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RMRS Rocky Mountain Remediation Services, L.L.C.

FERNALD SILO 3 PROJECT

Operational Environmental Control Plan RMR-0445-ENG-015-001

May 17, 2000

REVISED OPERATIONAL ENVIRONMENTAL CONTROL PLAN

RD PACKAGE SECTION 5.0

NOTE: APPENDIX A, POINT SOURCE AIR EMISSION DATA (5/17/00) REMANS UNCHANGED

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ACRONYMS AND ABBREVIATIONS

Ag	silver
ALARA	as low as reasonably achievable
anti-Cs	anti-contamination clothing
ARARs	applicable or relevant and appropriate requirements
As	arsenic
ASHRAE	American Society of Heating, Refrigeration, and Air Conditioning Engineers
AWWT	advanced wastewater treatment
Ba	barium
BAT	best available technology
Cd	cadmium
CDF	commercial disposal facility
CFR	Code of Federal Regulations
Cr	chromium
DCGs	derived concentration guides
DOE	Department of Energy
DOT	Department of Transportation
EDE	effective dose equivalent
Fe	iron
Fluor Fernald	Fluor Fernald, Inc.
FEMP	Fernald Environmental Management Project
ft.	feet
ft^3	cubic feet
gal./day	gallons per day
gal./min.	gallons per minute
HEPA	high-efficiency particulate air
Hg	mercury
HVAC	heating, ventilation, and air conditioning
in.	inch
kg./day	kilograms per day
lb.	pound
lb./day	pounds per day
lbs/drum	pounds per drum
ISA	Interim Storage Area
LLW	Low-Level Waste
microgram/m^3	microgram per cubic meter
min.	minute
mph	miles her hour
mrem	millirem
mrem/yr.	millirem per year
NESHAP	National Emission Standards for Hazardous Air Pollutants
NPDES	National Pollutant Discharge Elimination System

ACRONYMS AND ABBREVIATIONS (CONTINUED)

OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
OSDF	off-site disposal facility
Pb	lead
pCi/L	picocuries per liter
PFD	process flow diagram
PPE	personal protective equipment
ppm	parts per million
P/D	positive displacement
PQP	project quality procedure
RCA	Radiological Control Area
RCRA	Resource Conservation and Recovery Act
ReTRIEVR	rolled cable incremental link extending vacuuming robot
RMRS	Rocky Mountain Remediation Services, L.L.C.
Rn	radon
ROB	roll-off box
Se	selenium
SWIFTS	site-wide inventory forecasting and tracking system
TSS	total suspended solids
WAC	waste acceptance criteria
°F	degrees Fahrenheit
%	percent
#	number

1.0 PURPOSE

This plan describes the methods and materials that Rocky Mountain Remediation Services, L.L.C. (RMRS) shall use during Silo 3 Project operations to control: air emissions, fugitive dust, wastewater, stormwater, erosion, and waste. The methods and materials will be designed to minimize the impact of Silo 3 Project operations on the environment. This plan addresses the remediation of Silo 3 material including material retrieval, staging, treatment and storage, processing, material management, and transportation at the Silo 3 Retrieval Facility, Treatment Facility, and the Interim Storage Area (ISA) at the U.S. Department of Energy (DOE) Fernald Environmental Management Project (FEMP) site, Fernald, Ohio. This plan contains the following:

- Air Emissions Control–Description of the process controls to be used for planned stack or other air monitoring. This includes a description of how Silo 3 operations will ensure that emissions from material handling and processing equipment meet applicable or relevant and appropriate requirements (ARARs) and as low as reasonably achievable (ALARA) requirements.

- Fugitive Dust Control–Description of the methods and materials to be used by the Silo 3 Project to suppress and minimize the creation and dispersion of dust.

- Wastewater Control–Description of the design features and methods to be used to eliminate, minimize, or recycle the wastewater produced during Silo 3 Project operations. The wastewater control description will identify where wastewater will be generated, explain the pretreatment methods to be used, and cover the methods that will be used to segregate wastewater containing listed waste from other wastewater streams.

- Stormwater Control–Description of the methods, material and existing site features to be used by the Silo 3 Project to capture and control stormwater.

- Erosion Control–Description of the methods and material to be used to prevent erosion of soil either by wind or surface water in the Silo 3 Project area to reduce sediment loading in the stormwater.

- Waste Management–Description of the methods to be used to manage secondary waste and debris generated during the Silo 3 Project operations, including tracking of the secondary waste through the Fluor Fernald, Inc. (Fluor Fernald) site wide inventory forecasting and tracking system (SWIFTS) database.

The Silo 3 Project facility layouts are illustrated in the general arrangement plan, drawing 53-3230.

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2.0 AIR EMISSIONS CONTROL

The point source air emission data, document RMR-0445-ENG-010, (Appendix, A) describes the processes by which both area and point source emissions of air contaminants are controlled and monitored during the operation of the Silo 3 Project. It is anticipated that air contaminants, from two main sources, could occur: (1) Silo 3 and (2) the Treatment Facility. The design basis, specific air discharge points include:

- Silo 3's air evacuation discharge point.
- Air locks.
- Treatment Facility's air evacuation discharge point.

