C.5 PRE-OPERATIONAL PHASE TECHNICAL REQUIREMENTS

This section provides the technical requirements for the Pre-operational Phase of the project as defined in Section C.3.2.2. The Pre-operational Phase includes: engineering design, site preparation, facility construction, start-up preparations, and pre-operational assessment. Submittals to be provided by the Contractor in addressing these activities are identified in Sections C.5.1.2, C.5.1.4, C.5.2.2, and C.5.3.3 and Figure C.4-1.

C.5.1 Engineering Design

This section contains the performance basis, technical requirements, and submittals associated with engineering design of the Contractor's remediation system.

C.5.1.1 Technical Requirements for Engineering Design

This section contains the following elements:

- Summary of Design Basis;
- Environmental Controls;
- ARARs and TBCs;
- Substantive Regulatory Requirements;
- As Low As Reasonably Achievable (ALARA) Requirements;
- Environmental Investigations and Engineering Studies (if necessary);
- Surveying;
- Geotechnical Investigations; and
- Variability of Silo 3 Material.

C.5.1.1.1 Summary of Engineering Design Basis

The Contractor shall use the design basis information provided in this contract in the development of a technical baseline. The engineering design basis is discussed throughout this contract and includes functional requirements, design and performance requirements, ARARs, design criteria, and relevant design information. Table C.5-1 summarizes key design basis information provided in this contract and shall be incorporated into the Contractor's engineering design process. Design basis requirements are presented in the order in which they appear in this document. General design basis requirements are also presented in this table. Requirements for the Industrial-Package-Type 2 (IP-2) and the Silo

3 WAC disposal container are provided in Section C.6.2.10 of this document.

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
FUNCTIONS			
F-001	Function	**Retrieve Material**: This function shall provide the technologies, methods, and facilities required to retrieve the material contents from Silo 3 (includes metal oxides, discrete objects, and heel material). The retrieval of silo material function is defined by accessing the material, mobilizing the material, and transporting the material forward.	Attachments J.4.29, J.4.1 and J.4.2 Sections C.3.2.3.1, and C.6.2.2
F-002	Function	**Stabilize/Solidify Material**: This function shall provide the technologies, methods, and facilities required to stabilize/solidify Silo 3 material in order to meet the Silo 3 WAC. The stabilize/ solidify function is defined by receiving Silo 3 material, processing/treating the material to a product form consistent with the Silo 3 WAC, validating the product material form, packaging the product material form for shipment, and reprocessing any unacceptable product material.	Section C.6
F-003	Function	**Facility Shutdown and Dismantlement**: This function shall provide the technologies and methods required to safely shutdown and dismantle Contractor owned facilities. This function is defined by utility isolation, hold-up material removal, gross decontamination and ultimate dismantlement.	Section C.7
DESIGN BASIS REQUIREMENTS			
DBR-001	Design Basis Requirement	The Contractor shall incorporate ALARA principles in all aspects of engineering design process to attain radiological doses as far below controlling limits as reasonably achievable.	Section J.3.4.2.1
DBR-002	Design Basis Requirement	The Contractor shall not exceed load limits on the outer circumference of the Silo 3 dome (outside the 20-foot diameter center section) of 700 pounds or three persons. No load may be placed directly on the center section of the dome.	Section C.3.2.1.2.2, Attachments J.4.60, J.4.64
DBR-003	Design Basis Requirement	The Contractor shall have approximately 52 months of performance.	Section F
DBR-004	Design Basis Requirement	Contractor will provide uninterruptible power supply, if needed.	Section C.4.2.1
DBR-005	Design Basis Requirement	Contractor may consider use of alternative Stand-by fuels. All such systems shall be designed to meet all applicable design codes/ standards and fire protection requirements.	Section C.4.2.1
DBR-006	Design Basis Requirement	Contractor shall use Government furnished property for its intended use.	Section C.4.2.2
DBR-007	Design Basis Requirement	The Contractor shall furnish facilities (and structures) necessary to support its activities.	Section C.4.2.3
DBR-008	Design Basis Requirement	The Contractor shall provide a fire water system within its site to meet the requirements of NFPA.	Section C.4.3.2
DBR-009	Design Basis Requirement	The Contractor shall provide an emergency alarm system that complies with NFPA 72-1996 and is compatible with the existing FEMP site Honeywell Delta 1000 safety alarm system.	Section C.4.3.2.3

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBR-010	Design Basis Requirement	The Contractor shall provide emergency voice and evacuation alarm devices compatible with the FEMP site Honeywell Emergency Voice Alarm and Evacuation System. The master control for the system will be located at the FEMP designated communications center.	Section C.4.3.2.3
DBR-011	Design Basis Requirement	The Contractor shall install and maintain a chain link or snow fence around the Contractor's work area to control access. Snow fence shall be four feet high and orange for construction fencing or yellow for radiological boundaries and shall be secured and made of high density polyethylene. Snow fence posts shall be No. 5 rebar with orange plastic protective end caps spaced no more than eight feet apart with electric tie-wraps to secure fencing.	Section C.4.3.5, C.5.2.1.4
DBR-012	Design Basis Requirement	The Contractor shall use Best Available Technology (BAT) for air emissions from new sources.	Section C.5.1.1.3.1, Attachment J.4.1 (ARARs Tables)
DBR-013	Design Basis Requirement	Contractor's design must limit total maximum allowable annual average off-site impact of radon within the work area to 0.5 pCi/L per point source (above background).	Section C.5.1.1.3.1, Attachment J.4.1 (ARARs Tables)
DBR-014	Design Basis Requirement	The Contractor's requirement for BAT or radon control will be determined by FDF using the Contractor's uncontrolled emissions estimates and an integrated sitewide air model.	Section C.5.1.1.3.1, Attachment J.4.1 (ARARs Tables)
DBR-015	Design Basis Requirement	The Contractor shall design systems, structures and components with appropriate controls to minimize the release of radionuclides and other contaminates to the environment.	Section C.5.1.1.3.1
DBR-016	Design Basis Requirement	Control of dust and fugitive emission shall be in accordance with the FEMP's BAT determination.	Section C.5.1.1.3.1
DBR-017	Design Basis Requirement	The Contractor shall procure HEPA filters, prefilters, and housing assemblies in accordance with the Engineering Technical Specification, Section 15860, HEPA Air Filtration Device Requirements, Revision 0 (Attachment J.4.75).	Section C.5.1.1.3.1
DBR-018	Design Basis Requirement	The Contractor shall provide differential pressure monitoring across the HEPA filter system, including any prefilters	Section C.5.1.1.3.1
DBR-019	Design Basis Requirement	Emissions of radionuclide particulate material, excluding radon, shall meet the requirements of 40 CFR Part 61, Subpart H, National Emission Standards for Hazardous Air Pollutants (NESHAPs).	Section C.5.1.1.3.1
DBR-020	Design Basis Requirement	If Contractor's design estimate of maximum radon concentration is greater than 0.5 pCi/L, then additional control equipment (and continuous stack monitoring) shall be required.	Section C.5.1.1.3.1
DBR-021	Design Basis Requirement	The generation of liquid waste produced as a result of facility operations shall be minimized, and where technically and economically feasible, liquid waste shall be recycled throughout the process.	Section C.5.1.1.3.2, C.6.2.14.3
DBR-022	Design Basis Requirement	Liquid effluent handling systems shall be provided for handling these effluent streams.	Section C.5.1.1.3.2, C.6.2.14.3

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBR-023	Design Basis Requirement	Liquid wastes discharged from the Contractor's facility shall be sent to the FEMP AWWT and meet the acceptance criteria of the AWWT.	Section C.5.1.1.3.2, C.6.2.14.3
DBR-024	Design Basis Requirement	Wastewater must be staged for characterization prior to batch discharge to the AWWT.	Section C.5.1.1.3.2, C.6.2.14.3
DBR-025	Design Basis Requirement	Determining the acceptability of wastewater to the AWWT shall not include any stormwater or any dilution that results from combination of stormwater with the wastewater stream (intentional dilution, as a substitute to treatment, shall not be allowed).	Section C.5.1.1.3.2
DBR-026	Design Basis Requirement	If Contractor's data submitted during design review indicate the wastewater discharge would exceed the site treatment capabilities of the AWWT, pretreatment of the wastewater stream shall be required.	Section C.5.1.1.3.2, C.6.2.13.2
DBR-027	Design Basis Requirement	The potential for generation of contaminated stormwater, including any run-on and run-off, shall be minimized by design and operation.	Section C.5.1.1.3.2
DBR-028	Design Basis Requirement	The quantity of contaminated stormwater from the Silo 3 Project process area shall be minimized by segregating clean area run-off from potentially contaminated run-off.	Section C.5.1.1.3.2
DBR-029	Design Basis Requirement	To minimize contamination, all material and feed additives used in the treatment process to stabilize the Silo 3 material shall be stored/staged on a suitable base protected from stormwater run-on and run-off at all times.	Section C.5.1.1.3.2
DBR-030	Design Basis Requirement	The Contractor shall design/protect areas used for processing of materials from precipitation and stormwater run-on and runoff that could contribute to contaminated stormwater.	Section C.5.1.1.3.2
DBR-031	Design Basis Requirement	Contaminated stormwater shall not be discharged with "clean" stormwater.	Section C.5.1.1.3.2
DBR-032	Design Basis Requirement	Contaminated stormwater shall be contained and sampled prior to discharge into the wastewater management system.	Section C.5.1.1.3.2 and C.6.2.14.3
DBR-033	Design Basis Requirement	The Contractor shall provide facilities to prevent the introduction of any substances or materials into any stream, lake, aquifer, or other body of water which may pollute or degrade the water or constitute substances or materials deleterious to fish and wildlife.	Section C.5.1.1.3.2
DBR-034	Design Basis Requirement	New stormwater management systems shall be designed for the 25-year, 24-hour storm per FEMP site policy.	Section C.5.1.1.3.2
DBR-035	Design Basis Requirement	The Contractor shall use the five-year storm to evaluate the scour velocity regarding open channels.	Section C.5.1.1.3.2
DBR-036	Design Basis Requirement	Stormwater management basins will be designed to safely pass the 100-year 24-hour storm (see Rainfall Frequency Atlas of the U.S. Technical Paper 40, U.S. Department of Commerce, for levels for this storm event for the FEMP).	Section C.5.1.1.3.2
DBR-037	Design Basis Requirement	Storm drain systems not directly connected to the stormwater management system, with catchments less than 160 acres, may be designed by the Rational Method.	Section C.5.1.1.3.2
DBR-038	Design Basis Requirement	Those storm drain systems directly connected to an existing stormwater management system shall be designed by Soil Conservation Service (SCS) methods (e.g., TR-55, TR-20).	Section C.5.1.1.3.2

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBR-039	Design Basis Requirement	Stormwater control design details, construction methods, and materials shall be in accordance with Ohio Department of Transportation (ODOT) standards.	Section C.5.1.1.3.2
DBR-040	Design Basis Requirement	Stormwater management, as well as erosion and sediment control during construction, must comply with the latest version of Rainwater and Land Development: Ohio's Standards for Stormwater Management, Land Development and Urban Stream Protection, Second Edition, ODNR Division of Soil and Water Conservation, Columbus, Ohio, 1996.	Section C.5.1.1.3.2
DBR-041	Design Basis Requirement	The Contractor shall be responsible for any decontamination activities involving release of secondary generated waste (e.g., equipment, materials, tools, etc.) from the FEMP.	Section C.5.1.1.3.3 and C.7.2.3.7
DBR-042	Design Basis Requirement	Radioactive solid wastes generated within the Contractor's facilities shall be reprocessed to the extent practicable, or disposed of off-site. Secondary waste generation shall be minimized.	Section C.5.1.1.3.3
DBR-043	Design Basis Requirement	All secondary waste generated during the remediation of Silo 3 material shall be sampled and monitored in accordance with the requirements identified in this document.	Section C.5.1.1.3.4
DBR-044	Design Basis Requirement	Communication and electricity shall be run aboveground, all other utilities shall be run underground.	Section C.5.2.1.6
DBR-045	Design Basis Requirement	The Contractor shall install backflow preventers on domestic water lines at the tie-in point to the FDF lines and wherever a potable water branch line is connected to the domestic water line.	Section C.5.2.1.6
DBR-046	Design Basis Requirement	The remediation facility shall be arranged to reduce the amount of clearing required.	Section C.5.2.1.3
DBR-047	Design Basis Requirement	Access to the backflow preventers shall be provided to the designated site water purveyor.	Section C.5.2.1.6
DBR-048	Design Basis Requirement	All systems, structures and components shall be designed and specified in accordance with safety basis documentation (i.e., hazard category and Performance Grading).	Section J.3
DBR-049	Design Basis Requirement	The Contractor shall provide 120v/20amp double duplex, ground fault circuit interrupter (GFCI) power outlets with weather-resistant covers in the remediation facility to provide power for radiological monitors operated by FDF.	Section C.5.3.1.3
DBR-050	Design Basis Requirement	Adequate electrical power shall be provided for the operation of all electrical components, emissions monitoring equipment, and all items requiring electrical power.	Section C.5.3.1.3
DBR-051	Design Basis Requirement	Motors over 100 KW shall have efficiency of 90 percent or higher.	Section C.5.3.1.3
DBR-052	Design Basis Requirement	Concrete applications shall be designed according to all applicable American Concrete Institute (ACI) codes, ASTM; and Concrete Reinforcing Steel Institute (CRSI) codes.	Section C.5.3.1.4
DBR-053	Design Basis Requirement	The Contractor and any subcontractors shall use fly ash or slag (to the extent possible) in all concrete work performed on this project.	Section C.5.3.1.4
DBR-054	Design Basis Requirement	Permanent or temporary structures shall be designed according to all applicable codes and standards.	Section C.5.3.1.5
DBR-055	Design Basis Requirement	Utilities shall be protected and have concrete or steel supports.	Section C.5.3.1.6
DBR-056	Design Basis Requirement	All utilities shall be designed to applicable codes and engineering standards.	Section C.5.3.1.6

