PLUTONIUM DISPOSITION PROJECT (U)

Project M09A

SCOPE OF WORK

M-SOW-K-00011 Revision 0

for

Vitrification System (U)

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1.0 SCOPE

1.1 General Description

This Scope of Work (SOW) Covers the Vitrification System for the Plutonium Disposition Project. The Vitrification System receives a finely mixed powder of glass frit and plutonium oxide in transport hoppers from the Milling & Mixing System. In the Vitrification system the plutonium oxide/LaBS frit mixture is vitrified using a Cylindrical Induction Melter (CIM) and poured into Vit cans. The CIM consists of an induction heated Platinum/Rhodium (Pt/Rh) vessel. Ten CIM melter units will be required to obtain the throughput requirement. The output from Vitrification is Vit cans containing 10 kg of vitrified plutonium oxide/LaBS glass which are sent to the Bagless Transfer System.

1.2 Background

The Office of Environmental Management has approximately 13 metric tons (MT) of plutonium in approximately 21 MT of bulk materials without any defined disposition path. The Plutonium Disposition (PUD) Project is critical to meet the Department of Energy's strategic goal of providing a responsible resolution to the permanent disposal of the nation's excess high-level radioactive materials and waste; and to enable the cleanup of Environmental Management sites.

The Plutonium Disposition Facility (PDF) will be located at the K-Area Complex (KAC) to disposition up to approximately 13 Metric Tons (MT) of Environmental Management (EM) owned surplus plutonium. The facility will utilize a vitrification process to vitrify plutonium into a lanthanide borosilicate (LaBS) glass matrix. This glass will be packaged into bagless transfer cans and placed inside a Defense Waste Processing Facility (DWPF) type canister. The canister will be transported to DWPF and filled with High Level Waste (HLW) glass. The DWPF canisters will be stored in the Glass Waste Storage Buildings and later transported to the geologic repository at Yucca Mountain.

This Scope of Work (SOW) has been developed for the purpose of facilitating **construction** cost and schedule estimates for the Conceptual Design Report (CDR) on the PUD project. The input to this SOW was the approved technical baseline consisting of a Facility Design Description (FDD) and associated System Design Descriptions (SDD). Every effort has been made to assure alignment and consistency between this SOW and the appropriate sections of the technical baseline, in order to provide accurate estimates. This SOW is not a PUD technical baseline document. A more detailed description of the system can be found in the associated SDD listed in the reference section.

A HOLD is placed to identify information that is preliminary in nature, results from a design uncertainty, originates from insufficient documentation, needs verification, or identifies a discrepancy. A **TBD** is placed to identify places in the text where numeric values or descriptive information is not available at the time that the current revision of the SOW is released.

2.0 ACRONYMS/ABBREVIATIONS

AC	Alternating Current
CCTV	Closed Circuit Television
CIM	Cylindrical Induction Melter
C/S/A	Civil/Structural/Architectural

DS	Design Services
DWPF	Defense Waste Processing Facility
EMT	Electrical Metallic Conduit
GS	General Services
HBDER	High Business Design Estimate Range
HEPA	High-Efficiency Particulate Air (filter)
HVAC	Heating, Ventilation and Air Conditioning
ICS	Integrated Control System
IMC	Intermediate Metallic Conduit
I/O	Input/Output
KAC	K-Area Complex
LaBS	Lanthanide Borosilicate
MC&A	Material Control and Accountability
NFPA	National Fire Protection Association
PC	Performance Category
Pt/Rh	Platinum/Rhodium
PU	Plutonium
PUD	Plutonium Disposition
PuVit	Plutonium Vitrification
SC	Safety Class
SDD	System Design Description
SOW	Scope Of Work
SRID	Safeguards and Security Requirements Identification Document
SRS	Savannah River Site
SS	Safety Significant
TBD	To Be Determined
UNO	Unless Noted Otherwise
WSRC	Washington Savannah River Company