The locations of the probable air emissions are illustrated on the civil site plan, and the process flow diagram (PFD) 55-2008. Air emission control requirements include the control of fugitive and point source air contaminants in accordance with the FEMP's best available technology (BAT). The use of BAT is a substantive requirement of the Ohio Administrative Code (OAC), Section 3745-31-05(a)(3).

The Silo 3 gas treatment HVAC is presented in drawing 55-2008. Elements of the design for Silo 3 gas treatment operation, that minimize the potential for release of radioactive air emissions to the environment with respect to the retrieval and conveyance system, treatment system and ISA for treated Silo 3 material, are presented in Sections 2.1.1 to 2.1.3.

For radionuclide particulate emission sources at the FEMP, the Ohio Environmental Protection Agency (OEPA) has specified that BAT is the use of high-efficiency particulate air (HEPA) filters. The use of HEPA filters is also required for compliance with 40 Code of Federal Regulations (CFR) 61, Subpart H. HEPA filters, pre-filters, and housing assemblies will be obtained in accordance with Silo 3 Project Technical Specifications and Project Quality Procedure (PQP) 7.1, Control of Purchased Items and Services.

Emission of radionuclide particulate materials, excluding radon, will meet the requirements of 40 CFR Part 61, Subpart H, National Emission Standards for Hazardous Air Pollutants (NESHAP). 40 CFR Part 61.92, states that emissions of radionuclides to the ambient air from DOE facilities shall not exceed those amounts that would cause any member of the public to receive in any year an effective dose equivalent (EDE) of 10 millirem (mrem)/year or greater.

Provisions will be provided to monitor radon, emissions, during the Silo 3 Project, to verify that the site fence line radon concentration will not exceed the annual background average of 0.5 picocuries per liter (pCi/L) above background.

The headspace above the waste material in Silo 3 is known to contain elevated radon concentrations. The OU4 RI reports the Silo 3 headspace radon concentration at the 95 percent upper confidence limit (UCL) at 239,000 pCi/L. The OU4 RI reports the Silo 3 headspace volume at between 17,100 ft^3 and 17,754 ft^3.

Prior to initial access to the Silo, air flow will be established into the silo through a HEPA-filtered air inlet line hot-tapped into the center manway. Air flow will be established out of the Silo through the return air line connected to one of the auxiliary Silo ports (stream 5 on drawing 55-2000). The flow from this line will continue to the off gas baghouse filter and the remainder of the HVAC system. This airflow will allow a slightly negative pressure to be established in the silo prior to initial access and will assure that any emissions are routed through the HVAC system. This air stream is HEPA filtered to control particulate emissions, and is continuously monitored for both particulate radionuclides and radon. The flow from the Silo headspace to the HVAC system during this initial establishment of air flow will be closely metered to assure that exhaust stack emissions and resultant fence line impacts are within the steady-state emission estimates documented in Section 2.1.4 and Appendix A of this Plan. Weather conditions will be evaluated before the start of the radon release to assure that atmospheric stability and inversion conditions are consistent with the As Low As Reasonably Achievable (ALARA) principle.

2.1 Air Emissions Controls

The Silo 3 Project design controls air emissions through containment of the untreated Silo 3 material. Containment will be achieved as follows:

- Primary containment will consist of Silo 3, the retrieval hose, the inner conveyance pipe, and a double-walled pipe connected to the Treatment Facility equipment.

- Secondary containment is the associated equipment that will provide a seal to the Silo 3 dome, the reeled cable incremental link extending vacuuming robot (ReTRIEVR), the outer conveyance pipe, and the Treatment Facility inner enclosure.

- Tertiary containment is the Treatment Facility outer enclosure and the Retrieval Facility enclosure that will prevent environmental contamination and protect equipment from the weather.

The Treatment Facility will have inner and outer enclosures and will contain the filter receiver, processing system, reject material crushers, mixer, briquette maker, filter bag houses, a series of drag conveyors to move Silo 3 material through the system, and several process-related tanks. In addition, a ventilation module will provide a negative atmosphere to the contamination control barriers of the equipment and Silo 3. HEPA-filtered air, from the ventilation module, will be exhausted to the atmosphere through a series of multiple filters and single stage of HEPA filtration. After the Silo 3 material is processed, the briquettes will be placed into Department of Transportation (DOT) IP-2-metal 55-gallon drums. The filled drums will then be sealed and surveyed for surface radiological contamination prior to being palletized and transported, by forklift, to the ISA.

As detailed in Section 3.1 of the Fluor Fernald, Inc. 'Silos Project Environmental Monitoring Plan' (RD Package Appendix D), monitoring and reporting of emissions from the Silo 3 Project will be accomplished through a combination of enhancements to the current site-wide Integrated

Environmental Monitoring Plan (IEMP) monitoring network and project-specific stack monitoring.