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBR-057	Design Basis Requirement	HVAC systems shall be designed, tested, and installed in accordance with applicable requirements.	Section C.5.3.1.7
DBR-058	Design Basis Requirement	Fuel storage tanks and lines shall be designed, tested, and installed according to the ASME, American Petroleum Institute (API), NFC, and ASTM requirements.	Section C.5.3.1.8
DBR-059	Design Basis Requirement	Fuel storage/dispensing facilities shall meet applicable U.S. EPA and NFPA requirements.	Section C.5.3.1.8
DBR-060	Design Basis Requirement	The fuel loading system shall be designed such that fuel vendors do not enter a contamination zone to deliver and off-load fuels.	Section C.5.3.1.8
DBR-061	Design Basis Requirement	All steel construction shall be designed in accordance with the applicable sections of the American Iron and Steel Institute (AISI), ASTM, AISC, ASCE, and AWS.	Section C.5.3.1.9
DBR-062	Design Basis Requirement	The Contractor shall not exceed the load limits for the Silo 3 dome as specified in Attachment J.4.64.	Section C.3.2.1.2, C.6.2.1.2
DBR-063	Design Basis Requirement	The Contractor shall provide secondary containment for water systems used in Silo 3 material retrieval.	Section C.6.2.2
DBR-064	Design Basis Requirement	Treatment of the water collected from material retrieval shall include, as a minimum, removal of suspended solids prior to discharging the water to the AWWT.	Section C.6.2.2 , C.5.1.1.3.2
DBR-065	Design Basis Requirement	The Contractor shall meter and record the amount of dry Silo 3 material removed from the Silo, by weight, prior to commingling the material with any additives in accordance with Section G.2.2.	Section C.6.2.2
DBR-066	Design Basis Requirement	The Contractor shall not permit open piles, open storage, or conveyance systems to disperse Silo 3 material to the environment.	Sections C.5.1.2.3, C.6.2.4
DBR-067	Design Basis Requirement	Debris that cannot be processed through the primary treatment process shall be segregated from the material and processed in accordance with the Contractor's procedures (e.g., disposal, reprocessing).	Section C.6.2.5
DBR-068	Design Basis Requirement	The Contractor shall control access to radiation and contamination areas.	Section C.6.2.6
DBR-069	Design Basis Requirement	All equipment, material transfer and handling systems containing material that is regulated as a hazardous waste under RCRA shall have secondary containment.	Section C.6.2.8
DBR-070	Design Basis Requirement	The Contractor's treatment process shall treat all Silo 3 material and be optimized to operate at all times within an acceptable range for the designated waste loading.	Section C.6.2.9
DBR-071	Design Basis Requirement	The Contractor's treatment process shall be designed and operated to allow reprocessing of any product that fails to meet the Silo 3 WAC.	Section C.6.2.9, C.6.2.10.3.4
DBR-072	Design Basis Requirement	The Contractor shall package treated Silo 3 materials in a container that meets the DOT design criteria for an IP-2 container presented in 49 CFR Part 173.411(b)(2)	Section C.6.2.10.1.1
DBR-073	Design Basis Requirement	The Contractor shall provide a staging area to maintain an inventory of containers to meet the needs of the processing rate of the treatment facility and prevent any work stoppages.	Section C.6.2.10.1.2

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBR-074	Design Basis Requirement	The Contractor shall supply a container scale to verify the payload capacity of the container has not been exceeded.	Section C.6.2.10.1.4
DBR-075	Design Basis Requirement	The Contractor shall ensure enough space is available for interim staging of filled containers prior to transfer to FDF for shipment to the disposal site.	Section C.6.2.10.1.5
DBR-076	Design Basis Requirement	Secondary waste generated during operations (destined for off-site disposal) shall be packaged in containers appropriate for the materials' U.S. DOT hazard classification.	Section C.6.2.10.1.7
DBR-077	Design Basis Requirement	Treated Silo 3 waste shall be packaged for shipment as LSA-II solid material under exclusive use conditions, as defined under U.S. DOT requirements.	Section C.6.2.10.2.1
DBR-078	Design Basis Requirement	The Contractor shall ensure that the containers selected for shipment of treated Silo 3 waste meet external radiation level limitations for exclusive use conditions under 49 CFR Part 173.441(b).	Section C.6.2.10.2.1
DBR-079	Design Basis Requirement	Generation of secondary waste must be kept to a minimum and, to the extent practical, should be recycled during the treatment process.	Section C.6.2.10.3.5, C.6.2.10.3.6
DBR-080	Design Basis Requirement	Management of secondary waste generated by the Contractor shall be the responsibility of the Contractor.	Section C.6.2.10.3.5
DBR-081	Design Basis Requirement	The Contractor shall use, to the maximum practical extent, real-time monitoring for emissions.	Section C.6.2.14.6
DBR-082	Design Basis Requirement	The Contractor shall recycle certain sample material such as used, altered, and unaltered process control or material characterization samples, back into the treatment process.	Section C.6.2.14.6.4
DBR-083	Design Basis Requirement	Waste generated during the analysis of samples that cannot be recycled through the treatment process or managed in accordance with the Site Investigation Derived Waste Policy shall be managed, containerized, and stored by the Contractor in compliance with DOE Orders (i.e., 5820.24), site procedures, U.S. EPA regulations, DOT regulations, and other applicable state and federal laws.	Section C.6.2.14.6.4
DBR-084	Design Basis Requirement	Waste shall be properly segregated and containerized. Incompatible wastes shall not be placed in the same container and shall be stored separately from each other.	Section C.6.2.14.6.4
DBR-085	Design Basis Requirement	The Contractor shall perform gross decontamination of the remaining equipment and the interior of the treatment facility.	Section C.7.1.4
DBR-086	Design Basis Requirement	The Contractor shall identify a satellite accumulation area or an approved RCRA storage area for hazardous waste handling, treatment, and disposal as needed.	Section C.7.2.1.4
DBR-087	Design Basis Requirement	The Contractor shall control, collect, and hold all waste and effluent generated while removing and/or fixing contamination for sampling prior to dispositioning.	Section C.3.2.4.2.1, C.7.2.2.2, C.7.2.3.6
DBR-088	Design Basis Requirement	Contractor shall comply with the requirements for usage of coatings to facilitate decontamination.	Section C.7.2.2.3
DBR-089	Design Basis Requirement	The Contractor shall plan and coordinate work to minimize exposure of equipment, tools, and vehicles to potential radioactive contamination.	Section C.7.2.3.3

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBR-090	Design Basis Requirement	Equipment shall be located in areas with the least potential for contamination.	Section C.7.2.3.3
DBR-091	Design Basis Requirement	All vestibules, equipment, and/or structure containment material shall be noncombustible, or fire- and corrosion-resistant.	Section C.7.2.7.2
DBR-092	Design Basis Requirement	Local containment structures shall be designed to be leak-tight and capable of maintaining a negative pressure of at least 0.1 inches water gauge or six air changes per hour.	Section C.7.2.7.2
DBR-093	Design Basis Requirement	Where practical, and without penetrating local containment, all equipment components not functionally required to operate directly in the presence of radioactive materials shall be located outside the local containment.	Section C.7.2.7.2
DBR-094	Design Basis Requirement	Local containment or vestibule structures external to a building shall be designed to withstand the effects of normal operating conditions and the environment.	Section C.7.2.7.2
DBR-095	Design Basis Requirement	The Contractor shall ensure that all building exterior holes, gaps, or openings are adequately sealed to prevent exhaust of airborne radioactive particulates.	Section C.7.2.7.3
DBR-096	Design Basis Requirement	The Contractor shall ensure that all ductwork used is free of dust or dirt before installing it in the ventilation system to prevent premature impingement loading of the prefilters and HEPA filters.	Section C.7.2.7.3
DBR-097	Design Basis Requirement	The Contractor shall ensure that all vestibules are large enough to support appropriate storage containers, material handling and dismantling equipment, and debris containerizing operations.	Section C.7.2.7.3
DBR-098	Design Basis Requirement	The Contractor shall block, tie-down, or wheel lock all portable HEPA units.	Section C.7.2.7.4
DBR-099	Design Basis Requirement	The Contractor shall ensure that all local containments maintain negative pressures.	Section C.7.2.7.4
DBR-100	Design Basis Requirement	Within an enclosure, the Contractor shall use local ventilation to maintain exposures ALARA.	Section C.7.2.7.4
DBR-101	Design Basis Requirement	Storage areas shall be made of materials that are compatible with waste to be stored.	40 CFR Part 240 Subpart I, 40 CFR Part 264 Subpart C
DBR-102	Design Basis Requirement	Storage areas shall maintain containers in good condition (prevent deterioration that may result in leaking or rupturing of container and degradation of container labeling).	40 CFR Part 240 Subpart I, 40 CFR Part 264 Subpart C
DBR-103	Design Basis Requirement	Storage areas for containers holding wastes that do not contain free liquids shall be sloped or otherwise designed and operated to drain and remove liquid from precipitation, or the storage areas shall be designed to elevate or otherwise protect containers from making contact with accumulated liquid.	40 CFR Part 240 Subpart I, 40 CFR Part 264 Subpart C
DBR-104	Design Basis Requirement	Aisle space must be sufficient to allow unobstructed movement of personnel, material handling equipment (e.g., forklift), fire and spill control, and decontamination equipment.	40 CFR Part 240 Subpart I, 40 CFR Part 264 Subpart C
DBR-105	Design Basis Requirement	Treated Silo 3 material in storage area shall meet the radon flux requirements (20 pCi/m^2-sec) under 40 CFR Part 61 Subpart Q.	40 CFR Part 240 Subpart I, 40 CFR Part 264 Subpart C

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBR-106	Design Basis Requirement	The Contractor shall design all systems, structures and components for the Silo 3 project consistent with the ARARs presented in this document.	Sections C.5.1.1.3, C.6.2.13, C.6.2.14, Attachments J.4.1, J.4.2.
DBR-107	Design Basis Requirement	Materials of construction shall be compatible with the waste, ambient conditions, and operating conditions.	General
DBR-108	Design Basis Requirement	A minimum velocity face of 150 ft/min air velocity is required.	Section C.7.2.7.4
DBR-109	Design Basis Requirement	The Contractor shall provide for Human Factors in the design of all systems, structures, and components.	General
DBR-110	Design Basis Requirement	Electrical systems shall be designed, tested, and installed in accordance with the applicable sections of the NEC, ANSI, UL, NFPA, NEMA, NETA, and ISA.	Section C.5.3.1.3
DBR-111	Design Basis Requirement	Use of domestic water shall be minimized.	General
DBR-112	Design Basis Requirement	The waste retrieval systems shall be maintained or operated in an enclosure at a negative pressure during normal operating conditions.	Section C.6.2.2
DBR-113	Design Basis Requirement	Halon shall not be used by the Contractor.	Section C.4.3.3.2
DBR-114	Design Basis Requirement	The Contractor shall provide manual fire alarm stations, smoke detection for control room(s), and monitoring of any automatic sprinkler flow alarms.	Section C.4.3.2.3
DBR-115	Design Basis Requirement	Equipment material selection shall be commercially available and standardized equipment and components shall be utilized.	General
DBR-116	Design Basis Requirement	Equipment shall be selected for practicality of design as referred to a "fit for purpose" selection or configuration which will efficiently perform its intended function.	General
DBR-117	Design Basis Requirement	Equipment shall be assessed for its reliability, maintainability, and practicality.	General
DBR-118	Design Basis Requirement	Equipment redundancy shall be considered in achieving Contractor reliability, availability, and maintainability goals when evaluating against ALARA principles.	General
DBR-119	Design Basis Requirement	HVAC systems shall provide for contamination confinement and functions to ensure contamination control. Sufficient redundancy and/or space capacity shall be provided as necessary to ensure adequate ventilation during operations and maintenance.	General
DBR-120	Design Basis Requirement	Filters shall be place as near as practical to the source of contamination to minimize the spread of contamination (HVAC design).	General
DBR-121	Design Basis Requirement	The adequacy of the filtrations system (number of filtration stages required and type of filtration) shall be determined by analysis to ensure the contamination in the effluents are ALARA and do not exceed the emission limits (HVAC design).	General
DBR-122	Design Basis Requirement	The HVAC system shall be designed to maintain airflow from non-contaminated to progressively more contaminated areas.	General
DBR-123	Design Basis Requirement	Consideration shall be given to providing separate supply systems for contaminated and non-contaminated areas.	General

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBR-124	Design Basis Requirement	*The HVAC system shall use prefilters and/or moisture removal systems when cost effective to lengthen life of HEPA filters and/or reduce maintenance of HEPA systems within contaminated areas.*	General
DBR-125	Design Basis Requirement	*Safe isolation components shall be provided for mechanical and electrical systems during maintenance and repair.*	General
DBR-126	Design Basis Requirement	*Areas subject to contamination shall be designed to facilitate decontamination. Liners and coatings can be used to provide protection from decontaminating agents.*	General
DBR-127	Design Basis Requirement	*The maintenance area(s) shall provide the necessary equipment and facilities for performing maintenance activities.*	Section C.6.2.12
DBR-128	Design Basis Requirement	The Contractor shall incorporate radiological safety elements into the design of all systems, structures, and components.	Section J.3, J.3.4
DBR-129	Design Basis Requirement	*Engineering controls necessary to achieve ALARA goals shall be specified in the Contractor's design, operational and maintenance programs and procedures shall also incorporate ALARA requirements.*	Section C.5.1.1.6
DBR-130	Design Basis Requirement	No single point failure shall cause loss of the entire control system.	General
DBR-131	Design Basis Requirement	All normal operation open-close valves and dampers shall provide position feedback indication, as required.	General
DBR-132	Design Basis Requirement	The operator shall monitor damper line-up. Dampers shall be interlocked due to the various normal and maintenance operations as required.	General
DBR-133	Design Basis Requirement	Processes passing through various equipment shall be selectively monitored for flow, temperature fall or rise, and radon removal effectiveness, as required, to verify Contractor's process control parameters	
DBR-134	Design Basis Requirement	Contractor packaged control and monitoring systems shall provide necessary monitoring and control including operation trouble alarms.	General
DBR-135	Design Basis Requirement	Process systems shall be monitored and alarmed for abnormal operations.	General
DESIGN BASIS CRITERIA			
DBC-001	Physical characteristics of Silo 3 material	Physical, chemical, and radiological characteristics	Section J.2.4, Final ROD for Remedial Actions at Operable Unit 4, 12/94, as modified
DBC-002	As-built dimensions and features of the OU4 Silo 3	The as-built dimensions and features of Silo 3	Remedial Investigation Report for Operable Unit 4, 11/93 and Attachments J.4.43, J.4.43a