3.0 DESCRIPTION OF PHYSICAL WORK

3.1 Performance Category and Safety Classification (SC, SS, PS, GS)

3.1.1 Performance Category

3.1.1.1 The Vitrification System is Performance Category PC-2. **HOLD**. (Reference X-SYD-K-00006), (to be issued).

3.1.2 Functional Classification

3.1.2.1 The systems in this SOW shall be designed in accordance with the requirements of WSRC Manual WSRC-E7, Conduct of Engineering and Technical Support Procedure 2.25 Rev 14, “Functional Classification”, as follows (Reference X-SYD-K-00006, to be issued):

A. <u>Melter,</u>

Functional Classification – Safety Significant (SS)

B. Melter Heater Coils

Functional Classification – Safety Significant (SS)

C. Melter Heater Power Supplies (Equip. No. VIT-JX-001A to -010C)

Functional Classification – Production Support (PS)

D. Cooling Water System (including pumps, heat exchanger and tank).

Functional Classification – Safety Significant (SS)

E. Video Surveillance System

Functional Classification – Production Support (PS)

F. Can Lifting Device and Turntable

Functional Classification – Production Support (PS)

G. Gloveboxes

Functional Classification – Safety Significant (SS)

H. Hold-up Monitors

Functional Classification – Production Support (PS)

I. Bar Code Readers

Functional Classification – Production Support (PS)

3.2 Mechanical/Nuclear/Process

The Vitrification System has twelve gloveboxes: ten of which are Melter gloveboxes and the other two are a Can Feed glovebox and Cooling Area/Lag Storage glovebox. The melter gloveboxes are used for vitrification. The Can Feed glovebox is for empty Vit can introduction. The Cooling Area/Lag Storage glovebox is for Vit can cooling. An overview of the Vitrification process is provided in block flow diagram M-M8-K-00007. Material movement through the process is summarized in block flow diagram M-M8-K-00015.

3.2.1 Vitrification Glovebox Components

3.2.1.1 The following Vitrification process components will be contained within ten Melter gloveboxes. Reference sketch no. SK-DE-VIT-0003 for layout and location of components in the glovebox.The major components are:

A. 6” Platinum/Rhodium Melter Vessel, Insulated (10 ea.)

1. Details of the melter are in Data Sheet M-DS-K-00088. The melter is fed by a transport hopper from Milling & Mixing System. The melter melts the glass frit/plutonium oxide mixture to vitrify the plutonium. The melter includes a platinum/rhodium bubbler tube and thermowell. Platinum thermocouples are also welded to the melter vessel wall. A lid will be required on the melter, and will be opened and closed by remote operation.

B. Induction Heater Coils (30 ea.) and corresponding Heat Stations (30 ea.)

1. Details of the induction heater coils are in Data Sheet M-DS-K-00090. There are three heat zones on each melter, heated by three induction heater coils.

C. Off-gas duct (10 ea.)

1. The off-gas duct is assumed not to require specialty materials. The off-gas system is to be operated only after the dust has settled in the melter. See assumptions below. (Section 4.2)

D. Turntable (10 ea.)

1. Details of a typical turntable are in Data Sheet M-DS-K-00091 for estimating purposes. The turntable is located under the melter and moves Vit cans in and out from under the melter. The turntable will have four positions which would allow for an empty Vit can position, a position under the melter and two filled Vit can positions.

E. Vit Can Transfer Device (10 ea.)

1. Details of a transfer device are in Data Sheet M-DS-K-00091 for estimating purposes. The can transfer device is to lift and lower Vit cans from/to the transport cart.

F. Barcode Reader (20 ea.)

1. Details of the barcode readers are in Data Sheet J-JD-K-00068. The barcode readers are used to track the transport hoppers and Vit cans coming to and leaving the melter glovebox. There are two barcode readers for each glovebox.