2.1.1 Retrieval and Conveyance System

The Silo 3 retrieval and conveyance system will be designed to minimize:

- Airborne contamination and, as a result, minimize a release of radioactive emissions by using a vacuum pump and double-walled pipe to convey untreated Silo 3 material to the treatment system and HEPA filters.

- Radioactive particulate release using a multiple filter HVAC system; filter air through the filter module made up of roughing filters, 95 percent (%) American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE) filters, HEPA filters, and using isolation valves installed on Silo 3 equipment.

2.1.2 Treatment System

The Silo 3 treatment system will be designed to minimize:

- Airborne contamination and, as a result, minimize a release of radioactive emissions by using ventilated, sealed and closed conveying systems, hoppers and feeders during the handling of untreated Silo 3 material inside of the Process and Treatment Facilities.

- Airborne contamination and, as a result, minimize a release of radioactive emissions by using a non-cyclic briquette maker, venting and filtering equipment, and providing air hoods in potentially dusty areas.

- Particulate release using a multiple filter HVAC system and using isolation valves installed on Silo 3 treatment equipment.

2.1.3 Interim Storage Area

The Silo 3 ISA will be designed to:

- Minimize airborne contamination and, as a result, minimize a release of particulate and radon emissions by placing the briquettes in 55-gallon drums, sealing the drums, and requiring that the filed drums will not be opened outside of the Treatment Facility.

- Minimize particulate release using only approved 55-gallon drums constructed of high integrity steel and by sealing the drums prior to transporting them to the ISA.

- Maintain package integrity by palletizing drums and stack pallets to a maximum of two high on the paved ISA.

2.1.4 Estimated Point Source Air Emission Data

The Silo 3 HVAC system consists of filter modules, ductwork, fans, and air distribution and control devices. See drawings 55-2000, 55-2008, and 55-2010 for additional HVAC system details. The Point Source Air Emission Data, RMR-0445-ENG-010, is input for the FEMP air model evaluation. Exhibit 2.1-1 is a summary of expected releases from the Silo 3's Treatment Facility exhaust stack. The air filtration part of the Silo 3 HVAC system consists of pre-filters (or roughing filters), ASHRAE 95% filters, and HEPA filters. After air filtration, the Silo 3 air goes to a common plenum for release to the environment through the monitored Silo 3 Treatment Facility exhaust stack. The Silo 3 Treatment Facility exhaust stack is equipped with an air particulate monitor and a continuous radon monitor. The air particulate monitor is continuous and the monitor results will be electronically recorded in the control room on the data management system.

Exhibit 2.1-1: Estimate of Release from the Silo 3 Treatment Facility Exhaust Stack

Exhaust stack flow	16,003 $ft.^3$/min. (actual)
Off-gas density	0.0664 $lb./ft.^3$
Off-gas temperature	115°F (no stack effect)
Stack exit velocity	35 mph
Stack diameter	32 in.
Stack height	60 ft.
Particulate emission	2.329 micrograms/m^3
Radionuclide emission	0.001047 pCi/L (Rn not included)
Radon (Rn) emission	653.73 pCi/L (unabated)

To determine Silo 3 Project compliance with 40 CFR 61, Subpart H, and other ARARs, dispersion modeling was performed to quantify the emissions from the Silo 3 Treatment Facility exhaust stack. Dispersion modeling, of the Silo 3 Treatment Facility exhaust stack emissions, was also used to determine the Silo 3 Project impact on off-site emissions. The dispersion modeling, for the Silo 3 Treatment Facility exhaust stack emissions, used the FEMP site-specific metrology data and the CAP88-PC modeling package, to be consistent with the requirements of 40 CFR 61, Subpart H. The results of the dispersion modeling for the Silo 3 Treatment Facility exhaust stack emissions are summarized in Exhibit 2.1-2.

Exhibit 2.1-2: Results of Dispersion Modeling for Releases from the Silo 3 Treatment Facility Exhaust Stack

Maximum EDE to off-site receptor (excluding Rn) uncontrolled	2.6 mrem/yr.
Maximum annual average FEMP fence line Rn concentration	0.003 pCi/L
Maximum hourly average FEMP fence line Rn concentration	0.21 pCi/L

Modeling of radionuclide emissions, not including radon, without credit for control equipment, predicted a maximum EDE off-site of 2.6 mrem/year. Therefore, the HVAC system has a continuous isokinetic stack sampler, as required by 40 CFR 61.93. Modeling of radon emissions, predict a fence line impact significantly below the 0.5 pCi/L annual average criterion. The HVAC system will, however, include a continuous radon monitor.

3.0 FUGITIVE DUST CONTROL

This section describes the methodology to be used to control fugitive dust emissions and ensure compliance with applicable regulatory requirements, OAC-3745-17, and the site-specific limits in the Silo 3 Project area. When the Silo 3 Project is operating, generation of fugitive dust will be minimized by the containment systems to control air emissions as discussed in Section 2.0. Silo 3 material processing will be performed in negative pressure containment buildings. Site-specific BAT measures, for the control of fugitive dust, are defined in FEMP Fugitive Dust Control Requirements, RM-0047. Application of these requirements to the Silo 3 Project is defined in the Pre-Operational Environmental Control Plan, RMR-0445-0060. These same measures will be used to ensure that dust suppression is maintained during Silo 3 Project operations.