Table C.5-1 Summary of Design Basis

Item	Type	Description	References
DBC-003	Disposal requirements for construction and dismantlement waste	Radiological Contamination Area - Construction waste shall be disposed in accordance with the Silo 3 WAC and state laws pertaining to construction and debris. Construction waste determined to be nonradioactive or noncontaminated can be free released and disposed of in accordance with Section C.7.2.3.7.2 and state laws pertaining to construction and debris.	Section C.5.1.1.3.3, Construction and Dismantlement Waste Section C.7.3 Section J.3.4
DBC-004	Estimated volume of material to be retrieved, processed, and disposed (in situ volumes). Estimated weight range	5,100 cubic yards (in situ) 1,950 - 3,925 tons	Section C.3.2.1.2 Section J.2.4
DBC-005	Average in situ moisture content	3.7% - 10.2%	Section J.2.4
DBC-006	Other physical characteristics of Silo 3 material	Particle size analysis, material characterization	Attachment J.4.30 Section J.2.4
DBC-007	Radiological and chemical properties of waste and debris content		Section J.2.4 and Attachment J.4.44
DBC-008	Site Characteristics	General information on physical site characteristics in the vicinity of the project work area	Attachment J.2.3
	DESIGN BASIS INFORMATION		
DBI-001	Relevant treatability studies	Silo 3 Stabilization, Nuclear Fuel Services	Attachment J.4.45

C.5.1.1.2 Silo 3 WAC

The following items summarize key elements of the WAC for Silo 3 material:

- The WAC covers material contained within Silo 3 and contaminated wastes generated by processing [e.g., personal protective equipment (PPE), high efficiency particulate air (HEPA) filters]. In accordance with the OU4 Record of Decision (ROD) and the ESD for Silo 3, all Silo 3 material requires treatment to meet the Silo 3 WAC. Solid waste determined to be nonradioactive or noncontaminated wastes, as allowed by pertinent laws and regulations, can be free released or disposed in accordance with Section C.7.2.3.7.2;

- Wastes shall be adequately stabilized, sampled, and analyzed (Sections C.6.2.9 and C.6.2.14) to form a product that has consistent physical, chemical, and radiological characteristics which meet the Silo 3 WAC (Attachment J.4.4);

- Wastes that meet the Silo 3 WAC shall be loaded into containers provided by the Contractor. Containers shall meet the specifications provided in Section C.6.2.10;

- Stabilized wastes that do not meet the Silo 3 WAC [e.g., fail the Toxicity Characteristic Leaching Procedure (TCLP), free liquid present] shall be reprocessed by the Contractor. In addition, treated waste not accepted by the disposal facility for failing to meet the WAC (e.g., containers fail to meet the Silo 3 WAC, free liquids present) shall be returned to the Contractor or retained by the disposal facility for corrective action at the Contractor's expense; and

- Material removed from Silo 3 and treated Silo 3 waste shall meet the radon flux requirements under 40 CFR Part 61, Subpart Q during interim storage and final disposal; and

- The Contractor shall manage treated waste in accordance with this contract, and all appropriate federal, state, and local requirements. The Contractor shall transfer full containers to the interim storage area. FDF will prepare the containers for shipment to the disposal facility. Preparation activities will include evaluation of analytical data to ensure waste meets the Silo 3 WAC and inspection, cleaning, marking, and labeling containers in accordance with DOT and disposal facility requirements. Under the direction of FDF, the Contractor shall segregate shipping containers, as needed. The Contractor shall take temporary measures to secure against unauthorized material placement and provide for weather protection (e.g., installing a gasket to prevent water intrusion into the interior of the container). The Contractor shall decontaminate the exterior of the container to meet DOT shipping requirements and maintain cleanliness of the container until transfer of the container is made to FDF.

A copy of the Silo 3 WAC is included as Attachment J.4.4.

C.5.1.1.3 Environmental Controls

C.5.1.1.3.1 Air Emissions Requirements

Both fugitive and point source emissions of air contaminants may be produced during the life of the project. Site preparation and construction activities will likely produce dust emissions (Section C.5.2.1.8, Dust Suppression). The design and operation of all aspects of the project, including waste retrieval, treatment, and staging of waste and product must include controls to minimize the release of radionuclides and other contaminants to the environment. Transfer of untreated Silo 3 material must be in totally enclosed transfer vessels or process lines in order to minimize the release to the environment of radioactive particulate and gases. Any point source of emissions, such as a discharge stack, must have appropriate control equipment. The following paragraphs summarize the significant air emission control requirements. Sampling and analytical requirements, including air monitoring, are identified in Section C.6.2.14. Refer to Attachment J.4.1, ARARs and TBC requirements tables for more detailed information on the regulatory requirements for air emissions.

Control of dust and fugitive emissions shall be in accordance with the FEMP's best available technology (BAT) determination. The Ohio Administrative Code (OAC), Section 3745-31-05(a)(3), requires new emission sources to use BAT to control air emissions. The OEPA uses the Ohio Air Toxics Policy (OATP) to determine regulated air contaminants and as a guideline in determining the adequacy of proposed control designs in meeting the BAT requirement. A copy of the OATP is provided in Attachment J.4.66. BAT for radionuclide particulate air emissions is the use of HEPA filters.

BAT, in the form of HEPA filtration, will be required for most sources discharging radiological particulate emissions. The Contractor shall procure HEPA filters, prefilters, and housing assemblies in accordance with Engineering Technical Specification, Section 15860, HEPA Air Filtration Device Requirements (Attachment J.4.75). The American Society of Mechanical Engineers (ASME) manufacturing specifications for HEPAs intended for nuclear applications shall be followed. Prior to use, all HEPA filters must be Di-n-octyl Phthalate (DOP) tested by FDF at the FEMP, and DOP tested again by FDF following installation. As part of the BAT requirement, the Contractor shall provide differential pressure monitoring across the HEPA filter system, including any prefilters. The purpose of this monitoring is to monitor buildup of particulate on the filters for changeout, and also to provide alarm capability in case of a breach of the filters. A stack test may be required to demonstrate either the effectiveness of any control equipment used or the adequacy of the system to control emissions. See Section C.6.2.14.4 for additional information on air sampling and Section C.5.1.1.5 for a discussion of environmental permitting.

Emissions of radionuclide particulate material, excluding radon, shall meet the requirements of 40 CFR Part 61, Subpart H, National Emission Standards for Hazardous Air Pollutants (NESHAPs). According to 40 CFR Part 61.92, 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 mrem/year or greater. To determine compliance with this standard, FDF will estimate the amounts of radionuclides released from all site point sources, including information supplied by the Contractor

(Section C.5.1.3.4), and calculate the EDE values to members of the public using EPA-approved computer models. Those point sources having a maximum EDE value to a member of the public, as determined via the procedure described in 40 CFR 61.93(b)(4)(ii), greater than 0.1 mrem/year must be monitored continuously with an in-line detector, or representative samples of the effluent stream must be withdrawn continuously following the guidance presented in American National Standards Institute (ANSI) N13.1-1969, Guide to Sampling Airborne Radioactive Materials in Nuclear Facilities.

If required, stack monitoring systems shall be located and installed in accordance with 40 CFR Part 60, Appendix A, Method 1. The design and operation of any stack monitoring systems shall be the responsibility of the Contractor. Further information on stack monitoring to meet the CAA is provided in Section C.6.2.14.4 and Attachment J.4.1.

For purposes of radioactive gas management, the term radon as applied to this project shall include both Radon-222 (common radon from the U-238 decay series), and Radon-220 (thoron, from the thorium decay series). Where the regulations differentiate between the two gases, the distinction shall be made clear. Radon emissions from any point source shall be controlled in a manner that will not cause the point source to result in a contribution to the fence line radon concentration of greater than 0.5 pCi/L, as an annual average above background. If design estimates of maximum radon expected to be released from a point source, without taking credit for any control equipment, would not result in exceeding this limit, then additional control equipment (and continuous stack monitoring) shall not be required. Otherwise, control equipment and continuous stack monitoring shall be required. Compliance with any stack control limits for radon will be determined by FDF using a sitewide model and the Contractor's data as discussed in Section C.5.1.3.4.

Radon monitoring in the process area for worker protection, and outside the process area for environmental compliance purposes, will be the responsibility of FDF. Although continuous stack monitoring may or may not be required, any point source releasing radon must be configured to accept continuous monitoring equipment as a contingency provision. Personnel exposure limits and controls related to airborne contamination are defined in Sections J.3.3, FEMP Safety Requirements and J.3.4, Silo 3 Material Radiological Safety Requirements.

C.5.1.1.3.2 Wastewater and Stormwater Criteria Requirements

The following regulatory requirements apply to any wastewater and stormwater generated as a result of the Contractor remediation activities.

Wastewater

Liquid effluents may be produced within the facility as a result of processing activities. The generation of liquid waste produced as a result of facility operations shall be minimized. Where technically and economically feasible, liquid waste shall be recycled throughout the process. Liquid effluent handling systems shall be provided for handling these effluent streams. All liquid wastes discharged from the Contractor's facility shall be sent to the

FEMP AWWT and meet the acceptance criteria of the AWWT. Wastewater must be staged for characterization prior to batch discharge to the AWWT.

The Silo 3 material treatment process must be designed to recycle wastewater to the extent practicable. If zero discharge of wastewater is not practical, the generation of wastewater shall be kept to a minimum. Mass balance data for rate of wastewater generation, and types and concentrations of constituents in the wastewater expected to be discharged during the process shall be submitted as part of the Preliminary Design Package (Section C.5.1.2.4). Based on the mass balance data (and confirmed by analytical data during operations), wastewater from the process area may be able to be sent, without pretreatment, to the AWWT system for final treatment prior to discharge under the site NPDES Permit. Intentional dilution, as a substitute to treatment, shall not be allowed. Determining the acceptability of wastewater to the AWWT shall not include any stormwater or any dilution that results from combination of stormwater with the wastewater stream. If the data submitted during design indicate the wastewater discharge would exceed the site treatment capabilities of the AWWT, pretreatment of the wastewater stream shall be required. Specific criteria for wastewater discharged to the AWWT include:

- No listed hazardous waste, as defined under RCRA, may be discharged in the wastewater. Wastewater that exhibits a characteristic of hazardous waste for metals may require pretreatment based on the above discussion and is subject to restrictions below;

- Dissolved concentrations of heavy metals in any wastewater effluents shall not cause the Ohio water quality standards under the CWA for the receiving water to be exceeded (Attachment J.4.1 ARARs) [see note below];

- Discharge of total suspended solids (TSS) in excess of 1,000 ppm shall not be allowed;

- Any wastewater discharges shall be monitored and reported to FDF for the following constituents:

Arsenic	Lead	Total Dissolved Uranium
Barium	Selenium	Chloride
Cadmium	Radium-226	Nitrates
Chromium	Thorium-230	

- Discharges of wastewater shall not exceed the Derived Concentration Guides (DCGs) for radionuclides identified in DOE Order 5400.5, Section III (Attachment J.4.1 ARARs) [see note below];

- All wastewater discharged shall be metered with a flow measuring and recording device. Metering shall include measurement of total flow. In lieu of metering, the Contractor may elect batch discharge from a tank or other vessel of known volume. Batch discharge volumes shall be recorded and the records maintained; and

- **!** Any wastewater discharges shall be monitored by analysis of a grab sample from each tank or batch prior to discharge or any time the character of the wastewater is expected to change significantly (Section C.6.2.14.3).

NOTE: For design and evaluation of pretreatment for wastewater discharge from the treatment process, the Contractor may assume the wastewater would be commingled with 40,000 gallons per day of water prior to discharge to the receiving water body. This should be taken into account in evaluation of pretreatment needs to meet the Ohio water quality criteria and the DCGs of DOE Order 5400.5.

All wastewater discharges at the FEMP are covered by an existing NPDES Permit or any amendment (Attachment J.4.58). All wastewater and stormwater discharged from the Silo 3 Project shall be discharged through a recognized NPDES Permit discharge point. Process wastewater shall be discharged to an existing line that feeds the headworks of the AWWT. The FEMP currently discharges under OEPA NPDES Permit No. 1IO00004*ED, which expires March 31, 1998. An updated NPDES Permit will be provided to the Contractor upon approval by the OEPA.

Depending on the proposed design, modification of the existing site NPDES permit may be required. If modification of the permit is required, the Contractor shall be required to supply additional information regarding the effluent discharge from the Silo 3 Project. A water balance and mass balance addressing the contaminants of concern shall be required. Pollution prevention and recycling of waste streams shall be considered in all processes to address the OEPA anti-degradation requirements. If the Contractor suspects a modification to the NPDES permit may be required, the Contractor shall incorporate the time required for the modification process into its proposed schedule. The final decision regarding whether the NPDES permit requires modification will be made by FDF.

