.8 days. The design goal for managing radon gas is to provide reasonable assurance that the release of Rn-222 from residual radioactive material to the atmosphere will not exceed an average release rate of 20pCi/m^2-s.

11.7 RESTORATION

The final cover surface will be vegetated as a native prairie grassland.

11.8 ACCESS

Site access is expected to be limited to the existing gates. Roads will be provided on the final cover surface as necessary to provide access for maintenance and monitoring activities.

11.9 SITE SECURITY

Site security will be provided in accordance with the SMP.

12.0 Permanent Stormwater and Erosion Control

12.1 DESIGN STORM

The stormwater management elements that are on the final cover will be stormwater conveyance swales and discharge down chutes. These will be designed for at least a 25-year, 24-hour storm per Missouri solid waste regulations 10 CSR § 80-3.010(8)(B)1F to the extent practicable. St. Louis Lambert International Airport is assumed to be the relevant weather reporting station for assessing the magnitude of these weather events. Per NOAA Atlas 14, Volume 8, Version 2, the estimated precipitation with a 90% confidence interval for the 25-year, 24-hour storm is 5.62 inches.

12.2 DISCHARGE AND DETENTION REQUIREMENTS

The current landfill surface and the final design landfill surface are expected to have similar runoff characteristics, so no additional detention of stormwater is expected to be required at the discharge points beyond what is currently provided. Additional ponded water surface on or near the landfill is undesirable as it is attractive to waterfowl that create a hazard to the airport operations, so post-closure detention or retention basins will be avoided.

12.3 EROSION AND SEDIMENT CONTROL BEST MANAGEMENT PRACTICES

MDNR provides detailed information and requirements for selecting and using appropriate erosion and sediment control BMPs in the guidelines for preparing a SWPPP under 10 CSR § 20-6.200. The substantive requirements of these BMPS will be used to the extent practicable for developing the design of the permanent stormwater and erosion control for the proposed project.

13.0 Post-Remedial Action Flood Protection

13.1 DESIGN EVENT

Flooding is unexpected at the site except in the theoretical event of a levee breach along the Missouri River. The site is located within the area that is protected from a 500-year flood by the Earth City levee system. This is an engineered levee and flood control system designed, maintained, and operated to protect the commercial/industrial facilities in the Earth City Industrial Park.

13.2 EROSION AND SLOPE STABILITY

In the event of a levee breach along the Missouri River, it is expected that water will be at the toe of the perimeter berms at the landfill boundary. The primary challenges that these berms will face will be erosion of the perimeter berm and potential slope instability due to wetting of the berm soils. These challenges will be evaluated in the design of the perimeter toe berms.

14.0 Post-Remedial Action Operation, Monitoring, and Maintenance

14.1 COVER INSPECTION

Cover inspections will be conducted per the requirements of the SMP.

14.2 STORMWATER MONITORING

Stormwater monitoring will be conducted per the requirements of the SMP.

14.3 GROUNDWATER MONITORING

Groundwater monitoring will be conducted per the requirements of the SMP.

15.0 References

EMSI. 2016. *Work Plan for Installation of a Non-Combustible Cover over Radiologically-Impacted Material At or Near the Ground Surface is Radiological Areas 1 and 2, West Lake Landfill Operable Unit-1*, March 16, 2016

International Association of Plumbing and Mechanical Officials*. Uniform Plumbing Code (UPC),* current edition

International Code Council. *International Building Code (IBC)*, current edition

International Code Council. *International Mechanical Code (IMC),* current edition

National Fire Protection Association. *National Electrical Code (NEC),* current edition

USEPA. 1989. *Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments*, EPA 530-SW-89-047, July 1989

USEPA. 1995. *RCRA Subtitle D (258) Seismic Guidance for Municipal Solid Waste Landfill Facilities,* EPA 600-R-95-051, April 1995

USEPA. 2004. *(Draft) Technical Guidance for Resource Conservation and Recovery Act (RCRA)/CERCLA Final Covers.* EPA 540-R-004-007, April 2004