4.0 WASTEWATER CONTROL

This section describes the design features that will eliminate wastewater produced during Silo 3 Project operations. The Silo 3 treatment system is designed to use process wastewaters to the maximum extent possible. Water is not used in the retrieval and conveyance system; therefore process wastewater controls are not applicable to this component of Silo 3 Project operations. Water is not used within the ISA; therefore process wastewater controls do not apply to this component of Silo 3 Project operations.

The Silo 3 treatment system will use water from the FEMP water system (nominal 1650gal./day for a four-day week) and is to be supplemented by process washwater. The process washwater will be generated as the mixer is rinsed to remove residual material, collected in the process water tank, and recycled back to the treatment system. To accommodate the process washwater, a 500-gallon tank will be placed in the Treatment Facility.

The Silo 3 Project design promotes waste minimization and recycling: to limit the volume of Silo 3 material impacted wastewaters generated during the treatment process. However, if the amount of wastewater generated exceeds process needs, then the wastewater in the tanks will be characterized to assess if the FEMP advanced wastewater treatment (AWWT) system pretreatment criteria, as identified in Exhibit 4.0-1, are met. If the wastewater meets the pretreatment standards, then the wastewater can be released directly to the AWWT system for final treatment. If the wastewater does not meet the pretreatment criteria, then the wastewater will be pretreated to meet the requirements of the AWWT. It is anticipated that Envirobond™ and flocculent will be added to wastewater that does not meet the pretreatment criteria, and the residual wastewater will be processed through the Treatment Facility radioactive liquid waste system in accordance with the AWWT pretreatment criteria.

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Exhibit-4.0-1: Pretreatment Limits for Silo 3 Project Wastewater Discharge

MAXIMUM FLOW:			5 gal./min. (7,200 gal./day)	
TOTAL SUSPENDED SOLIDS (TSS)			1,000 parts per million (ppm)	
METALS PARAMETER	***DISCHARGE LIMITS*** kilograms per day (kg/day)	pounds per day (lb./day)	**RADIONUCLIDE PARAMETER**	**DISCHARGE LIMITS picocuries per liter (pCi/L)**
Arsenic (As)	0.14	0.3	Actinium-227	10
Barium (Ba)	2.7	6.0	Lead-210	30
Cadmium (Cd)	0.006	0.013	Polonium-210	80
Chromium (Cr)	0.14	0.3	Protactinium-231	10
Lead (Pb)	0.03	0.07	Radium-226	100
Mercury (Hg)	0	0	Radium-228	100
Selenium (Se)	0.03	0.06	Thorium-228	400
Silver (Ag)	0.0014	0.003	Thorium-230	300
Iron (Fe)	0.03	0.06	Thorium-232	50
			Uranium-243	5 ppm
			Uranium-235/236	
			Uranium-238	

Liquid wastes, discharged from the Silo 3 Treatment Facility, will be sent to the FEMP AWWT and meet the acceptance criteria of the AWWT. Wastewater will be retained for characterization prior to batch discharge to the AWWT. Wastewater that does not meet the AWWT criteria will be processed through the Treatment Facility radioactive liquid waste system. Envirobond™ and flocculent will be added to wastewater that does not meet the AWWT criteria, and the residual wastewater will be processed through the Treatment Facility radioactive liquid waste system.

Based on the mass balance data (and confirmed by analytical data during operations), and process knowledge, wastewater from the Treatment Facility may be able to be sent, without pretreatment, to the AWWT system for final treatment prior to discharge under the site National Pollutant Discharge Elimination System (NPDES) permit.

The following criteria will be implemented for excess wastewater handling:

- No listed or characteristic hazardous waste, as defined under Resource Conservation and Recovery Act (RCRA), may be discharged in the wastewater.

- Discharge of TSS, in excess of 1,000 ppm, shall not be allowed.

- Wastewater discharges shall be monitored and reported to Fluor Fernald for the following constituents:

Metal and Anions:

Arsenic	Lead	Chloride
Barium	Mercury	Nitrates
Cadmium	Selenium	Carbonate
Chromium	Silver	Sulfate

Limits for radionuclide concentrations (except uranium) are based on DOE Order 5400.5 derived concentration guides (DCGs) for water. The limit for total uranium is based on treatability at the AWWT facility.

Wastewater, meeting the AWWT, will be batched and wastewater discharge volumes and analytical results shall be recorded. The records of discharge volumes and analytical results shall be maintained. Prior to discharge of wastewater, RMRS will collect the required samples of wastewater and provide them promptly to Fluor Fernald for analysis.

Process wastewater shall be discharged to an existing line that feeds the headworks of the AWWT or other method that is provided by Fluor Fernald.

If excess wastewater does not meet the AWWT acceptance guidelines, then the water will be treated with Envirobond™ and flocculent and processed through the Treatment Facility radioactive liquid waste system. If the treated wastewater still does not meet the AWWT acceptance criteria, then the water will be solidified and stabilized with cement or bentonite in 55-gallon drums inside the Treatment Facility.