The Contractor's activities may be affected by any change in terms and conditions of the NPDES permit. Any required process modifications, or changes in the wastewater or stormwater control or monitoring requirements deemed necessary will be the subject of a directed change under the Contract.

Stormwater

The potential for generation of contaminated stormwater, including any run-on and run-off, shall be minimized by process design and operation. Contaminated run-off could come from areas that are in direct contact with waste or have a high potential of coming in contact with waste, such as process pads and stockpile areas. The quantity of contaminated stormwater from the Silo 3 Project process area shall be minimized by segregating clean area run-off from potentially contaminated run-off. All staging of Silo 3 material shall preclude the release of material. At no time shall the Contractor be allowed to place unstabilized or stabilized Silo 3 material in an open pile or open top tank. To further minimize contamination (and in keeping with the environmental ALARA concept), all waste and feed additives used in the treatment process to stabilize the Silo 3 material shall be stored/staged on a suitable base protected from stormwater run-on and run-off at all times.

Environmental releases shall be avoided to the extent possible. Any spills or other unplanned releases to the environment shall be reported immediately by the Contractor to FDF, and cleaned up immediately to minimize the release of contaminants to the environment. FDF will respond to the release in accordance with Section C.6.2.11.

Clean run-off could include building roof drainage and run-off from areas of fixed contamination. "Clean" stormwater shall be discharged either into the stormwater collection basin, or routed to the ditch adjacent to the process area for discharge directly to Paddy's Run. Areas used for processing of materials that could contribute to contaminated stormwater shall be protected from precipitation and stormwater run-on and runoff, to the extent practicable, in the design. Contaminated stormwater shall not be discharged with "clean" stormwater. Contaminated stormwater shall be contained and sampled in accordance with Section C.6.2.14.3 prior to discharge into the wastewater management system.

The Contractor shall provide facilities to prevent the introduction of any substances or materials into any stream, lake, aquifer, or other body of water which may pollute or degrade the water or constitute substances or materials deleterious to fish and wildlife.

New stormwater management systems shall be designed for the 25-year, 24-hour storm per FEMP site policy. The Contractor shall use the five-year storm to evaluate the scour velocity regarding open channels. Stormwater management basins will be designed to safely pass the 100-year 24-hour storm (see Rainfall Frequency Atlas of the U.S. Technical Paper 40, U.S. Department of Commerce, for levels for this storm event for the FEMP).

Storm drain systems not directly connected to the stormwater management system (if any), with catchments less than 160 acres, may be designed by the Rational Method. Those storm drain systems directly connected to an existing stormwater management system shall be designed by Soil Conservation Service (SCS) methods (e.g., TR-55, TR-20). Stormwater control design details, construction methods, and materials shall be in accordance with Ohio Department of Transportation (ODOT) standards. Stormwater management, as well as erosion and sediment control during construction, must comply with the latest version of Rainwater and Land Development: Ohio's Standards for Stormwater Management, Land Development and Urban Stream Protection, Second Edition, Ohio Department of Natural Resources (ODNR) Division of Soil and Water Conservation, Columbus, Ohio, 1996 [Formerly U.S. Department of Agriculture-Soil Conservation Service, Water Management and Sediment Control in Urbanizing Areas, U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C., 1987].

If practical, contaminated stormwater shall be recycled into the treatment process to minimize the volume of water requiring treatment. At a minimum, contaminated stormwater shall meet the requirements identified above for wastewater prior to discharge to the AWWT.

C.5.1.1.3.3 Secondary Waste

Site preparation and construction activities, and design for operations shall minimize the amount of secondary waste generation. The approach to waste management shall be based on a philosophy of waste minimization, recycling, and environmental ALARA (Attachment J.4.74). The methods used to manage waste and debris generated shall be consistent with the ARARs and TBCs, which are included in Attachments J.4.1 and J.4.2, and site procedures (Attachment J.4.3). Management includes waste characterization (Attachment J.4.94), staging, segregation and containment, and treatment. Also, refer to Section C.6.2.10 for packaging requirements.

All secondary waste to be shipped off-site will be surveyed by FDF radiological personnel for radioactive contamination prior to removal from the site. Per Section C.7.2.3.7, the Contractor shall be responsible for any decontamination activities involving release of equipment, materials, tools, etc., from the FEMP.

Generation of solid waste, hazardous waste, and/or new radioactive waste within the facility shall be minimized. Nonradioactive solid waste shall be surveyed by FDF radiologic control technicians prior to disposal as solid waste. Unless they can be released as non-contaminated in accordance with Section C.7.3.7.2, radioactive solid wastes generated within the facility shall be reprocessed to the extent practicable or disposed off-site with treated Silo 3 waste.

C.5.1.1.3.4 Sampling and Analysis

All secondary waste generated during the remediation of Silo 3 material shall be sampled and monitored in accordance with the requirements identified in Section C.6.2.14, and Attachments J.4.1 and J.4.2.

C.5.1.1.4 ARARs/TBCs

Tables in Attachment J.4.1 of this contract provide the ARARs/TBCs for this project.

C.5.1.1.5 Substantive Regulatory Requirements

CERCLA Section 121(e)(1) states that no federal, state, or local permit will be required for the portion of any removal or remedial action conducted entirely on-site, where such remedial action is selected and carried out according to Section 121. This does not, however, exempt that project from complying with the substantive requirements that would have been imposed by such permits. Although no environmental regulatory permits for remediation of Silo 3 material will be required for activities conducted on-site, the design and operational controls must meet the substantive requirements of permits that ordinarily would be required under the CAA, CWA, and RCRA. Under the CAA, Ohio's Permit to Install (PTI) and Permit to Operate (PTO) requirements must be met. Under RCRA, the tank and container design and operating requirements are examples of substantive requirements that must be met.

Substantive requirements for each ARAR and TBC are discussed in detail in the tables in Attachments J.4.1 and J.4.2. Attachment J.4.2 identifies substantive regulatory requirements for Silo 3 remediation. Based upon the nature and extent of the Contractor's proposed technology and process, there may be other regulatory requirements to comply with and it is the Contractor's responsibility to do so. The Contractor shall provide a strategy for compliance with these requirements, along with a cross reference to identify where compliance is addressed in the Contractor submittals for design, operation, etc. Blank columns are provided in Tables J.4.2-1, J.4.2-2, and J.4.2-3 in Attachment J.4.2 to facilitate submittal of this information.

C.5.1.1.6 ALARA Requirements

ALARA is an approach to manage and control radiological exposures (individual and collective) to the work force and to the general public at levels as low as reasonably achievable, taking into account social, technical, economic, practical and public policy consideration. ALARA is not a dose limit but an objective to attain doses as far below the applicable controlling limits as is reasonably achievable. Engineering controls necessary to achieve ALARA goals shall be specified in the Contractor's design of the remediation system. Operational and maintenance programs and procedures shall also incorporate ALARA requirements. Overall ALARA compliance will be reviewed and evaluated by FDF (Section J.3.4.2.1).

C.5.1.1.7 Environmental Investigations and Engineering Studies

Previous environmental and engineering investigations have been conducted in the area of the Silo 3 structure (Section C.3.2.1.2). If the Contractor determines that supplemental environmental or engineering studies are necessary to support aspects of the design, upon concurrence by FDF, a work plan describing the scope, objectives, methods, and description of need for the study shall be prepared and submitted by the Contractor for approval. The Contractor shall perform these studies in accordance with the following:

- Environmental sampling and analysis shall be performed in accordance with the Sitewide CERCLA Quality Assurance Project Plan (SCQ) (Attachment J.4.33) and the U.S. EPA's Guide for Conducting Treatability Studies under CERCLA (EPA 1992); and

- Investigations or studies shall be planned and executed by the Contractor in a manner that will not hinder compliance with the start date for operations as established in the schedule (Section C.4.6).

C.5.1.1.8 Surveying

Local benchmarks are identified in Section C.5.2.1.1. A plan of the proposed project area, which identifies the locations of existing benchmarks (including topographic contours), is

included as Attachment J.4.90. If additional surveys are required, they shall be conducted in accordance with the following:

- Surveyed coordinates shall be referenced to the North American Datum (NAD) 83 State Planar Coordinate System; and

- All survey work shall be to a third order accuracy standard as established by the Standards and Specifications for Geodetic Control Networks.

C.5.1.1.9 Geotechnical Investigations

Previous geotechnical investigations in the vicinity have been conducted as referenced in Section C.3.2.1.2.4. The soils in the footprint have good bearing capacity, as indicated by the 3,500 psf allowable bearing capacity (Attachment J.4.63). Any additional geotechnical investigations (if required) shall be conducted in accordance with the following:

- If required to support design or construction, any geotechnical investigations, including any subsurface sampling and analysis conducted during such investigations, shall be done in accordance with the latest revision of the American Society For Testing and Materials (ASTM), Section 4 (Soil and Rock; Dimension Stone; Geosynthetics). Any deviation from the above ASTM procedures shall be approved in writing by the FDF Technical Representative prior to implementation;

- Any geotechnical calculations (e.g., bearing capacity, slope stability) performed by the Contractor to support the design shall be approved by a State of Ohio registered Professional Engineer (P.E.) in accordance with standard engineering practice; and

- Geotechnical investigations shall also be performed in accordance with the SCQ and the U.S. EPA's Guide for Conducting Treatability Studies under CERCLA (EPA 1992).

C.5.1.1.10 Variability of Silo 3 Material

The expected variability in concentrations of the Silo 3 material constituents is represented in the OU4 Remedial Investigation (RI) data summary tables found in Section J.2. However, any constituent in Silo 3 may be present in significantly lower or higher quantities than shown in the tables.

Approximately 90 percent of the Silo 3 material, based on a weight fraction of the material, passed through a 200-mesh sieve (0.074 mm) during testing for the OU4 RI. This indicated that the majority of the material was silt size or less.

Analysis of the Silo 3 material by Argonne National Lab, June 1996, used two other techniques to evaluate particle size distribution. The very fine particle material (0.001 to 1 µm) was analyzed using a Laser Light Scattering technique on a dispersed, suspended fraction of the Silo 3 material. Based on the intensity of reflected light, it was determined that the small particulate in this size range averaged 0.2 µm, with a peak range of 0.05 to

0.35 µm. Argonne also used Scanning Electron Microscopy and computer software to determine the size distribution based on the number of particles greater than 0.5 µm. This analysis indicated that approximately 90 percent of the particles counted ranged in size between 0.5 and 5 µm. The Argonne report is included as Attachment J.4.30.

The Contractor is encouraged to consider the variability in concentrations of the Silo 3 material constituents and the variability in the Silo 3 material particle size in determining its treatment and process requirements.

C.5.1.2 Engineering and Design Documentation Requirements

This section discusses the engineering and design documentation and submittal requirements for this project. These documents shall be submitted in accordance with Figures C.4-1 and C.4-2.

C.5.1.2.1 Functional Requirements Document

The Functional Requirements Document shall expand upon the functional requirements contained in this contract. This document provides the fundamental technical criteria and design basis requirements necessary to develop conceptual, preliminary, and final design. These criteria and requirements address design concepts such as minimum performance capabilities/margins, design basis criteria, diversity, reliability, availability, independence, redundancy, separation, environmental protection, and health and safety protection. The criteria shall incorporate organizational requirements, DOE directives, regulatory requirements, industrial standards and codes, historical information, and engineering experience which provide the basis for verifying that the final project conforms to the requirements of the intended function.

C.5.1.2.2 Design Criteria Package

The Design Criteria Package shall expand upon the design criteria contained in this Contract. The design criteria shall be specific criteria that affect the Contractor's design, including, but not limited to, contract performance requirements, pertinent DOE Orders specified or referred to in this contract, and standard industrial codes and requirements. The design criteria shall also provide: a) the Contractor's ARAR compliance strategy, based on the proposed design, for complying with the ARARs and the substantive permit requirements (a "permitting crosswalk"), and a description of where in the design package a particular requirement is addressed. Tables in Attachment J.4.1 and J.4.2, respectively, provide space to record this information; and b) a summary of the results of studies, reports, and/or evaluations the Contractor conducted in support of the design. Assumptions should be clearly identified for any design criteria that cannot be verified until the Contractor is in the field.

C.5.1.2.3 Conceptual Design Package

The Conceptual Design Package shall describe the major systems required by the Contractor to meet the stated objectives described in this contract. Interfaces to minor systems (e.g., cooling water systems, waste water systems) shall be included in the design package, however, full system development need not be included. The fundamental objective of the conceptual design report is to develop a project scope that satisfies the project and site mission needs, operating needs, and site/regulatory requirements; validates the project feasibility and attainable technical performance levels; identifies, quantifies, and qualifies project risks; and lays the foundation for developing the project baseline. The Conceptual Design Package shall include, as a minimum, the next revision (previously submitted with the bid package) of the following documents:

- process flow diagrams;
- heat and material balances;
- general arrangement drawings;
- site plot plan;
- electrical load summary;
- electrical one-line diagram;
- Silo 3 retrieval technology description;
- estimate of secondary waste.

In addition, the Contractor is requested to provide revision A of the following documents (revision A provides major component details and provides a sufficient definition of the concept):

- functional analysis;
- ALARA philosophy;
- piping and instrumentation diagrams;
- process descriptions;
- Performance Grading;
- tie-in drawings;
- heating, ventilation, and air conditioning (HVAC) flow and control diagrams;
- control system block diagrams.
- equipment list;
- data sheets and draft specifications for key equipment and long lead items;
- lists of required drawings, specifications, and other documents;
- storm water drainage plan.