Tables

Table 1
Remedial Design ARARs

Chemical Specific ARARs				
Citation		**Chemical/Medium**	**Requirement**	**Determination**
40 CFR § 192.02(a), (b)	Standards for the Control of Residual Radioactive Materials from Inactive Uranium Processing Sites (UMTRCA)	Radon-222 in air	Standards for Radon-222 release rate and average concentration in air; plus duration of control effectiveness.	Relevant and appropriate.
40 CFR § 61.90-97	National Emission Standards for Emissions of Radionuclides Other Than Radon from Department of Energy Facilities (NESHAP)	Radionuclides other than Radon-222 and Radon-220 in air	Standard for radionuclide emissions expressed as effective dose equivalent to a member of the public.	Relevant and appropriate for buildings, structures, and operations on OU-1.
40 CFR § 61.222(a)	National Emission Standards for Radon Emissions From the Disposal of Uranium Mill Tailings (NESHAP)	Radon-222 in air	Standard for Radon-222 release rate.	Relevant and appropriate.
10 CSR § 20-7.031(5)	Missouri Water Quality Standards	Water	Specific criteria for water quality, including limits for radionuclides.	Applicable to discharges to waters of the state.
RSMo 260.500-550; 10 CSR § 24-2.010; 10 CSR § 24-3.010	Emergency Notification of Releases of Hazardous Substances and Extremely Hazardous Substances	All chemical compounds or substances listed under CERCLA	Notification requirements for hazardous substance releases.	Notification requirement is not an ARAR, but compliance is anticipated.
		Petroleum	Notification requirements for petroleum releases.	Notification requirement is not an ARAR, but compliance is anticipated.
10 CSR § 20-7.031(5)(B)(1)	Missouri Water Quality Standards - Toxic Substances	Water	Criteria for toxicity; including benthic organism harm mitigation and maximum fish tissue levels.	Applicable to discharges to waters of the state.

Table 1
Remedial Design ARARs

Chemical Specific ARARs				
Citation		**Chemical/Medium**	**Requirement**	**Determination**
10 CSR § 20-7.031(5)(B)(2)	Missouri Water Quality Standards - Toxic Substances	Water	Metal analysis methods.	Applicable to discharges to waters of the state.
10 CSR § 20-7.031(5)(B)(3)	Missouri Water Quality Standards - Toxic Substances	Water	Standard for toxic substances for which sufficient toxicity data are not available.	Applicable to free liquids generated from contaminated media, if discharged to a surface water body.
10 CSR § 20-7.031(5)(E) .	Missouri Water Quality Standards - pH	Water	Criteria for pH.	Applicable to free liquids generated from contaminated media, if discharged to a surface water body.
10 CSR § 20-7.031(5)(F)	Missouri Water Quality Standards - Taste- and Odor-Producing Substances	Water	Criteria for taste- and odor-producing substances.	Applicable to discharges to waters of the state.
10 CSR § 20-7.031(5)(H)	Missouri Water Quality Standards - Solids	Water	Criteria for solids.	Applicable if elevated TSS is present in potential discharge.
10 CSR § 20-7.031(5)(I)	Missouri Water Quality Standards - Radioactive Materials	Water	Criteria for radioactive materials.	Applicable.
10 CSR § 20-7.031(5)(J)	Missouri Water Quality Standards - Dissolved Oxygen	Water	Criteria for dissolved oxygen.	Applicable if DO is not within acceptable range in potential discharge.
10 CSR § 20-7.031(5)(K)	Missouri Water Quality Standards - Total Dissolved Gases	Water	Criteria for total dissolved gases.	Applicable if dissolved gases are present in potential discharge.
10 CSR § 20-7.031(5)(L)	Missouri Water Quality Standards - Sulfate and Chloride	Water	Criteria for sulfate and chloride for protection of aquatic life.	Applicable if elevated sulfides and chlorides are present in potential discharge.

Table 1
Remedial Design ARARs

Chemical Specific ARARs				
Citation		**Chemical/Medium**	**Requirement**	**Determination**
10 CSR § 20-7.031(5)(M)	Missouri Water Quality Standards - Carcinogenic Substances	Water	Criteria for carcinogenic substances expressed as cancer risk rate.	Applicable if elevated carcinogenic substances are present in potential discharge.
10 CSR § 20-7.031(5)(Q)	Missouri Water Quality Standards - Whole Effluent Toxicity (WET) Chronic Tests	Water	Criteria for chronic WET tests results.	Applicable if elevated WET is present in potential discharge.