It is estimated that 500 gallons of Silo 3 Project process and decontamination wastewaters will be generated, primarily as a component of shutdown and dismantlement, by project completion. The decontamination wastewater will be recycled through the decontamination process to minimize the total quantities of water generated and then treated, as necessary, to ensure compliance with the AWWT pretreatment criteria. The final decontamination water will be collected, sampled for characterization, and tanked for disposal on-site depending on whether the acceptance criteria for the AWWT facility can be met. If the final decontamination water (anticipated 500 gallons) exhibits the characteristics of a hazardous waste for cadmium, chromium, lead, or selenium, then the tank will be decontaminated to meet the applicable RCRA closure requirements. The final decontamination water, in the holding tanks, will be removed as completely as practicable. The tanks will be washed with approximately five percent or less of each tank's volume and the rinsates managed in the AWWT. The decontaminated empty tank will be disposed of as Low-Level waste (LLW).

If process, raw, or decontamination water generated during project closure does not meet the AWWT pretreatment criteria and the water cannot be used as process water, then the water will be pretreated and dispositioned as described above for excess wastewater. Regardless of their hazardous characteristics, the wastewaters will be sampled and analyzed to determine whether the materials, in isolation, meet input restrictions for the AWWT. If any individual wastewater stream contains either radionuclides or hazardous substances above discharge limits, then the waters may be combined with other wastewaters generated during project closure so that plant input criteria are not exceeded.

When spills or leaks of water contain sufficient concentrations of Silo 3 material to exceed RCRA a characteristic hazardous waste limit, then the water will be pretreated and dispositioned as described above for other wastewater streams. The Silo 3 material treatment process, or alternate treatment methods, identified previously, to remove the hazardous waste characteristics in preparation for off-site disposal, will process solids impacted by spills or leaks.

5.0 EROSION AND STORMWATER CONTROL

Surface water management practices will be implemented by RMRS in the Silo 3 Project work areas that include the Retrieval Facility, Treatment Facility and the ISA. The development of stormwater management practices is in accordance with FEMP stormwater pollution prevention plan and Ohio Department of Natural Resources regulations. The Silo 3 Project stormwater drainage plan is described in RMR-0445-ENG-09. Run-on stormwater will be diverted before it enters the Silo 3 Project work area. Run-on stormwater flows will be directed to Paddy's Run. Stormwater generated from RMRS' roofing and paved areas will be vectored to the non-contaminated basin. The operational environmental control plan is consistent with the expectations of FEMP's stormwater pollution prevention plan. To facilitate surface drainage away from Silo 3 Project work area, areas adjacent to structures will be designed to have a one-percent minimum slope away from the structures. Unpaved areas will be designed to have a two-percent minimum slope. Concrete slabs, door stoops, truck ramps and other similar sources, will be designed to slope at least two-percent, where feasible. Splash pads will be provided below roof drains, gutters, and other similar sources.

The ISA is to be paved to prevent the formation of standing of water. Rain or snow will not impact the integrity of the drums in the ISA for the duration of the Silo 3 Project.

Existing Silo 3 Project stormwater control features and control methods will be maintained, including permanent or temporary erosion and sediment controls installed during Silo 3 Project site preparation and construction. The Silo 3 Treatment Facility will be engineered with berms to divert stormwater into an existing retention basin for subsequent management by FEMP. Stormwater generated from paved areas (to include roofing and paving) associated with RMRS Silo 3 Treatment Facility will be routed to the non-contaminated basin.

5.1 Functional Requirements

The stormwater and erosion and sediment controls will be designed to satisfy the criteria outlined below:

- Route surface-water to designated locations where it can be appropriately managed.
- Protect Infrastructure Road, 2nd Street, Silo 3 Treatment Facility, Silo 3 Project work area, and ISA areas from damage caused by precipitation and stormwater run-on and run-off.
- Discharge surface-water to existing watercourses in accordance with applicable regulatory and DOE requirements.

The Pre-Operational Environmental Control Plan, RMR-0445-ENG-0060, describes the run-on and run-off control features designed to satisfy the erosion and sediment control criteria. A description of the run-off and run-on control features, that are to be installed during the Silo 3 site preparation and construction, is provided in the pre-operational environmental control plan (drawing 52-3012). Stormwater and erosion control during the pre-operational phase of the Silo 3 Project will be provided by monitoring these same control features. In summary, these features will include:

- Installation of silt fence on downslope sides of construction areas.
- Construction of sediment traps, as required.
- Installation of silt fences below sump discharge, where applicable.
- Installation of temporary culverts along roads next to construction site, as required.
- Installation of check dams in drainage channels and swales, as required
- Installation of additional permanent riprap, as required.
- Construction drainage channels as shown on drawing 52-3012, and the Pre-Operational Environmental Control Plan, RMR-0445-0060.
- Maintenance, repair or replacement of existing surface water and erosion control features, as required.
- Stabilization, in seven days of their final use, excavations that are expected to be inactive for 45 days or more.
- Dewatering.