C.5.1.2.4 Preliminary Design Package

The preliminary design package need not be submitted all at once. It is preferred that documents be submitted as they become available in order to expedite the review process and to allow comments to be incorporated into follow-on documents prior to submittal. The package shall include, as a minimum, revision 0 of the following technical baseline documents:

- functional analysis;

- ALARA philosophy;
- process flow diagrams;
- heat and material balances;
- general arrangement drawings;
- site plot plan;
- electrical load summary;
- electrical one-line diagram;
- HVAC flow and control diagrams;
- Performance Grading;
- piping and instrumentation diagrams;
- tie-in drawings;
- control system block diagrams.

The Contractor shall provide the next revision of the following documents previously submitted with the Conceptual Design Package:

- Silo 3 retrieval technology description;
- process descriptions;
- electrical load summary;
- estimate of secondary waste;
- equipment list;
- data sheets and draft specifications for key equipment and long lead items;
- lists of required drawings, specifications, and other documents;
- storm water drainage plan.

In addition, the Contractor shall provide revision A of the following documents as appropriate for the Contractor's design for the Preliminary Design Package:

- timed estimates of secondary waste disposal requirements;
- instrument list;
- line list;
- metallurgical diagrams;
- radiological zone drawings;
- shielding calculations;
- underground piping drawing;
- system design descriptions;
- control room arrangement;
- cathodic protection design;
- lightening protection design;
- grounding design.

C.5.1.2.5 Final Design Report

The final design report shall be complete and considered ready for construction. All drawings, documents, purchase specifications, construction specifications, reports, studies,

analyses, calculations, etc. shall be revision 0, minimum. The final design report shall contain written narratives that fully describe the process, mechanics and control methodology.

C.5.1.2.6 Design Closeout Report

The Contractor shall submit the design closeout report for the project at the end of startup testing. The package shall include, as a minimum:

- as-built copies of all drawings and specifications;
- operating and maintenance manuals for equipment;
- completed system design descriptions, including startup, operation, shutdown, and off-normal operational procedures.

C.5.1.3 Engineering Evaluations and Data Submittals

C.5.1.3.1 Failure Modes and Effects Analysis

A Failure Modes and Effects Analysis shall be prepared to evaluate every major piece of equipment, valve, instrument, etc. to determine their potential failure modes (e.g., fail to operate, fail to close, etc.) and the effects of each failure. Results of this analysis shall be incorporated into the plant design to ensure a safe, reliable plant.

C.5.1.3.2 Energy Conservation Report

If the balance of the facilities will require greater than 500 million Btu/yr or includes a building greater than 10,000 ft^2, an energy conservation report must be prepared to meet the intent of DOE order 6430.1A, Section 0110-1213. The report(s) shall be submitted concurrent with the final design report.

C.5.1.3.3 Environmental Investigation/Engineering Study Work Plan(s)

Work plan(s) for conducting environmental investigations and engineering studies shall be developed consistent with the requirements of EPA's Guide for Conducting Treatability Studies under CERCLA (EPA, 1992) (Section C.5.1.1.7).

C.5.1.3.4 Point Source Air Emission Data

The Contractor shall provide information to FDF related to air emissions from point sources. This information will be used to determine the need and adequacy of control equipment, and to establish stack limits using the integrated site-wide air model. The Contractor shall:

- Provide an estimate of the concentrations of air pollutants that are reasonably expected to be emitted from each point source, without taking credit for any reductions due to air pollution control equipment. Air pollutants of concern are those regulated under the

OEPA OATP (Section C.5.1.1.3.1 and Attachment J.4.66), 40 CFR Part 61 Subpart H (NESHAPs for radionuclides), and the DOE Order 5400.5, Section III, DCG for radioactive particulate in air and radon (Attachment J.4.1). The Contractor shall provide an estimate of the concentrations of any other pollutants that the Contractor knows or believes to be present in the off-gas from each point source. Such pollutants may include organics, acid gases, inorganics, sulfides, etc. See the ARARs in Attachment J.4.1 for more details regarding the regulations that govern air pollution.

! Provide the assumptions used to develop the estimates above. Include, as a minimum, the following:

- Source term (waste stream and additives) constituents and release rate;
- Stack location in the process area;
- Stack height;
- Stack diameter;
- Expected off-gas flow rate;
- Off-gas exit velocity;
- Off-gas temperature; and
- Ambient temperature (range).

Based on the expected air pollutants, associated regulations, and assumptions, the Contractor shall propose control and monitoring equipment for all point sources for releases from the process. In addition to the regulated pollutants, the Contractor shall provide the basis of any assumptions used to develop emission estimates (and control equipment etc.) for any other pollutants that the Contractor knows or believes to be present in the off-gas from each point source. FDF will review the information provided by the Contractor for compliance with ARARs and/or standards.

! Provide FDF with any revisions or modifications related to air emission estimates, associated stack parameters, and selection of control or monitoring equipment. FDF will review the information provided by the Contractor and will notify the Contractor if changes in stack limits, controls, or monitoring equipment are required.

! Incorporate all selected emission control and monitoring devices into the Preliminary Design Package (C.5.1.2) and the Remedial Design Package (C.5.1.4) submittals to FDF. FDF will review these submittals and inform the Contractor of any required changes or modifications.

NOTE: If it is determined by the OEPA that stack performance testing is required, FDF will retain an independent performance test firm to perform emissions testing on point sources to verify that BAT is being met for emissions from the stack. BAT is required to control emissions pursuant to OAC 3745-31-05. The stack performance test shall be conducted in accordance with U.S. EPA and/or OEPA-approved test methods. The performance test scope of work, parameters for testing, test criteria, and resulting test data will be submitted by FDF to OEPA as required.

C.5.1.4 Remedial Design Package

Principal elements of the Contractor's design submittals shall be compiled into the Remedial Design Package for EPA review and approval. The RD Package shall describe the design and operation of the Contractor's remediation facility to successfully stabilize Silo 3 material in a manner that will ensure protection of worker and public health, safety, and the environment. The RD Package shall also describe the environmental controls that will be utilized during construction and operation of the facility to ensure protection of human health and the environment. The RD Package shall be submitted to the U.S. EPA and OEPA for comment during the preliminary design stage of the Contractor's design process. U.S. EPA and OEPA comments shall be addressed in the Contractor's Final Design Package for approval. The Remedial Design Package shall contain the following information:

! Design Documentation - The following elements of the Contractor's Preliminary Design Package shall be included in the RD Package submitted to the EPA:

- Silo 3 Retrieval Technology Description;
- Process Description;
- Process Flow Diagram;
- Heat and Material Balance; and
- General Arrangement Drawing.

! ARARs Compliance Strategy - The RD Package shall contain the following information from the Contractor's Design Criteria Package:

- The Contractor's ARAR compliance strategy, based upon the proposed design, for complying with the ARARs and the substantive permit requirements identified in Attachments J.4.1 and J.4.2, respectively.

! Pre-operational Environmental Control Plan - The RD Package shall contain the Contractor's Pre-operational Control Plan. This plan shall describe the methods and materials that the Contractor shall use during site preparation and construction to control erosion, dust, and stormwater, and minimize the impact of these activities on the environment. This plan shall contain the following:

- Erosion Control - Description of the methods and materials to be used to prevent erosion of soil either by wind or surface water in the process or project work area to reduce sediment loading in the stormwater;

- Dust Control - Description of the methods and materials used to suppress and minimize the creation and dispersion of dust;

- Stormwater Control - Description of the methods, materials, and existing site features to be used to capture and control stormwater; and

- Waste Management - Description of the methods used to manage waste and debris generated during site preparation and construction.

! Process Control Plan describing:

- Treatment formula specifications and description;
- Waste loading range;
- Controlling limits and operating parameters;
- Methods for measuring parameters, monitoring components;
- Frequency of measurements;
- Means for preventing and correcting deviations and incorporating results into operations;
- Silo 3 WAC processed waste must meet;
- Plan for handling processed waste that does not meet the Silo 3 WAC; and
- List of procedures and plans governing the project operations (Note: procedures shall be made available for agency review upon request).

! Description of Health and Safety Controls - including information equivalent to that in the PSHSP for Operations Activities (Section J.3.3.1.2).

! Contingency Plan for operations containing:

- List of potential problems that could be anticipated;

- Plan for developing corrective actions and contingency operations to prevent undue hazard in the event of a failure;

- Plan for emergency situations and emergency shutdowns; and

- Safety tasks required in event of systems failure (may be linked to site safety plan developed during remedial responses).

! Sampling and Analysis Plan

The SAP (Section C.6.2.14) shall describe all sampling and analysis activities including methods to certify that the treated waste will meet the Silo 3 WAC; to verify that discharged water will meet the FEMP AWWT requirements (Sections C.5.1.1.3.2 and C.6.2.13.2); to verify that operations is maintaining systems within recommended parameters; and to verify that fugitive and point source air contaminants are controlled (Sections C.5.1.1.3.1 and C.6.2.13.1). Methods of sample collection to achieve representative samples of the process and waste streams shall be described. Analytical methods for the process materials, air, waste, and water analyses shall be listed. Screening or sampling methods for process control shall be described. Quality control for sampling and analysis shall be described, including internal and external (duplicate samples, blanks) quality control and calibration of equipment. Sample chain-of-custody procedures, field log book procedures, and data management functions shall be

described. Analytical data reporting format, detection limits, and turnaround times shall be described and shall be acceptable to the FDF. The Contractor shall submit analytical results to FDF upon receipt from the laboratory.

! Operational Environmental Control Plan

The Operational Environmental Control Plan shall describe the methods and materials that the Contractor will use during operation to control erosion, dust, wastewater, stormwater, and air emissions to minimize the impact of these activities on the environment. The Contractor shall provide the following in this plan:

- Air Emissions Control - Describe process controls used, and any plans for stack or other air monitoring. Include a description of how operations will ensure that emissions from material handling and processing equipment meet ARARs and ALARA requirements. Refer to Sections C.5.1.1.3.1, C.5.1.3.4, and C.6.2.13.1 for specific requirements and additional information on management of air emissions.

- Dust Control - Description of the methods and materials to be used to suppress and minimize the creation and dispersion of dust during operations. Refer to Sections C.5.2.1.8 and C.6.2.13.1 for additional information on dust control.

- Wastewater Control - Description of the design features and methods to be used to eliminate, minimize, or recycle the wastewater produced during operations. Where wastewater will be generated, a description of any pretreatment methods to be used and any methods that would be used to segregate wastewater containing listed waste from other wastewater streams. Refer to Sections C.5.1.1.3.2 and C.6.2.13.2 for specific requirements and additional information on management of wastewater.

- Stormwater Control - Description of the methods, materials, and existing site features to be used to capture and control stormwater. Refer to Sections C.5.1.1.3.2 and C.6.2.13.3 for additional information on stormwater control.

- Erosion Control - Description of the methods and materials to be used to prevent erosion of soil in the project work area to reduce sediment loading in the stormwater. The erosion control system used for site preparation and construction may be used as a basis. Refer to Sections C.5.2.1.7 and C.6.2.13.4 for additional information on erosion control.

- Waste Management - Description of the design approach and methods to be used to manage secondary waste and debris generated during operations including tracking of waste through FDF's SWIFTS database. Refer to Sections C.5.1.1.3.3, C.6.2.10.3, and C.6.2.13.5 for additional information.

! Silo 3 Gross Decontamination Plan

- Methods and equipment for gross decontamination;

- Methods to control, handle, segregate, and minimize secondary waste;
- Product Data - Manufacturer's technical information, including the material to be used, its intended use, and its application instructions;
- Methods to characterize, treat, package, and store secondary waste; and
- Application Methods of coatings and sealers.

C.5.1.5 Definitions of Design Deliverables

This sections defines the minimum expected contents of the design deliverables specified in Section C.5.1.2 of this document. Letter revisions of documents are considered preliminary and need not include all details of the design. Number revisions of documents, starting with 0, are considered final and shall contain information required for construction.

C.5.1.5.1 Control System Block Diagrams

This is a schematic diagram that depicts the basic control system components and clearly define major hardware and operator interfaces. Hardware interconnections illustrate the relationship between major hardware, communication networks, human machine interfaces, peripherals and any external systems.

C.5.1.5.2 Data Sheets

This is a one to two page summary of the physical and functional parameters for each piece of equipment. Its primary use is as an attachment to a specification.

C.5.1.5.3 Electrical Load Summary

This is a listing of electrical loads. It shall include the equipment name and number, voltage, phase, and horsepower or kilowatts.

C.5.1.5.4 Electrical One-Line Diagram

This is a schematic diagram of the electrical distribution system. It shall include electrical loads, transformers, disconnects, and circuit breakers. It shall include line numbers and wire sizes.

C.5.1.5.5 Equipment List

This is a listing of equipment. It shall contain the equipment name, number, location, functional capacity, physical size, electrical capacity, weight, materials of construction, manufacturer, model number, purchase requisition number, and any special notes. The equipment number shall contain the system number, equipment designator, and train designator.

C.5.1.5.6 Functional Analysis

A functional analysis is a structured methodology employed early in the engineering design process to determine the requirements that define the scope of the project. This procedure is a logical step-by-step analysis used to identify and develop the functions required to be performed in order to meet the overall project objective. The functional analysis identifies the requirements for performing a process or mechanical function without dictating the physical design or specific technology and/or process of that function. It defines boundaries to functions, identifies the various systems or steps that are required to perform the identified functions, establishes logical functional relationships, and presents the information as a hierarchy of modular functions. A functional analysis consists of two components: the Functional Analysis Diagram, and the Functional Analysis Document.

The Functional Analysis Diagram is developed to present a hierarchy of functions (including technical, safety, and environmental functional requirements) that are required to be performed in order to satisfy overall project objectives. This diagram provides a basis that is developed into the Functional Analysis Document. The Functional Analysis Document defines each function in terms of its scope, relations, and interfaces, and is used to transition from analyzing a function to identifying component elements, substantive requirements, and associated functions. This document also identifies preliminary system requirements and begins to produce specific technical requirements.