Table 1
Remedial Design ARARs

Location-Specific ARARs				
Citation		**Location**	**Requirement**	**Determination**
10 CSR § 20-6.200 [specifically 20-6.200(2)(B)3.B, 200(6)(A)1, and 200(6)(B)]	Missouri Storm Water Regulations	Landfills, land application sites, open dps that have received hazardous or industrial wastes.	Regulatory basis and substantive requirements for storm water discharges.	Substantive requirements applicable for control of stormwater runoff during and after remedy construction.
10 CSR § 20.7.015(5)(A)	Missouri Effluent Regulations - No-Discharge Streams	Fee Free Creek watershed	Prohibition of discharge to metropolitan no-discharge streams (except as permit under 10 CSR § 20-7.031(7)).	Applicable if water pollutants are present in any water discharge.
10 CSR § 20-7.031(2)(A) - (C)	Missouri Water Quality Standards - Designated Uses	Waters of the State of Missouri	Designated uses of state waters, including specified rivers, streams, lakes, and reservoirs.	Applicable if water pollutants are present in any water discharge.
10 CSR § 20-7.031(3)	Missouri Water Quality Standards - Anti-Degradation Standards	Waters of the State of Missouri	Standards for Tier I and II anti-degradation protection.	Applicable if water pollutants are present in any water discharge.
RSMo 260.500-550; 10 CSR § 24-2.010; 10 CSR § 24-3.010	Missouri Water Quality Standards - General Criteria	Waters of the State of Missouri	General water quality criteria applicable to all waters of the state at all times, including mixing zones.	Applicable if water pollutants are present in any water discharge.
10 CSR § 20-7.031(5)(A)	Missouri Water Quality Standards - Chronic Toxicity Criteria	Mixing zones	Criteria for chronic toxicity; where mixing zones are applicable, they will be based on 7Q10 low flow.	Applicable if water pollutants are present in any water discharge. (Mixing zone applicable only if receiving stream is not classified.)

Table 1
Remedial Design ARARs

Location-Specific ARARs				
Citation		**Location**	**Requirement**	**Determination**
10 CSR § 80-3.010(8)(B)1.F and (8)©	Missouri Landfill Regulations - Design and Operation - Water Quality	Surface of landfills	Design and operation requirements for surface water runoff control.	Not applicable, but substantive portions are relevant and appropriate. Operational requirements in (8)(C) should be performed.
10 CSR § 80-3.010(15)(A)	Missouri Landfill Regulations - Design and Operation - Vectors	Landfill	Requirements for control of vectors	Relevant and appropriate to Areas 1 and 2 after removal of RIM.
10 CSR § 80-3.010(4)(B)1.A and 1.B; 10 CSR § 80-3.010(19)	Missouri Landfill Regulations - Design and Operation - Site Selection and Safety	All work areas	Requirements for protection of safety of landfill personnel and other affected parties; includes requirements related to airports and bird hazards.	Not relevant and appropriate to Areas 1 and 2 after removal of RIM, but still TBC.
10 CSR § 80-3.010(13)	Missouri Landfill Regulations - Design and Operation - Air Quality	Landfill	Requirements for minimization of air quality impacts at landfills.	Relevant and appropriate to excavation and grading activities in Areas 1 and 2.

Table 1
Remedial Design ARARs

Location-Specific ARARs				
Citation		**Location**	**Requirement**	**Determination**
10 CSR § 80-3.010(6)(A) - (B)	Missouri Landfill Regulations - Design and Operation - Quality Assurance / Quality Control	Side slope of landfill and disturbed areas	Requirements for QA/QC measures for landfill construction, operation, corrective action, and closure.	Not applicable, but substantive portions related to closure / final cover are relevant and appropriate; addressed under Action-Specific ARARs. QA/QC design requirements will be detailed in CERCLA documents and subject to approval under CERCLA process.
10 CSR § 80-3.010(17)(A) - (B)	Missouri Landfill Regulations - Design and Operation - Cover	Landfill	Requirements related to daily, intermediate, and final landfill covers, including application and design.	Substantive elements are relevant and appropriate.
10 CSR § 80-3.010(18)(A) - (C)	Missouri Landfill Regulations - Design and Operation - Compaction	Landfill	Requirements related to solid waste and cover compaction at landfills.	Substantive elements are relevant and appropriate.
10 CSR § 80-3.010(4)(A)	Missouri Landfill Regulations - Design and Operation - Site Selection	Landfill	Requirements related to landfill site selection, including geologic, hydrologic, and soil conditions.	Substantive elements are relevant and appropriate.