6.0 WASTE MANAGEMENT REQUIREMENTS

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Management of secondary wastes, generated as a result of Silo 3 Project operations, shall be consistent with applicable FEMP site procedures and regulatory guidance. Silo 3 secondary wastes will be managed, recycled, treated, and disposed in a manner that promotes waste minimization and consistency with environmental and ALARA goals. Systems and activities will be evaluated to estimate the anticipated secondary waste volumes associated with the Silo 3 Project operation. Systems and activities to be considered, include: waste generation from system testing, product forming, packaging, material retrieval, material conveyance, processor feed, processing, packaging, product recycling, product additive, radioactive liquid waste, HVAC, sampling, replacement parts and miscellaneous tooling, and personal protective equipment (PPE). It is estimated that the Silo 3 Project will generate, approximately 227 cubic feet of secondary waste. The secondary waste will be segregated, characterized and packaged in accordance with FEMP procedures. During the Silo 3 Project operations, secondary waste will be used, to the extent possible, to fill void space in the drums. RMRS will provide input for tracking of secondary waste to Fluor Fernald SWIFTS database.
Fluor Fernald, radiological control, will survey Silo 3 Project debris to ensure that the debris meets FEMP free-release criteria. RMRS will arrange for the delivery and pickup of commercial disposal facility (CDF) containers or dumpsters for the disposition of waste deemed free releasable. RMRS personnel will be responsible for tracking the volume of debris sent to a CDF.

6.1 Treatment System Testing

The Silo 3 treatment system will be cold tested on-site using non-hazardous materials. Waste generated by testing will be sent to a non-hazardous waste facility. It is estimated that the treatment system testing will generate 100 gallons of non-hazardous water and 16,000 pounds of non-hazardous surrogate briquettes. This estimate is based on one hour of operation and one cleaning of the treatment system.

6.2 Material Retrieval and Conveyance System

The material retrieval and conveyance system does not generate secondary waste. The system is a closed flow through system. Any secondary waste generated, would be failed components. Due to the short duration (six-month operation) of the job, no component failures are expected. Routine secondary waste generation is estimated to be two 55-gallon drums of PPE from maintenance and from personnel support, or retriever and conveyance operations.

6.3 Silo 3 Material Conveyance

The material conveyance system includes the filter receiver and the P/D (positive displacement) blower. The Silo 3 material conveyance system, described on drawing 55-2000, is not expected to generate waste filters from the filter separator, as secondary process waste. The filter life is 2000 operating hours compared to the 509 hours (six-month operation) of expected operating time. Filters may be generated, on a non-routine basis, due to filter blow out or clogging (because of an increase in material moisture content). It is estimated that routine secondary waste generation is to be zero.

6.4 Processor Feed System

The processor feed system, as described on drawing 55-2001, consists of; the Silo 3 material feed screen, debris collection drums, two Silo 3 material feed hoppers, and a delivery system. The Silo 3 material will go from the filter receiver and be dropped through the Silo 3 material feed screen, to remove debris. The filtered debris will be collected in a debris collection drum. It is expected that two 55-gallon drums, of debris, will be generated during the Silo 3 Project operations. If the debris material collected is harden or caked Silo 3 material, then it will be processed through the rejected material system for size reduction and re-introduced into treatment system. Debris material, that is not compatible with the treatment system, will be segregated as secondary waste and dispositioned by characterization. It is expected that two 55-gallon drums of non-compatible debris, including two used screens from screener will be generated during Silo 3 operations. Due to the short duration (6-month operation) of the Silo 3 treatment operations, no component failures are expected. It is estimated that other waste generated from processes feed system equipment is to be zero.

6.5 Processor System

The processor system, consists of the Silo 3 material mixer, and is described on drawing 55-2001. The feed streams to the Silo 3 material mixer are: a combined stream of Silo 3 material, binder, reducing agent, absorbent (as required), briquetting fines, and water. The Silo 3 material mixer is a continuous mixer and will combine the materials as it passes through the mixer on its way to the briquetting press. It is expected that the Silo 3 material mixer will require periodic cleaning with process water. Required periodic cleaning was discussed in Section 4.0. Due to the short duration (6-month operation) of the Silo 3 treatment operations, no component failures are expected. It is estimated that routine secondary waste generation is to be zero.

6.6 Product Forming

The product forming system consists of the briquetting press, the briquette screen, the briquette conveyor, and the briquetting fines recycle system. The product forming system will receive materials from the Silo 3 material mixer as described on drawing 55-2001. The briquetting press will operate on a continuous basis. The product forming system will decrease the volume of the Silo 3 material binder mixture, to aid in volume reduction and make the material easier to handle. The size of briquette will be approximately two-in. by two-in. by 1.5-in..

Downstream of the briquetting press is a briquette screen, which separates the fines from the briquette product. The fines, collected on the briquette screen, are fed to the fines conveyor and deposited in the fines hopper. Next, the collected fines drop into the fines feed conveyor, and are then metered into the mixer feed conveyor at a rate consistent with the other Silo 3 material feed streams.