G. Gamma Holdup Monitors (50 ea.)

1. Details of the gamma holdup monitors for measuring holdup for MC&A purposes are in Data Sheet J-JD-K-00069. Each glovebox has two gamma holdup monitors for a subtotal of 20 monitors. There are two gamma holdup monitors on each melter for a subtotal of 20 monitors. There is one gamma holdup monitor for each melter exhaust for a subtotal of 10 monitors.

H. For Piping and valves bulk material for inside the Melter gloveboxes see Attachment 1.

3.2.1.2 The following Vitrification process components will be contained within the Can Feed Glovebox. Reference sketch no. SK-DE-VIT-0007 for layout and location of components in the glovebox.The major components are:

A. Scale (1 ea.)

1. Details of the scale are in Data Sheet J-JD-K-00070. The scale is used to weigh empty Vit cans entering the Vitrification System.

B. Barcode Reader (1 ea.)

1. Details of the barcode readers are in Data Sheet J-JD-K-00068. The barcode reader tracks empty Vit cans entering the Vitrification System.

3.2.1.3 NOTE: This item is for HBDER Scope only. The following Vitrification process components will be contained within the Cooling Area/Lag Storage Glovebox.

Reference sketch no. SK-DE-VIT-0006 for layout and location of components in the glovebox. The major components are:

A. Transport Elevator (1 ea.)

1. A description of the transport elevator is in M-ESR-K-00012, Par. 4.6. The transport elevator will lift/lower filled vit cans to/from storage/cooling positions in the glovebox.

B. Barcode Reader (1 ea.)

1. Details of the barcode readers are in Data Sheet J-JD-K-00068. The barcode reader tracks filled vit cans going in and out of the glovebox.

3.2.2 Gloveboxes

See M-SPP-K-00059 for general glovebox requirements.

3.2.2.1 Melter Gloveboxes dimensions and layout are shown in drawing SK-DE-VIT-0003. The melter glovebox interfaces with a transport tunnel both above the glovebox and another tunnel below the glovebox. Access to the tunnels is isolated with slide-gate type doors that isolate the glovebox from the transport tunnels when access to and from the tunnels is not required. Gloveboxes are equipped with shielding to reduce the radiation dose to collocated workers and maintenance personnel.

Gloveboxes are ventilated with room air which is drawn through inlet HEPA filters and exhausted through additional HEPA filters to the Glovebox Exhaust System. See drawings M-M5-K-01947 and M-M6-K-02272 for glovebox exhaust flow diagram and piping and instrumentation diagram. Glovebox air flow also serves to cool hot Vit cans. (Ref. M-CLC-K-00695).

A removable maintenance panel is provided to replace the entire melter assembly in the event of a failure of the melter (e.g. melter vessel leakage). (Ref. M-ESR-K-00017). The maintenance concept is to have the melter assembly mounted on rails in the glovebox and to be easily removable/replaceable manually.

A. HEPA filter in stainless steel housing. (20 ea.)

B. Non-testable HEPA filter mounted to skin of glovebox. (10 ea.).

C. 8” automatic damper, pneumatically operated, stainless (10 ea.)

D. 4” isolation dampers, stainless (40 ea.)

E. 4” balancing damper, stainless (10 ea.)

F. ¼” three-way ball valves, stainless (70 ea.)

G. 1” ball valve, stainless (10 ea.)

3.2.2.2 The Can Feed Glovebox dimensions and layout are shown in drawing SK-DE-VIT-0007. The Can Feed glovebox interfaces with the lower transport tunnel. Access to the tunnel is isolated with a slide-gate type door that isolates the glovebox from the transport tunnel when access to the tunnel is not required.

The glovebox is ventilated with room air which is drawn through inlet HEPA filters and exhausted through additional HEPA filters to the Glovebox Exhaust System. See drawings M-M5-K-01976 and M-M6-K-02317 for glovebox exhaust flow diagram and piping and instrumentation diagram.