Table 1
Remedial Design ARARs

Location-Specific ARARs				
Citation		**Location**	**Requirement**	**Determination**
54 USC 312508; PL 113-287; 128 Stat. 3256	Archaeological and Historic Preservation Act	Land	Requirements for data recovery and preservation activities if federal actions endanger prehistoric, historical, and archaeological data.	Applicable only if such data are affected (*e.g.,* a potential off-site borrow area). Site has been considerably disturbed by past human activities and is not expected to contain such data.
16 USC 1531-15444; 50 CFR § Part 17	Endangered Species Act	Any	Requirements for federal agencies to ensure federal actions do not adversely affect endangered or threatened species or critical habitat.	Applicable only if such species were affected. No federal listed or proposed threated and endangered species or their habitats identified by assessment performed during RI.
RSMo 251.240; 3 CSR § 10-4.111	Missouri Wildlife Code - Endangered Species	Any	Prohibition against pursuing, taking, possessing or killing endangered or threatened species designated by U.S. DoE or MDoC.	Applicable only if such species were affected.
7 USC 4201 et seq; 7 CFR § 658; 40 CFR § 6.302(c)	Farmland Protection Policy Act	Farmland (prime, unique, or of state and local importance)	Requirements for federal agencies to ensure federal actions to not adversely affect farmlands.	Applicable to any potential off-site soil borrow area.

Table 1
Remedial Design ARARs

Action-Specific ARARs				
Citation		**Action**	**Requirement**	**Determination**
40 CFR § 192.02	Standards for the Control of Residual Radioactive Materials from Inactive Uranium Processing Sites (UMTRCA)	Radioactive waste disposal	Standards for Radon-222 release rate and average concentration in air and duration of control effectiveness.	Not applicable, as site is not a designated Title I uranium mill tailings site and current and future uses of Areas 1 and 2 are restricted. However, longevity standard is relevant and appropriate.
40 CFR § 192.32, specifically 192.32(b)(1)	Standards for Management of Uranium Byproduct materials Pursuant to Section 84 of the Atomic Energy Act of 1954, As Amended	Radioactive waste disposal	Standards for management of uranium byproduct materials; includes standards for Radon-220 and Radon-222 release rates and duration of design effectiveness.	Not applicable, as site is not a designated Title I uranium mill tailings site and current and future uses of Areas 1 and 2 are restricted. However, longevity standard is relevant and appropriate.
40 CFR § 260 et seq	Resource Conservation and Recovery Act Subtitle C	Hazardous waste management	Standards for identification of and treatment, storage, and disposal of hazardous wastes; includes methods for determining whether a waste is hazardous and storage container markings.	May be applicable. RIM in Areas 1 and 2 do not meet criteria for classification as hazardous wastes, but other waster materials in Areas 1 or 2 may meet criteria.
19 CSR § 20-10.090	Missouri Radiation Regulations - Deposal of Radioactive Wastes	Radioactive waste disposal	Requirements for the disposal of radioactive materials.	Substantive portions of requirements are applicable.

Table 1
Remedial Design ARARs

Action-Specific ARARs				
Citation		**Action**	**Requirement**	**Determination**
RSMo 260.500-550; 10 CSR § 24-2.010; 10 CSR § 24-3.010	Missouri Radiation Regulations - Storage of Radioactive Materials	Radioactive waste storage and control of radioactive contamination	Requirements for the storage of radioactive materials.	Substantive portions of requirements are applicable to temporary on-site storage of RIM.
10 CSR § 80-4.010(17)	Missouri Landfill Regulations - Demolition Landfill Design and Operation	Solid waste disposal	Cover placement and design requirements for demolition landfills.	Relevant and appropriate to regrading of Areas 1 and 2 after removal of RIM, and to final slopes and cover design for Areas 1 and 2.
42 USC 4901 et seq	Noise Control Act	Construction activities	Requirements for protection of the public from noises that jeopardize human health or welfare.	Applicable to any remedial action.
40 CFR § 61.150 and 154(j)	National Emission Standards for Hazardous Air Pollutants (NESHAP) - Asbestos	Asbestos management	Requirements for management of regulated asbestos containing materials (RACM).	Demolition and renovation standards are applicable if RACMis encountered during implementation. Notice requirements may be applicable if RACM is disturbed during excavation.
40 CFR 50.3-50.19	National Primary and Secondary Ambient Air Quality Standards	Radionuclides and radon particulates	Standards for ambient air quality for numerous pollutants.	Standards do not directly address radioactive materials, but may be relevant during remedy implementation.