Due to the short duration (6-month operation) of the Silo 3 treatment operations, no component failures are expected. It is estimated that routine secondary waste generation is to be zero.

6.7 Packaging System

Treated Silo 3 material will be in the form of briquettes, when it comes from the product forming system. The packaging system loads briquettes into drums, and then palletizes the drums. The packaging system is described on drawing 55-2001.

Due to the low moisture content of the Silo 3 material, no free water is anticipated in the final product, therefore no absorbent will be added to the drums. The filled drums will then be moved to the drum lidding station where they will be sealed, for contamination control. Next, the drums go to the drum banding station and primary smear station where a clamp band will be applied and the drum smeared and the smears monitored for surface contamination.

The drums, that pass the smear check, move to the drum weigh and shipping station. If a drum fails the smear check, it will be cleaned. If the drum can not be easily cleaned, then the drum is diverted to the drum wipe down and inspection station. The diverted drum will be wiped down and smear checked. The diverted drum, that passes the smear check, is moved to the drum weigh and shipping station where it will join the other drums. Drums that fail the first wipe down and swipe, will be re-wiped and swiped until clean. Drums that have been determined to be clean and within weight specifications (1200 lbs./drum.), will go on to the palletizer and be loaded onto a pallet. The pallet of drums will then be moved by the loaded pallet conveyor out of the Treatment Facility where the pallet will be picked up by the loaded pallet mover. Next, the pallets will be banded at the pallet banding station and picked up by the full drum forklift and transported to the ISA.

Due to the short duration (6-month operation) of the Silo 3 treatment operations, no component failures are expected. It is estimated that routine secondary waste generation is to be zero.

It is estimated that 50 ft^3 of routine secondary waste will be generated during the packaging operation. Expected waste will include; PPE, plastic bags, used smears, wipes, tape and small containers, and packaging material debris. The routine secondary waste will be segregated, characterized and packaged in accordance with FEMP procedures.

6.8 Reject Material System

If product sample briquettes fail to meet the Silo 3 waste acceptance criteria (WAC), then the rejected drum lot will be removed from the ISA and returned to the Treatment Facility for reprocessing. The drum unloader will dump the rejected briquettes from the drum into the reject hopper. Using the integral screw conveyor, the briquettes will then move from the reject hopper into the reject crusher. The crushed reject briquettes will be moved from the crusher to the Silo 3 material feed conveyor, by the crushed reject conveyor. Crushed reject briquettes will be processed to meet the Silo 3 WAC requirements, through the same process as the original Silo 3 material. It is estimated that one % of the processed material will require reprocessing, or approximately 120 (55)-gallon drums of briquettes.

The empty drums will be reused for reprocessed or treated Silo 3 material. Due to the short duration (6-month operation) of the Silo 3 treatment operations, no component failures and subsequent waste are expected.

It is estimated that 12 drums of secondary waste will be generated, during recycle operations. This waste will be characterized and packaged in accordance with FEMP procedures.

6.9 Product Additives

The product additive system includes the binder storage tote, binder screw feeder, binder feeder screw feeder, additive tote, and additive feed screw feeder. The product additive system does not generate secondary waste. The product additive system is a closed flow through system and the totes are re-usable. Any product additive material left over at the end of the Silo 3 Project, will be non-hazardous waste. It is estimated that routine secondary waste generation is to be zero.

6.10 Radioactive Liquid Waste System

The radioactive liquid waste system includes the wash water recycle tank, wash water recycle tank mixer, process water pump, wash water recycle pump, and sump pump. The mixing equipment is anticipated to require washing down two times over the six-month operating period, to prevent the build up of Silo 3 material. The water used to washdown the mixing equipment, will be water from the process water tank. The briquette machine is not expected to require a washdown. If the briquette machine does require washdown, then the washdown wastewater will be treated as mixer wash water. The washdown water will be cycled through the process equipment where it will dissolve the bonded Silo 3 material and return with the suspended Silo 3 material to the process water tank. The washdown water and Silo 3 material, in the process water tank, will create approximately a three- percent solids solution. The washdown water and Silo 3 mixture will be used in the next operating days as process water. The routine washing down of the briquetting and mixing equipment will not generate secondary waste, because washdown water is reused. The system is a closed flow through system. Any waste generated would be failed components. Due to the short duration (six-month operation) of the job, no component failures are expected. It is estimated that routine secondary waste generation is to be zero.

6.11 HVAC Systems

The HVAC system includes the Treatment Facility exhaust air system, and material retrieval HVAC. The HVAC system has three HVAC filter banks to control emissions from the Silo 3 Project: Treatment Facility, and conveyance system (duplicate filters banks). The filter banks contain a pre-filter, 95 % ASHRAE filter, and HEPA filter. The expected number of filter changes is listed in Exhibit 6.11-1.
Additional secondary waste will be generated from non-routine or process sampling. The sample secondary waste is expected to include: PPE, plastic sample bottles, and tools used to collect the samples. This additional secondary waste volume is expected to be 6 ft.^{3}.