C.5.1.5.7 General Arrangement Drawing

This is a scale drawing that shows the location of all equipment and facilities. It shall include all major equipment, power panels, motor control centers, transformers, instrument panels, etc., with equipment numbers.

C.5.1.5.8 Heat and Material Balance

This is a listing of flows, temperatures, pressures, contents, and concentrations, for key flow streams, identified on the process flow diagram by stream number. The listing may be placed directly on the flow diagram or in an attached table.

C.5.1.5.9 HVAC Flow and Control Diagram

This is a schematic diagram that depicts the system design necessary to fulfill the functional requirements of the heating, ventilating, and air conditioning system. It is similar to a process flow diagram. It shall include all equipment, systems, components, air flows and directions, air temperatures, duct sizes, and materials of construction.

C.5.1.5.10 Instrument List

This is a listing of process sensors and field measurement devices. It shall contain the instrument name, number, location, function, loop number, manufacturer, model number, wetted materials construction, purchase requisition number, and any special notes. Instrument designators shall be in accordance with ANSI/Instrumental Society of America (ISA)-S5.1.

C.5.1.5.11 Line List

This is a list of all fluid lines on the project. The list shall contain line numbers, the process system, the fluid being transported, service temperature and pressure, material of construction, line size, insulation and heat tracing, origin, and terminus, and other technical data used in design stress analysis, fabrication, installation, and testing. Line numbers shall indicate the process system, line size, material classification, hot or cold insulation, and heat tracing.

C.5.1.5.12 Metallurgical Diagram

This is a diagram, based on the process flow diagram, that depicts the metallurgy requirements for all equipment, instrumentation, piping, and valves. This information shall be incorporated into the equipment list, instrument list, line list, and valve list.

C.5.1.5.13 Piping and Instrumentation Diagram

The Piping and Instrumentation Diagram (P&ID) is a schematic diagram that depicts the system design and control logic. It shall show equipment, instrumentation, controls, valves, and interconnecting piping (with their respective numbers). The P&ID shall show interfaces to other systems, tie-in points to existing utilities, and performance grade breaks.

C.5.1.5.14 Process Description

This is a general written description of the system process. It shall discuss such things as flows, motive equipment, processing steps, control philosophy, temperatures and pressures.

C.5.1.5.15 Process Flow Diagram

This is a schematic diagram that shows major equipment with name and equipment number, and interconnecting main piping with stream numbers corresponding to the heat and material balance. Utility services are shown to the extent required to clarify their function in the process.

C.5.1.5.16 Radiological Zone Drawing

This is a scale drawing that shows the expected radiological zones in all facilities. The radiation zone drawing depicts the application of the ALARA philosophy. The drawing divides the facility into radiological areas based upon the radiological requirements in accordance with the ALARA philosophy. It segments the facility into radiological areas,

identifies access control points, and provides guidelines for operations and maintenance maximum allowable durations in those areas.

C.5.1.5.17 Site Plot Plan

This is a scale drawing that shows the location of facilities and major equipment on the site. It includes existing site features.

C.5.1.5.18 Stormwater Drainage Drawing

Stormwater drainage is a topographical representation of the site design. It shall depict structures, systems, and components and grading used to direct or remove storm water from the site around the Contractor's facility. It shall show the direction of drainage, the method used and tie-in points to existing system, as applicable.

C.5.1.5.19 System Design Description

This is a complete, detailed description of the system. It shall include information from the process description plus a complete description of all equipment and instrumentation in the system.

C.5.1.6 Project Management Documentation Requirements

The following planning documents may be prepared and submitted individually or they may be combined, as deemed appropriate by the Contractor, provided the that the content meets the requirements specified.

C.5.1.6.1 Project Management Plan

A Project Management Plan (PMP) shall be prepared to describe the management approach, organizational structure (including resumes of the project management team and discipline leads), methodologies, practices, and implementing procedures for this project. The PMP shall clearly delineate and support project management interface requirements between the Contractor and FDF including progress reviews, design reviews, monthly status review meetings, and quarterly project review meetings. The PMP shall address how the Contractor will perform the work within the established schedule. The PMP shall be updated and maintained in accordance with the Contractor's internal procedures.

C.5.1.6.2 Engineering Management Plan

An Engineering Management Plan shall be prepared to describe the engineering procedures necessary to produce, review, and issue contract documents in conformance with the functional requirements of this project. The plan shall cover training, drawings, specifications, calculations, procedures, design reviews and checking, and computer code verification and validation.

C.5.1.6.3 Configuration Management Plan

A Configuration Management Plan shall be prepared to describe the approach to establishing and maintaining the project baseline (technical, cost, and schedule). The project baseline shall be established upon completion of the preliminary design. Once established, all documents that define the project baseline shall be governed by the approved change control procedures. Controlled copies of these documents shall be maintained throughout the project's life cycle, beginning with the initial baseline document and including all approved changes via controlled revisions of the originals.

Prior to becoming part of the baseline, documents shall be maintained as letter revisions. Upon becoming a controlled document, it shall be released as revision 0 (zero) and all subsequent changes shall be maintained as number revisions. The change control procedure shall use a graded approach to reviewing and approving changes, depending on the magnitude of the impact.

The Configuration Management element is defined in the FDF Site Procedure in Attachment J.4.78.

C.5.1.6.4 Records Management and Document Control Plan

The Contractor shall prepare a Records Management Plan which identifies the program to control preparation, review, approval, issuance, use, revisions and storage of documents that establish policy, prescribe work, specify requirements, and or establish design. The scope of the Records Management Plan shall include technical, environmental, health and safety, operations and project control identified documents for the project. Where requirements can not be included, these shall be addressed in the Records Management Plan and include the document which provides control will be identified. A matrix of documents shall be developed and maintained to provide title and numerical identification, status, and revision.

C.5.1.6.5 Procurement Management Plan

The Contractor shall provide a Procurement Management Plan which establishes and insures that purchased items and services meet established requirements and perform as specified. Included in the plan shall be a matrix of key procurements. The matrix shall be maintained and will identify the items/services purchased, system identification, specification or design code requirements, vendor name, inspection/test acceptance plan identification requirements, whether source or receipt inspection is required, date inspection will be performed, and status of the inspection/test.

C.5.2 Site Preparation

This section contains the technical requirements for site preparation activities as defined in Section C.3.2.2.2 and lists the required submittals. These technical requirements also apply during facility construction.

C.5.2.1 Technical Requirements for Site Preparation

This section includes the following components:

- Lay out of work;
- Identification and relocation of utilities;
- Site clearing;
- Fencing;
- Paving and surfacing;
- Utilities;
- Erosion control; and
- Dust suppression.

C.5.2.1.1 Lay Out of Work

The construction and the work rights-of-way shall be staked out and dimensions relating to the interconnection with existing features shall be verified. Two site concrete benchmarks are provided to locate the Contractor's site and facilities:

- Monument 101 - Northing 480160, Easting 1347155, Elevation 564.20 feet; and
- Monument 102 - Northing 480335, Easting 1347840, Elevation 576.07 feet.

Other survey markers, along with the x and y coordinates and elevations, are provided on the Project Area Topographic Plan provided in Attachment J.4.90. Coordinates for survey monuments 101 and 102 will be established for horizontal and vertical control by FDF prior to construction. Any inconsistencies in the dimensions of the existing site features or utility locations shall be communicated to the FDF Technical Representative for review and resolution prior to commencing work.

The location of the existing underground services and utilities as indicated in Figure C.5-1 are approximate and must be field verified. Connections to services and utilities located within five feet horizontally and two feet vertically of the location shown on the drawings shall be considered to be within the scope of the project. Underground services and utilities located more than five feet horizontally and two feet vertically from the location indicated on the drawings may be considered as a "changed condition" by the Contractor and work incident thereto shall be performed in accordance with Section H.38 provisions for differing site conditions in order for the Contractor to receive compensation.

C.5.2.1.2 Identification and Relocation of Utilities

The Contractor shall be responsible for preparing drawing packages using Contractor design drawings and FDF provided underground utility drawings (latest revisions) to support the Contractor in obtaining penetration permits under the FEMP penetration permitting program. Permits are obtained for specific scopes of work in clearly defined work areas. FDF will provide a competent person for 100 percent supervision during the penetration activities. The Contractor shall provide daily briefing prior to starting excavation and penetration activities.

The Contractor shall verify the exact location of buried utilities, cable, pipes, and wire before excavation in the area of work. Location of known existing utilities will be clearly identified in the field by FDF using flags or spray paint as a requirement of the penetration permit. Hand excavation may be required to locate energized lines.

A Service Interruption Permit is required to de-energize live utilities when the penetration activity is within three feet of the outer most edge of the live utility or three feet below the approved depth of penetration. The Contractor shall repair any underground utilities damaged by the Contractor during execution of the work at no cost to FDF. Active utilities, which do not interfere with the work, shall be supported and protected from damage. After obtaining FDF approval, the Contractor shall relocate or remove active utilities that interfere with work.

The Contractor shall provide complete red-line as-built drawings to FDF after the completion of tie-in or excavation activities associated with each penetration permit so that this information can be added to the FEMP Site Utilities drawing database.

C.5.2.1.3 Site Clearing

Site clearing shall include the removal and disposal of large debris that protrude, encroach upon, or otherwise obstruct the work. Loose rocks, boulders, or rock piles present on the surface of the areas designated to be cleared shall be distributed and incorporated into the filling operation. Areas to be cleared shall be clearly marked, and the Contractor shall obtain an excavation/penetration permit in accordance with Section J.3.3.1.29 and the FDF Technical Representative's approval prior to beginning clearing. The remediation facility shall be arranged to reduce the amount of clearing required.

C.5.2.1.3.1 Soil

Topsoil shall be removed and stockpiled for reuse where possible. Soil for reuse must not be stockpiled for more than 30 days. If it cannot be removed within that timeframe, FDF shall be notified and a construction fence shall be placed around the pile by the Contractor. Material that cannot be reused shall be disposed in accordance with the procedures for construction waste presented as Attachment J.4.3.

All excavation, handling, and movement of soil must be in compliance with EW-1019, "Management of At- or Below-Grade Debris," (Attachment J.4.99). If any soil is excavated as a result of this project, it must either be placed back in the same location from which it was removed or be transported to an existing site soil pile. If excess soil is anticipated, the Contractor shall notify FDF of the location of the area of excavation prior to excavation so that data from the Site Environmental Database can be pulled and krieged to determine what, if any, constituents of concern have been identified in the area of excavation, and whether or not the levels of the constituents of concern meet or exceed the Final Remediation Limits, the On-site Disposal Facility (OSDF) WAC, or the Silo 3 WAC. Based upon this data FDF will direct the Contractor on the proper disposition location.

C.5.2.1.3.2 Underground Debris

If debris is encountered underground during excavation activities at the FEMP, the Contractor shall notify FDF immediately. FDF will direct the Contractor on the appropriate disposition. FDF will arrange for the delivery of containers as needed and the initiation of characterization and the completion of task orders for movement. FDF will be responsible for the packaging and disposal of this unplanned debris in accordance with state of Ohio laws pertaining to construction waste and debris.

C.5.2.1.4 Fencing

Snow fence shall be four feet high and orange for construction fencing or yellow for radiological boundaries. Fencing material shall be secured and made of high density polyethylene.

Snow fence posts shall be No. 5 rebar with orange plastic protective end caps spaced no more than eight feet apart with electric tie-wraps to secure fencing.

C.5.2.1.5 Paving and Surfacing

The following list identifies the requirements for paving and surfacing:

- All paving and surfacing methods, materials, design, and details shall conform to ODOT standards;

- American Association of State Highway Transportation Officials; (AASHTOs) *A Policy on Geometric Design of Highways and Streets* ,1990 (GDHS-90), will be used as a reference in site lay out; and

- Unless conditions dictate otherwise, the minimum slope shall be 0.5 percent.

C.5.2.1.6 Utilities

The following list identifies requirements for utilities:

- Tie-in points for sanitary sewer, process water (designated as treated water), fire water, and electric power are identified on Figures C.5-1 and C.5-2;

- Communication and electricity shall be run aboveground. Other utilities shall be run underground;

- Design requirements are specified in Section C.5.3.1.6; and

- The Contractor shall install backflow preventers on domestic water lines at the tie-in

point to the FDF lines and wherever a potable water branch line is connected to the domestic water line. Access to the backflow preventers shall be provided to the site water purveyor.

C.5.2.1.7 Erosion Control

Appropriate permanent or temporary measures shall be implemented by the Contractor to prevent erosion due to run-on and run-off, and control sediment during site preparation and construction. Erosion and siltation controls shall be maintained in effective operating condition during site preparation and construction. Exposed soils and fill material shall be permanently stabilized at the earliest possible date.

ODOT standards for control measures shall be specified. Erosion control shall be consistent with the Rainwater and Land Development, Ohio's Standards for Stormwater Management, Land Development, and Urban Stream Protection, Second Edition, ODNR, Division of Soil and Water Conservation, Columbus, Ohio, 1996 (Formerly U.S. Department of Agriculture-Soil Conservation Service, Water Management and Sediment Control in Urbanizing Areas, U.S. Department of Agriculture, Soil Conservation Service, Washington, D.C., 1987), and the FDF SWPPP (Attachment J.4.59).

Erosion control features shall be in place prior to any disturbance of the soil in the work area. Erosion/sediment control measures shall be maintained throughout the duration of the Contractor's work.

C.5.2.1.8 Dust Suppression

All site preparation or construction activities that are the responsibility of the Contractor shall be conducted in accordance with this section.

Figure C.5-1 Site Plan Interface Drawing Existing Utilities

Figure C.5-2

All areas undergoing site preparation or construction, including excavations, access roads, processing areas, and staging areas for material or waste for transportation, and all other areas within the work area shall be maintained to minimize the creation and dispersion of dust in accordance with OAC 3745-17-07 and OAC 3745-17-08. If trucks are used to transport any excavated or borrow material during site preparation or construction, they shall be equipped with covers or some other means to control dust from the cargo (Attachment J.4.1, ARARs).