Table 1
Remedial Design ARARs

Action-Specific ARARs				
Citation		**Action**	**Requirement**	**Determination**
40 CFR § 761 Subparts D, G, N, O, P, R, and S	PCB Manufacturing, Processing, Distribution in Commerce, and Use Prohibitions (Toxic Substances Control Act)	PCB cleanup and management	Requirements for cleanup of PCB wastes; including performance standards for disposal technologies.	Applicable if PCBs are encountered during remedy implementation.
10 CSR § 20-6.200	Missouri Storm Water Regulations	Runoff-generating activities.	Requirements, terms, and conditions for stormwater discharge permits.	Substantive requirements applicable for control of stormwater runoff during and after remedy construction.
10 CSR § 10-6.020(3)(A)	Missouri Air Quality Standards and Air Pollution Control Regulations	PM_{10} non-methane organic compounds (NMOC)	Specifies *de minimis* emission levels.	Applicable during remedy implementation.
10 CSR § 10-6.130	Missouri Air Quality Standards and Air Pollution Control Regulations	Emissions-generating activities.	Requirements for controlling emissions during air pollution events.	Applicable. Could require shut-down of remedy construction activities during purple or maroon air quality event.
10 CSR § 10-6.170	Missouri Air Quality Standards and Air Pollution Control Regulations	Particulate matter	Requirements for control of particular matter emissions.	Applicable to control of fugitive dust emissions during remedy construction activities.

Table 1
Remedial Design ARARs

Action-Specific ARARs				
Citation		**Action**	**Requirement**	**Determination**
40 CFR Part 122; incl. 40 CFR § 122.26(b)(14)(v)	National Pollutant Discharge Elimination System (NPDES)	Various pollutants	Requirements of the NPDES program; defines "storm water discharged associated with industrial activity" to include landfills, land application sites, and open dumps that receive or have received industrial wastes.	Applicable if stormwater draining from site impact Waters of the United States. Missouri has an approved state program under 40 CFR Part 123.
40 CFR Part 131; incl. 40 CFR § 131.36	Water Quality Standards	Development, review, revision, and approval of water quality standards by states, as authorized by Clean Water Act	Standards for water quality; including toxics criteria for states not complying with Clean Water Act Section 303(c)(2)(B).	Not applicable to Missouri, but are relevant. Missouri has adopted its own water quality standards under 10 CSR 20-7.031(5).
L. 1990 H.B. 1192 § 1	Missouri Cave Protection Law	Pollution and vandalism	Classifies vandalism and pollution of Missouri caves as a Class A misdemeanor.	May be applicable if site is determined to contain solution-enlarged fractures during excavation.
RSMo 260.350-260.1039; 10 CSR § 25-1 through 19; 10 § CSR 25-19.010	Hazardous Waste Management Law; Missouri Hazardous Waste Management Regulations	Hazardous waste generation, storage, treatment, transportation, and disposal	Requirements for management of hazardous waste (including electronic scrap).	Substantive portions of 10 CSR 25 may be relevant and appropriate if hazardous waste management is required under Amended Remedy.
10 CSR § 80-2.030	Missouri Solid Waste Management Regulations - Closure and Post-Closure	Closure and post-closure	Requirements for post-closure care and O&M.	Post-closure care and corrective action requirements for landfills are relevant and appropriate.

Table 1
Remedial Design ARARs

Action-Specific ARARs				
Citation		**Action**	**Requirement**	**Determination**
10 CSR § 80-2.030(1)	Missouri Solid Waste Management Regulations - Closure and Post-Closure	Closing side of disturbed landfill	Requirement to obtain approval of closure method from MDNR	Post-closure care and corrective action requirements for landfills are relevant and appropriate.
10 CSR § 80-3.010(17)(B)3 and 7, (C)3	Missouri Landfill Regulations - Design and Operation - Cover	Slope construction	Design standards for: surface grades; side slopes; active, immediate, and final slopes.	Substantive elements are relevant and appropriate.
10 CSR § 80-3.010(8)(C)2	Missouri Landfill Regulations - Design and Operation - Water Quality	Precipitation on open side slopes	Standards for management of water which comes into contact with, passes through, or emerges from solids waste.	Relevant and appropriate during construction.
10 CSR § 80-3.010(6)	Missouri Landfill Regulations - Design and Operation - Quality Assurance / Quality Control	QA/QC of cover	Standards for thickness and testing of each lift of soil for final cover.	Relevant and appropriate during construction.
10 CSR § 80-3.010(17)(C)4	Missouri Landfill Regulations - Design and Operation - Cover	Cover requirements	Design standards for final cover.	Substantive elements are relevant and appropriate.