The glovebox is equipped with an airhood to allow the introduction of empty Vit cans into the process.

A. HEPA filter in stainless steel housing. (2 ea.)

B. Non-testable HEPA filter mounted to skin of glovebox. (1 ea.).

C. 8” automatic damper, pneumatically operated (1 ea.)

D. 4” isolation dampers (5 ea.)

E. 4” balancing damper (2 ea.)

F. ¼” three-way ball valves, stainless (7 ea.)

3.2.2.3 NOTE: This item is for HBDER Scope only. The Cooling Area/Lag Storage Glovebox dimensions and layout are shown in drawing SK-DE-VIT-0006. The Cooling Area/Lag Storage Glovebox interfaces with the lower transport tunnel coming from the melters and with the transport tunnel that connects to the Bagless Transfer System. Access to the tunnels is isolated with slide-gate type doors that isolate the glovebox from the transport tunnels when access to and from the tunnels is not required. Glovebox is equipped with shielding.

The glovebox is ventilated with room air which is drawn through inlet HEPA filters and exhausted through additional HEPA filters to the Glovebox Exhaust System. See drawings M-M5-K-01977 and M-M6-K-02315 for glovebox exhaust flow diagram and piping and instrumentation diagram.

A. HEPA filter in stainless steel housing. (2 ea.)

B. Non-testable HEPA filter mounted to skin of glovebox. (1 ea.).

C. 8” automatic damper, pneumatically operated (1 ea.)

D. 4” isolation dampers (4 ea.)

E. 4” balancing damper (1 ea.)

F. ¼” three-way ball valves, stainless (7 ea.)

3.2.3 Scope at -20 Level and Outside the Gloveboxes

3.2.3.1 Vitrification Cooling System

The Vitrification Cooling System is distilled water service. Distilled water is required such that the water is electrically non-conductive as it is used to cool the

induction heater power supplies, heat stations, and coils. Consequently, austenitic stainless steel is required for piping and components. See drawings M-M5-K-01949 and M-M6-K-02294 through M-M6-K-02309 for flow and piping & instrumentation diagrams.

A. Heat Exchangers (2 ea.).

1. Details of the shell and tube heat exchanger are per Data Sheet M-DS-K-00094.

B. Centrifugal Pumps (3 ea.)

1. Details of the canned motor pumps are per Data Sheet M-DS-K-00093.

C. Expansion tank. (1 ea.)

1. Details of the expansion tank are per Data Sheet M-DS-K-00092.

D. Piping and Valves Bulk Material

1. Bulk piping outside the gloveboxes is documented in sketches SK-DE-ISO-0001 through -0003. See Attachment 1 for piping bulks inside the gloveboxes and for valve bulks. All cooling water piping is insulated with elastomeric foam.

3.2.4 Piping

3.2.4.1 Piping material is designated by a “P-spec” designation from SRS Document WSRC-IM-95-58, Guide No. 15060. The piping material will be welded or utilize flange fittings.

3.2.4.2 There will be a total of 40 ea. glovebox tubing penetrations.

3.3 Instrumentation and Controls

3.3.1 Each of the ten melters will be controlled by the Melter Induction Coil Heater Controls (M-DS-K-00090) housed in the10 Induction Heater Control Cabinets at the -20' I/O Room. A redundant serial link will be provided by the vendor for communication to the ICS (J-SOW-K-00002; to be issued). The ICS will monitor and provide supervisory control to the melter. Each of the three induction heating coils will include the controller, On/Off switches, status, variable output, amps, volts, and power, and interlocks. Controls equipment requirements are detailed in the control block diagram J-J8-K-00024 and in Logic Description J-J2-K-01553.