In general, water or other substances used for dust suppression shall not increase the concentration of contamination in the area where the water is being applied. Dust suppressants shall be applied in accordance with the procedures for dust control described in the Contractor's Pre-operational Environmental Control Plan (Section C.5.2.2.2).

C.5.2.2 Submittals

Refer to Figure C.4-2, Deliverables/Submittals Requirements Form. The following components are discussed in this section:

- Site Preparation Package;
- Pre-operational Environmental Control Plan; and
- Project-Specific Health and Safety Plan.

C.5.2.2.1 Site Preparation Package

The Site Preparation Package shall contain, but not be limited to, the items listed below. This package shall be submitted to FDF for review and concurrence at approximately the 50 percent completion level (FDF reserves the right to obtain an independent review). The package shall have sufficient detail to clearly describe all concepts that will be further detailed for a 100 percent review.

The 100 percent design review package, where essentially all engineering is completed and the design package is in the final review by the Contractor, shall be submitted to FDF. FDF will review and comment on the 100 percent review package for compliance with contract and site requirements.

The Site Preparation Package shall contain the following:

- Description of the work;
- Site plan;
- Foundation/containment plan and details;
- Grading plan (including any additional storm sewers);
- Associated profiles and details;
- Specifications;
- Manufacturers' fabrication drawings of portable structures; and
- Utility plans for portable structures.

C.5.2.2.2 Pre-operational Environmental Control Plan

The Pre-operational Environmental Control Plan, submitted by the Contractor, shall describe the methods and materials that the Contractor shall use during site preparation and construction to control erosion, dust, and stormwater to minimize the impact of these activities on the environment. The Contractor shall provide the following:

- Erosion Control - Description of the methods and materials to be used to prevent erosion of soil either by wind or surface water in the process or project work area to reduce sediment loading in the stormwater. Included in the description shall be a drawing showing the location of the erosion control features, along with estimates of the amount of run-on and run-off in the work area. Refer to Section C.5.2.1.9 for additional information on erosion control.

- Dust Control - Description of the methods and materials to be used to suppress and minimize the creation and dispersion of dust (Section C.5.2.1.8).

- Stormwater Control - Description of the methods, materials, and existing site features to be used to capture and control stormwater (Section C.5.1.1.3.2).

- Waste Management - Description of the methods to be used to manage waste and debris generated during site preparation and construction. Management includes waste characterization and segregation. The approach to waste management shall be based on a philosophy of waste minimization, recycling, and environmental ALARA to the extent practicable.

C.5.2.2.3 Project-Specific Health and Safety Plan (PSHSP)

Requirements for the PSHSP are stated in Section J.3.3.

C.5.3 Facility Construction

This section contains the technical requirements for construction of the Contractor's remediation facility as defined in Section C.3.2.2.3. The Contractor shall conform to all applicable codes and standards for design and construction of all facilities. The Contractor shall request and adequately justify in writing any deviation from those codes and standards or concepts that present health or safety risks to workers or the general population, and obtain written approval from the FDF Technical Representative prior to implementation. Changes implemented during facility construction shall be managed in accordance with the Contractor's approved Configuration Management Plan.

C.5.3.1 Technical Requirements for Construction

C.5.3.1.1 Mechanical

Mechanical components and systems, including piping shall be designed, tested, installed, and labeled in accordance with industrial codes and standards, as applicable. The Contractor's piping stress analysis information shall be incorporated into pipe support design.

The service classification and specifications shall be clearly identified in the preliminary design package and in the Construction Acceptance Test (CAT) Plan.

The Contractor shall have and maintain an approved Welding Program to ensure only qualified welders are performing welding activities and welders certification and qualification records are maintained. The Contractor shall submit its Welding Program to FDF for approval.

The Contractor rigging shall be in compliance with the DOE Hoisting and Rigging Manual (Section J.3.3.1.23.1).

C.5.3.1.2 Conveyors and Material Transferring Equipment

Conveyor and material transfer components and systems shall be designed, tested, and installed in accordance with the Conveyor Equipment Manufacturers Association (CEMA) codes and standards as applicable.

C.5.3.1.3 Electrical

Electrical components and systems shall be designed, tested, and installed in accordance with the applicable sections of the following codes and standards:

- National Electrical Code (NEC);
- ANSI;
- Underwriters Laboratories, Inc. (UL);
- NFPA;
- National Electrical Manufacturers Association (NEMA);
- National Electrical Testing Association (NETA); and
- ISA.

In addition to any electrical receptacles/services required by the Contractor to perform its operation, the Contractor shall provide five 120v/20amp double duplex, ground fault circuit interrupter (GFCI) power outlets with weather-resistant covers to provide power for radiological monitors operated by FDF. The actual location of these receptacles shall be identified based on the Contractor's preliminary design.

Adequate electrical power shall be provided for the operation of all electrical components, emissions monitoring equipment, and all items requiring electrical power. Motors over 100 kW shall have efficiency of 90 percent or higher.

C.5.3.1.4 Concrete Foundations, Floors, Pads, and Ramps

Concrete work shall be designed and constructed according to applicable American Concrete Institute (ACI) codes, including: ACI 301 for Structural Concrete for Buildings; ACI 318 for Building Code Requirements for Reinforced Concrete; ACI 347 for Recommended Practice for Concrete Formwork; ASTM; and Concrete Reinforcing Steel Institute (CRSI) codes. Concrete testing and cement selection shall be done in accordance with ACI and ASTM codes. Sampling and testing of the concrete shall be performed by an independent laboratory and paid for by the Contractor.

The Contractor and any subcontractors shall use fly ash or slag in concrete work performed on this project. Figure C.5-3 provides national specifications for cement and concrete containing recovered materials that were recommended in 1995.

The Contractor and any subcontractors shall verify whether the above specifications are current (or up to date) prior to their use. In addition, performance standards and mix design may also impact the extent to which fly ash or slag is used.

If the Contractor or subcontractor determines the use of fly ash or slag in concrete is technically inappropriate, it must justify in writing the reasons for the technical inappropriateness. The written determination must also include whether the purchase of these items was excluded because of unavailability or price considerations. This determination must be provided by the Contractor to the FDF Contract Administrator for approval prior to use of the alternative cement or concrete materials. The FDF Contract Administrator will provide written approval of the use of the alternative cement or concrete material within five business days of receipt of the Contractor's determination.

C.5.3.1.5 Buildings

Permanent or temporary structures shall be designed, constructed, and/or assembled according to all applicable codes and standards including the Uniform Building Code (UBC), Ohio Basic Building Code (OBBC), American Institute of Steel Construction (AISC), American Welding Society (AWS), ASTM, ANSI, and ACI codes (ACI 301, Structural Concrete for Buildings; ACI 302, "Guide for Concrete Floor and Slab Construction; and ACI 318 - Building Code Requirements for Reinforced Concrete). Material testing and construction shall be done in accordance with the above codes.

C.5.3.1.6 Utilities

Tie-in points for utility services are identified in Figure C.5-1. Utilities shall be protected and have concrete or steel supports. Utilities shall be designed and constructed to applicable codes and engineering standards, such as ASTM, ANSI, ASME, American Water Works Association (AWWA), AWS, NFPA, National Fuel Code (NFC), OBBC, and NEMA.

Figure C.5-3 Recommended Specifications for Cement and Concrete Containing Recovered Materials

Cement Specifications	Concrete Specifications
ASTM C 595, "Standard Specification for Blended Hydraulic Cements." ASTM C 150, "Standard Specification for Portland Cement." AASHTO M 240, "Blended Hydraulic Cements."	ASTM C 618, "Standard Specification for Fly Ash and Raw or Calcined Natural Pozzolan for Use as a Mineral Admixture in Portland Cement Concrete." ASTM C 311, "Standard Methods of Sampling and Testing Fly Ash and Natural Pozzolans for Use as a Mineral Admixture in Portland Cement Concrete." ASTM C 989, "Ground Granulated Blast-Furnace Slag for Use in Concrete Mortars." AASHTO M 302, "Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars." American Concrete Institute Standard Practice ACI 226.R1, " Ground Granulated Blast-Furnace Slag as a Cementitious Constituent in Concrete."

C.5.3.1.7 Heating, Ventilation, and Air Conditioning (HVAC)

HVAC systems shall be designed, tested, and installed in accordance with applicable requirements of Sheet Metal and Air Conditioning Contractors National Association (SMACNA), UL 778 - Motor Operated Water Pumps, NFPA 70 - National Electrical Code, ASTM, ASME, ANSI, and the American Society of Heating, Refrigeration, and Air Conditioning Engineers (ASHRAE)-1989, Handbook of Fundamentals.

C.5.3.1.8 Fuel Storage/Dispensing Facilities and Fuel Oil/Diesel

Fuel storage tanks and lines shall be designed, tested, and installed according to the ASME, American Petroleum Institute (API), NFC, and ASTM requirements. Fuel storage/dispensing facilities shall also meet applicable U.S. EPA and NFPA requirements. The Contractor shall arrange for fuel deliveries. The fuel loading system shall be designed such that fuel vendors do not enter a contamination zone to deliver and off-load fuels. See Section H.27 for additional requirements for notification of fuel storage tanks.

C.5.3.1.9 Steel Construction

Steel components shall be designed, tested, and installed in accordance with the applicable sections of the American Iron and Steel Institute (AISI), ASTM, AISC, American Society of Civil Engineers (ASCE), and AWS.

C.5.3.1.10 Erosion Control

Refer to Section C.5.2.1.7.

C.5.3.1.11 Dust Suppression

Refer to Section C.5.2.1.8.

C.5.3.1.12 Equipment and Piping Labeling

The Contractor shall label all equipment and piping in accordance with FEMP Site Procedure No. ED-12-4016, Equipment and Piping Labeling (Attachment J.4.39). The label identification shall also be in compliance with CONOPs requirements.

C.5.3.2 Construction Acceptance Testing (CAT)

A CAT Plan shall be developed by the Contractor and submitted for FDF approval to verify that elements of an item/activity/system are in compliance with the standards, codes, and specifications contained within the Preliminary Design Package (Figure C.4-1, Submittal Register).

CAT requirements should be standard, and may include, but not be limited to, hydrostatic, pneumatic, flow, electrical, ventilation, mechanical, functional, load, water quality, nondestructive and run-in test. Quality records of the testing shall be maintained in the project files, by system. Attachments J.4.67 through J.4.72 present reference samples of these forms.

C.5.3.2.1 Punchlist/Construction Turnover

The Contractor shall perform formal walkdowns and generate a punchlist in relation to the completion of the construction work, identify and list items to be completed in a timely manner, and identify when the control of the work will be turned over to operations. The punchlist walkdowns shall be performed as a joint effort between the Contractor and FDF's representatives. Completion of the punchlist is to ensure the facility is installed as designed, red-line information is incorporated into final drawings for operations (as-builts), equipment technical documents are available for maintenance, and ensure close-out of the construction phase. No equipment shall be operated during punchlisting. The punchlist shall identify any safety concerns which may affect operations and maintenance by FDF personnel.

The Contractor shall provide a schedule to FDF for completion of punchlist items and plan for turnover of system(s) to operations. In accordance with Section C.8.3.2 FAT&LC Workforce staffing, the Contractor shall notify FDF 30 days in advance of the need of the personnel.

C.5.3.3 Construction Submittals

C.5.3.3.1 Construction Safe Work Plan

The Contractor's Safe Work Plan shall be specific to the activities to be performed under this contract. The Safe Work Plan shall be prepared in accordance with ACR-002 (Attachment J.4.49).

C.5.3.3.2 Pre-operational Environmental Control Plan

For the construction phase of work, the Contractor shall implement the Pre-operational Environmental Control Plan prepared prior to Site Preparation (Section C.5.2.2.2).

C.5.3.3.3 Pre-Operational Health and Safety Plan

For the construction phase of work, the Contractor shall use the same PSHSP discussed in Section C.5.2.2.3.

C.5.4 Start-Up Preparations

This section includes the following technical requirements for start-up preparations and pre-operational programmatic submittals.

This section contains the technical requirements for start-up preparations to be performed by the Contractor in Section C.3.2.2.4.

- CONOPs;
- Procedures;
- Operator Training; and
- SOT.

C.5.4.1 Technical Requirements for Start-Up Preparations

The Contractor shall provide training of the Contractor's workforce including GCBCTC and FAT&LC personnel, develop operating and SOT procedures, conduct SOT, and prepare/participate in a PA prior to start-up of the Contractor's operation.

The chapters of DOE Order 5480.19, Conduct of Operations Requirements for DOE Facilities, that apply to each of the Contractor's major process operations at the FEMP, as interpreted by FDF are presented in Table C.5-2, CONOPs Applicability Matrix. The

Contractor may develop another interpretation of the Applicability Matrix based on their proposed operation. However, any modifications must be reviewed and approved by FDF. The Contractor shall justify which sections of the DOE Order do not apply.

C.5.4.1.1 Procedures

Procedures shall be developed and submitted to FDF for review and approval to implement the requirements of DOE Order 5480.19, with the emphasis on the safe operation of the facilities and systems based upon the complexities and hazards to be encountered. Safe operation shall protect personnel, the environment, and equipment.

The Contractor's program related to CONOPs, Chapters 6 and 7, Investigations and Notifications, has special requirements. The Contractor shall notify FDF's Facility Owner, who will then notify the FDF Assistant Emergency Duty Officer (AEDO) of any occurrences requiring notification per DOE Order 232.1, Occurrence Reporting and Processing of Operations Information, which includes occurrences involving an off-normal event, such as spills or other accidental releases to the environment, fires, explosions, and personnel injuries or contamination. The Contractor shall participate and cooperate in any required investigations of occurrences (Section J.3.4.6.2). The Contractor shall also be required to implement the FEMP Lock and Tag Program (Attachment J.4.76). A substitute lock and tag program may not be utilized by the Contractor.