Table 1
Remedial Design ARARs

To Be Considered				
Citation		**Chemical/Medium**	**Requirement**	**Determination**
OSWER Directive 9285.6-20	Radiation Risk Assessment at CERCLA Sites: Q&A	Radon in air	Guidance on conducting risk assessment on radiologically contaminated sites.	TBC for purposes of demonstrating compliance with UMTRCA where UMTRCA is identified as an ARAR for indoor air radon exposure.
OSWER Directive 9200.4-18 (EPA 1997a)	Establishment of Cleanup Levels for CERCLA Sites with Radioactive Contamination	Radioactive contamination at CERCLA sites.	Guidance on use of UMTRCA standards as CERCLA cleanup standards.	Not an ARAR. ERA has defined the full RIM excavation alternatives to mean attainment with risk-based radiological clean levels specified in guidance.
EPA's Regional Screening Levels for Chemical Contaminants at Superfund Sites	https://www.epa.gov/risk/regional-screening-levels-rsls	Various	Online tables and tool for risk-based screening levels.	TBC when determining protective exposure levels for contaminants of concern.
EPA's "Dose Compliance Concentrations for Radionuclides at Superfund Sites" (DCC) Calculator	https://epa-dcss.ornl.gov	Various	Online tool to demonstrate compliance with any dose-based ARAR.	TBC in demonstration of compliance with any dose-based ARAR (e.g., air concentrations of radionuclides necessary to meet NESHAP standards).
RSMo 260.500-550; 10 CSR § 24-2.010; 10 CSR § 24-3.010	Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments	Hazardous wastes	Guidance on final cover systems for hazardous waste landfills and surface impoundments; includes multilayer cover design guidance.	Not applicable or relevant, but presents information that may be useful for design of final cover system.

Table 1
Remedial Design ARARs

To Be Considered				
Citation		**Chemical/Medium**	**Requirement**	**Determination**
EPA 540-R-04-007 (April 2004)	(Draft) Technical Guidance for RCRA/CERCLA Final Covers	Hazardous wastes	Guidance on final cover systems for MSW and hazardous waste landfill being remediated under CERCLA and RCRA; includes design standards, monitoring, and maintenance.	Not applicable or relevant, but presents information that may be useful for design of final cover system.
FAA Record of Decision (1988); FAA Memorandum of Understanding (2003)	-	-	ROD presents requirements relative to the proximity of the proposed Lambert Airport runway to Bridgeston Sanitary Landfill. MOU between FAA, EPA, and other agencies addresses aircraft-wildlife strikes.	Not legally binding, but TBC.
FAA Advisory Circular AC 150/5200-33B (2007)	Hazardous Wildlife Attractants On or Near Airports	-	Guidance on land uses that have the potential to attract hazardous wildlife on or near public-use airports; includes separation distances.	TBC for site excavation activities.

Table 1
Remedial Design ARARs

To Be Considered				
Citation		**Chemical/Medium**	**Requirement**	**Determination**
Executive Order 11988; 40 CFR § 6.302(b) and App. A	Floodplain Management - Procedures for Implementing the National Environmental Policy Act and Assessing the Environmental Affects Abroad of EPA Actions	-	Requirements for federal agencies to avoid adverse impacts associated with development of a floodplain. 40 CFR Part 6 specifies EPA policy on implementation of Executive Order 11988.	TBC for any remedial action for the Buffer Zone / Crossroads Property. Mitigative measures would be taken to minimize any adverse impacts.
Governor's Executive Order 82-19	-	-	Specifies that the potential effects of actions taken in a floodplain should be evaluated to avoid adverse impacts.	TBC for any remedial action for the Buffer Zone / Crossroads Property. Mitigative measures would be taken to minimize any adverse impacts.
Closure and Post-Closure Plan for Bridgeton Sanitary Landfill (Revised April 2016)	-	-	Closure and post-closure procedures for any portion of OU-1 remedy that impacts Bridgeton Landfill permitted area, specifically final cover, grading, and vegetation plan.	TBC in design and construction of cover system or drainage improvements for Areas 1 and 2; if additional waste materials are placed in those areas as a part of remedial action impact the Bridgeton Landfill permitted area; or if regrading and/or cover improvements are implemented for Areas 1 and 2.