Exhibit 6.11-1. Filter Waste Volume Estimate

System	# of changes per 6-month operation	Waste generated (cubic ft)
Off-Gas Treatment	8	128
Treatment Facility HVAC	4	768
Total Filter Waste		896

6.11.1 Treatment Facility Exhaust Air System

The Treatment Facility system is the air treatment system for the process enclosure. It is estimated that the Treatment Facility HVAC filters will have to be changed four times during the planned six-month operation of the Treatment Facility, Exhibit 6.11-1.

6.11.2 Off-Gas Treatment System

The Silo 3 material retrieval system will be the most heavily laden air stream in the Silo 3 Project. The Silo 3 conveyance air stream will pass through two filter separators and a filter module. Duplicate filter modules are on the off-gas treatment system. The filter modules are made up of: two cubic feet of roughing filter media, the 95 % four cubic feet ASHRAE filter, and the four cubic feet HEPA. Based on a seven hours of operation per operating day the roughing filters will be changed every 22.6 operating days, the 95 % ASHRAE filter every 22.6 operating days, and the HEPA filters every 192.5 operating days. It is estimated that the off-gas treatment filters will have to be changed eight times during the planned six-month operation of the off-gas treatment system, Exhibit 6.11-1.

6.11.3 Silo Contamination Control

The inlet filters for the air treatment system for the retrieval enclosure will not have to be changed during the planned six-month operation of the Treatment Facility.

6.12 Sampling System

The sampling system includes the feed sampler and product sampler. The sampling system does not generate secondary waste. The sampling system is a closed system. A dropped sample container may generate secondary waste. Any sampling system contaminated waste generated, would be failed components. Samples, returned after analysis, will be packaged in 55-gallon drums with briquettes or PPE. Due to the short duration (six–month operation) of the job, no sampling system component failures are expected. It is estimated that routine secondary waste generation is to be zero.

6.13 Replacement Parts and Miscellaneous Tooling

During the Silo 3 project operations, the careful elimination of excess materials introduced into the radiological control area (RCA) will prevent the unnecessary generation of secondary waste. Decontamination of materials, to be removed from the RCA, will be considered. Silo 3 equipment is designed for ease in decontamination, but not all equipment and material can be decontaminated to free release levels. If equipment, such as replacement parts and tooling, can not be decontaminated, then these items will be size-reduced and compacted, if necessary and as much as practical, to reduce the volume of secondary waste generated. The non-decontaminated secondary waste will be managed as radioactive waste.

6.14 Personal Protective Equipment

The Silo 3 material retrieval and conveyance system will emphasize the use of recyclable and reusable materials. PPE and miscellaneous materials (e.g., rags, and swipes) generated by the Silo 3 Project, will be evaluated for both chemical and radiological contamination. Disposable anti-contamination clothing (anti-Cs) will be bagged and placed in a roll-off box (ROB) for disposal at the off-site disposal facility (OSDF), as Category-4 material. The inner layer of launderable anti-Cs will be bagged and sent to a laundry facility, for cleaning. The laundry facility will monitor anti-Cs after cleaning. Other PPE, cleared as non-radiological through routine scans or surveys by hand-held instrumentation, will be considered clean. If PPE or other fabrics appear stained or heavily soiled, then the fabric will be decontaminated to eliminate the staining or soiling. PPE not suitable for laundering (i.e., disposable PPE, rubber gloves, plastic, and tape) will be packaged in acceptable material containers. Certain components of the processing system will be decontaminated and made available for reuse. Materials used to decontaminate other equipment or materials will be bagged and put in a ROB for disposal at the on-site disposal facility.

7.0 REFERENCES

DOE Order, 5400.5, Derived Concentration Guides (DCGs) for Water

Fluor Fernald, Stormwater Pollution Prevention Plan, PL-3083, Rev 0, Fernald Environmental Management Project, Fernald, OH (May 1996)

Project Quality Procedure (PQP), 7.1, Control of Purchased Items and Services
RM-0047, FEMP Fugitive Dust Control Requirements

RMR-0445-ENG-010, The Point Source Air Emission Data

RMR-0445-0060, Pre-Operational Environmental Control Plan

RMR-0445-ENG-09, Storm Water Drainage Plan

RMRS Drawing, 52-3002, Civil Site Plan

RMRS Drawing, 52-3012, Erosion Control Plan

RMRS, Drawing 53-3230, General Arrangement Plan, Process Building

RMRS Drawing, 55-2000, Retrieval and Conveyance PFD

RMRS Drawing, 55-2001, Treatment System PFD

RMRS Drawing, 55-2006, Process Water Recycle P&ID

RMRS Drawing, 55-2008, Silo 3 Gas Treatment HVAC PFD

RMRS Drawing, 55-2010, Silo 3 Process Building Ventilation PFD

40 CFR: Part 61, Subpart H; Part 61 Subpart Q; Part 60, Appendix A, Methods 22, Visual Determination of Fugitive Emissions from Material Sources and Smoke Emissions from Flares, Part 268.1(4); and Part 268.3.

APPENDIX A

The Point Source Air Emission Data,
RMR-0445-ENG-010