All operations shall be conducted in accordance with approved operating procedures. Guidance for developing these operating procedures can be obtained from the FDF CONOPs Program, RM-0029, Chapter 16 (Attachment J.4.34); and the DOE-STD-1029-92, DOE Standard Writers Guide for Technical Procedures.

C.5.4.1.2 Training

The Contractor shall be responsible for providing the necessary training to the labor force (i.e., Contractor's personnel, FAT&LC, GCBCTC) and shall maintain a trained labor force throughout the performance of the contract. FDF will provide training facilities, instructors, materials, and recordkeeping for the site access training under this contract. (refer to Section J.3.3.3).

C.5.4.1.2.1 Operator Training Program

Training will be conducted under the FDF Training Program.

The Contractor shall provide operations training per 29 CFR Part 1910 and 29 CFR Part 1926, as applicable, to the Contractor and FAT&LC personnel. FDF will provide the facilities and recordkeeping for this training. An FDF training instructor will also be provided to assist the Contractor in conducting operations training.

The Operator Training Program shall be comprehensive and designed to show a level of comprehension commensurate with job duties and responsibilities. It shall delineate all project personnel and include a description of project personnel's titles, personnel duties

and associated training requirements, training requirement objectives, and training courses (which may include individual lecture/on-job-training sessions, training manuals, audio-visual aids, and other course materials).

C.5.4.1.2.1.1 Training Program Contents

The Contractor shall provide the following information in the Operator Training Program in accordance with DOE Order 5480.20A:

- Identification and definition of the performance-based training goals and how those goals will be achieved; what will constitute satisfactory student training performance and comprehension; and the specific interval, or requalification period, for student retraining and certification;

- A comprehensive list of all operator labor classifications, and the minimum requirements and standards necessary for an operator to successfully qualify and maintain qualification in that labor classification;

- Training program objectives, including minimum operator standards that clearly define training goals and how those goals will be achieved shall be described;

- Learning objectives to specify measurable behavior that a student should be able to demonstrate following completion of training;

- Training aids to include all training course manuals, outlines, handouts, audio-visual aids, and equipment;

- References - Source documents for all aspects of the Operator Training Program; and

- For scheduling purposes, the Contractor shall identify the total numbers of students, by job description or job classification, anticipated to be trained annually, and throughout the active term of this contract. Further, the Contractor shall identify what constitutes a minimum number of students for each training course to be taught.

C.5.4.1.2.1.2 Lesson Plans

From the Operator Training Program, the Contractor shall develop and prepare individual lesson plans. A lesson plan is a narrative description of a particular course lecture/on-job-training session. Lesson plans serve to demonstrate detailed information about course curricula and training methods. At a minimum, each lesson plan shall consist of Lesson Outline, Course Objectives, Enabling Objectives, and Terminal Objectives.

The lesson plans shall describe how the instructor will achieve all course lecture/on-the-job-training session objectives, and include all equipment, training aids, handouts, and references.

Table C.5-2 CONOPs Applicability Matrix

Chapter	Chapter Title - Summary	Waste Retrieval	Waste Process	Packaging and Staging
1	Operation Organization and Administration - Discusses policies, resources, monitoring, and accountability needed in operations.	Y	Y	Y
2	Shift Routines and Operating Practices - Describes some important aspects of routine shift activities and watch standing practices.	Y	Y	Y
3	Control Area Activities - Addresses important elements of control area activities that are necessary to support safe and efficient facility operation.	Y	Y	Y
4	Communications - Describes important aspects of plant program for audible communications.	Y	Y	Y
5	Control of On-Shift Training[a] - Guidelines related to control of training activities by operations personnel.	Y	Y	Y
6	Investigation of Abnormal Events[b] - Covers important aspects of abnormal events investigation program.	N	N	N
7	Notifications[c] - Provides guidelines to ensure uniformity, efficiency, and thoroughness of notifications to support fulfillment of DOE requirements consistent with DOE Order 151.1.	N[c]	N[c]	N[c]
8	Control of Equipment and System Status - Provides an overall perspective on control of equipment and system status.	Y	Y	Y
9	Lockouts and Tagouts - Describes important elements of a Lockout/Tagout Program and is intended to meet requirements of 29 CFR Part 1910.	Y	Y	Y
10	Independent Verification - Describes important aspects of an independent verification program.	Y	Y	Y
11	Logkeeping - Describes features needed in the operation logs to ensure they are properly maintained.	Y	Y	Y

Table C.5-2 CONOPs Applicability Matrix

Chapter	Chapter Title - Summary	Waste Retrieval	Waste Process	Packaging and Staging
12	Operations Turnover - Compliments guidelines of Chapter 2, Shift Routines and Operating Procedures, and Chapter 3, Control Area Activities, and describes important aspects of a good shift turnover.	Y	Y	Y
13	Operations Aspects of Facility Chemistry and Unique Processes - Describes important aspects of operations involvement in chemistry and unique processes.	Y	Y	N
14	Required Reading - Describes an effective required-reading program.	Y	Y	Y
15	Timely Orders to Operators - Describes key features of an effective operator orders program.	Y	Y	Y
16	Operations Procedures - Describes important aspects of operations procedure development and use.	Y	Y	Y
17	Operator Aid Postings - Describes important aspects of an operator aid program.	Y	Y	Y
18	Equipment and Piping Labeling - Describes important aspects of a labeling program.	Y	Y	Y[d]

Y = Chapter applicable to subdivision category.
N = Chapter not applicable to subdivision category.
a = Contractor shall develop an initial training plan, lesson plans, and training plan for all job classifications. The Contractor shall develop an on-the-job training program for employee job classification changes or new employees.
b = Contractor not responsible for investigations, but is expected to cooperate fully with investigations.
c = Contractor not responsible for direct notifications to the AEDO, but is expected to comply fully with FEMP site procedure notification reporting requirements.
d = Labeling applies to containers and interim staging area.

C.5.4.1.3 System Start-up and System Operability Testing

SOT, by systems, shall be provided by the Contractor in accordance with the following requirements:

! CAT must be completed prior to initiation of SOT.

! SOT procedures shall be written by the Contractor and given to FDF through the submittal process for review and comments. This cycle will continue until acceptance by FDF.

! SOT procedures shall be formatted per requirements of Attachment J.4.32 (RM-0034) of this contract.

! The Contractor shall provide an administrative control process to revise SOT procedures.

! SOT shall ensure that the following is completed, as a minimum requirement:

- Performance of the integrated systems meets design performance requirements;
- Optimum operating performance of the integrated systems are met; and
- Any problems that may adversely affect operational reliability of the system have been identified and corrective actions taken.

Attachments J.4.31 and J.4.32 contain the FDF Engineering procedure and guidance for systems operability procedure and guidance for SOT. These documents are provided as an example of the requirements to be addressed in SOT procedures.

C.5.4.2 Request for Pre-operational Assessment

Upon the completion of start-up preparations, the Contractor shall submit a written request to FDF to perform a PA in accordance with Section C.5.5.

C.5.5 Pre-operational Assessment Process

The primary management tool used by FDF to determine the Contractor's readiness is the PA process outlined in RM-0025 (Attachment J.4.95). The type of review required for this project will be determined based on the approved hazard category (HC) of the Contractor's facility. The assessment will be either an Operational Readiness Review (ORR), Readiness Assessment, or a Standard Start-up Review (SSR).

The SSR is the minimum assessment required. If the operation is determined to be a HC-3 operation, an ORR shall be required. Because Silo 3 is currently identified as a HC-3 facility, it is expected that an ORR shall be required for the Contractor's retrieval activities.

Different levels of assessment may be required for remaining segments of the Contractor's operation depending upon the approved hazard category. If the operation is determined to be a radiological operation at the minimum, a Readiness Assessment shall be required. An SSR is required for operations that are determined to be other industrial hazards. The Contractor shall base the level of assessment for each of the identified segments of operation on the HC for those segments. These assessments are outlined in RM-0025.

C.5.5.1 Activities Requiring a Pre-operational Assessment

The following Contractor activities will be assessed, and subsequent Start-up Approval from FDF and DOE will be required, before the Contractor can commence operation, such as:

- Retrieval and transfer of any material from Silo 3 (ORR required);
- Operation of treatment facility; and
- Loading of treated waste into containers and interim staging of containers.

The Contractor may propose to conduct the assessment of these activities in a single PA or as multiple PA's reflecting the segmentation and hazard category delineation of the facilities and activities. Final approval of the PA approach will be with FDF.

C.5.5.2 Ready to Operate

The PA will start when the Contractor formally declares to FDF in writing that the system(s) are ready to operate and all of the supporting documentation is complete. The Contractor shall inform FDF of its intent to undergo a PA on any of the activities at least 60 calendar days prior to the formal declaration. The Contractor shall provide the FDF Technical Representative with a "Ready to Operate" (RTO) letter which shall specifically state which of the activities are ready to operate. The Contractor's readiness will be evaluated against the following Core Requirements (CR) from DOE Order 425.1:

- (CR 1) There are adequate and correct procedures and safety limits for operating the process systems and utility systems;

- (CR 2) Training and qualifications programs for operations and operations support personnel have been established, documented, and implemented (the training and qualification program encompasses the range of duties and activities required to be performed);

- (CR 3) Level of knowledge of operations and operations support personnel is adequate to support safe operations;

- (CR 4) Facility safety documentation is in place that describes the "safety envelope" of the facility. The safety documentation should characterize the hazards/risks associated with the facility and should identify mitigating measures (systems, procedures, administrative control, etc.) that protect workers and the public from those hazards/risks. Safety systems and systems essential to worker and public safety are defined and a

system to maintain control over the design and modification of facilities and safety-related utility systems is established;

- (CR 6) A process has been established to identify, evaluate, and resolve deficiencies and recommendations made by oversight groups, official review teams, audit organizations, and the operating Contractor;

- (CR 8) Management programs are established, sufficient numbers of qualified personnel are provided, and adequate facilities and equipment are available to ensure operational support services (e.g., training, maintenance, waste management, environmental protection, industrial safety and hygiene, radiological protection and health physics, emergency preparedness, fire protection, quality assurance, criticality safety, and engineering) are adequate for operations;

- (CR 10) An adequate start-up or restart test program has been developed that includes adequate plans for graded operations testing to simultaneously confirm operability of equipment, the viability of procedures, and the training of operators;

- (CR 11) Functions, assignments, responsibilities, and reporting relationships are clearly defined, understood, and effectively implemented with line management responsible for control of safety;

- (CR 12) The implementation status for the project Operations program is adequate for operations;

- (CR 13) There is a sufficient number of qualified personnel to support safe operations;

- (CR 14) A program is established to promote a culture in which project personnel exhibit an awareness of public and worker safety, health, and environmental protection requirements and, through their actions, demonstrate a high priority commitment to comply with these requirements; and

- (CR 19) The technical and management qualifications of Contractor personnel responsible for facility operations are adequate.

C.5.5.3 Contractor's Specific Requirements to Support the PA(s)

The following are specific requirements for time and/or services the Contractor shall supply to support the PA:

- Provide controlled copies of all requested project documentation as requested by the PA Team including design calculations; engineering drawings of facilities; and related design documents (e.g., project plans, operating procedures, procedures related to the project, training records and plans, and equipment specifications and vendor technical reference manuals);

- Provide a central Contractor point of contact to coordinate between the Contractor and PA Team to facilitate obtaining additional documents for review and to coordinate interviews with Contractor personnel;

- Provide personnel as requested by the PA Team for interviews about the project, including operations, maintenance, and design and support personnel;

- Schedule ten (10) days for conducting an SSR;

- Schedule approximately twenty (20) working days for conduct of a Readiness Assessment (time from start of FDF-DOE assessment until completion of Readiness Assessment); and

- Schedule forty (40) working days for conducting an ORR which includes review by FDF and subsequent review by DOE.

C.5.5.4 Start-up Approval Authority

Start-up approval authority for this project will be given by FDF upon verification that all pertinent requirements and regulations have been met. This verification takes place through the PA process previously described. The Contractor may not commence the activities/operations described above until receipt, in writing, of Authorization to Operate from FDF.

C.5.5.5 PA Deficiencies

The Contractor shall correct deficiencies noted by the PA Team prior to the indicated milestone (typically prior to starting operations for 'prestart' findings). If, during the conduct of the PA, FDF determines that the condition of readiness of the project is such that further conduct of the PA is impeded, FDF will notify the Contractor in writing, explaining the impedance, and additional time will be allowed for further project preparation prior to the Contractor declaring Readiness to Operate again. Once all required deficiencies have been corrected to the satisfaction of both FDF and the Contractor, the Contractor shall send a "Readiness to Proceed" letter to FDF. FDF will send the Contractor a "Start-up Approval" letter after FDF has completed review of PA report and associated corrective action documentation, and FDF has received approval from the DOE Start-up Approval authority.

C.5.5.6 PA in Eventuality of a Project Restart

If a project operation(s), once started, is shut down due to operational problems, health/safety issues, regulatory mandate (i.e., DOE or EPA), a PA may be required prior to restarting operations on the project (Section C.6.2.15). Should a restart PA be required, the process shall be the same as described herein for the initial PA, DOE Order 425.1.

C.5.6 Lessons Learned

Throughout the duration of the project, the Contractor shall support FDF in its implementation of the Lessons Learned Program for the Silo 3 Project. FDF is interested in documenting positive and negative lessons learned, as well as opportunities for improvement, so that the various approaches taken, results achieved, and issues which remain can be shared to benefit other DOE sites. The Contractor shall discuss lessons learned as they arise at its weekly meetings with FDF and record them in the meeting minutes per Section C.4.8.2.

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