3.3.2 In addition, each of the ten melters will be controlled by the ICS containing the following instruments UNO, (for automatic valves not listed below, see Mechanical section above):

3.3.2.1 Melter (see M-DS-K-00088 for Melter which includes cover positioner, see M-M6-K-02300 to -02309) additional instrumentation required:

A. Electric actuator (10 ea.)
B. Position Switches (20 ea.)
C. Zoned Thermocouples (20 ea. + 10 ea. in melters)
D. Melter Leak Detection Switch (10 ea.), (RLE Technologies, Model Seahawk LDZ1 or equal)

3.3.2.2 Turntable with can in position switch and Transfer Device (see M-DS-K-00091) additional instrumentation:

A. Position Switch (10 ea.)

3.3.2.3 Cooling water to induction heaters instrumentation (see M-DS-K-00092, 93, and 94; see also M-M6-K-02996 and M-M6-K-02997)

A. Flow Meters (2 ea.), (Dwyer HFT-2440, transmitting rotameter)
B. Pump Motor Status (3 ea.)
C. Conductivity Probe and Switch (1 ea.), (Foxboro 875CR).
D. Temperature Indicating Controller (2 ea.)
E. Differential Pressure Transducer (2 ea.)
F. Thermocouple(4 ea.)
G. Local Level Gage (1 ea.)
H. Local Pressure Gage (8 ea.)
I. Pressure Transducer (2 ea.)

3.3.2.4 Glovebox exhaust instrumentation (see M-M6-K-02272)

A. Differential Pressure Transducer (24 ea.) (Dwyer 3000SGT, or equal)
B. Flow Meter (12 ea.), (Air Monitor, Model FR- pitot pressure, or equal)

3.3.2.5 Dry Air to Bubbler and Drain Tube - (see M-DS-K-00088 and M-M6-K-02271) (Ref. Scope for Dry Air equipment M-SOW-K-00021, to be issued)

3.3.2.6 Melter Offgas instrumentation (see M-M6-K-02272)

A. 1” Solenoid Valves (10 ea.)

3.3.2.7 Glovebox Air Supply instrumentation-(see M-M6-K-02272)

A. Differential Pressure Transducer (12 ea.), (Dwyer 3000SGT, or equal).

3.3.2.8 Lag Storage Transport Elevator additional instrumentation (see Material Transport Strategy M-ESR-K-00012)

A. Actuators (2 ea.)
B. Position Switches (2 ea.)

3.3.2.9 Vitrification Glovebox Instrumentation Rack (2 ea.), Equipment No’s VIT-INST-100 and VIT-INST-200 (-40' I/O Room).

3.3.2.10 MC&A Equipment

A. See Mechanical/Nuclear/Process section for description of major equipment in each glovebox for details of barcode readers, gamma hold-up monitors and a scale used for MC&A.

3.4 Electrical

3.4.1 The Vitrification System will contain the following major electrical components and services. The major electrical components will be provided as Engineered Equipment. This Scope of Work includes all raceway, power, control cables/terminations between process related equipment and associated controls.

Provide onsite setup and assembly of the referenced Engineered Equipment. Refer to the attached Bulk Takeoff for cable and conduit descriptions and quantities. Approximately 172 glovebox penetrations will be required.

3.4.1.1 Electrical power distribution will be as shown on single line drawings E-E2-K-02229 and E-E2-K-02230. See Attachment 3 for Electrical Bulk Material List giving specific cable, wiring and conduits count.

3.4.1.2 Note: Separate individual wireways (6”X6”X4”) will be installed to each melter as listed in Attachment 3. At least a 12” separation will be maintained between installed wireways.

3.4.1.3 The Vitrification Viewing System, has the following electrical equipment, refer to Block Diagram No. E-EB-K-00705 and Data Sheet No. E-DS-K-00021.

A. 30 ea.– Vitrification Melter Glovebox Cameras VIT-PCTV-001A, B, C thru VIT-PCTV-010A, B, C

B. 5 ea.– Pan/Tilt Room Cameras VIT-CCTV-001 thru VIT-CCTV-005

C. 1 ea.– Video Equipment Rack with Controller and Selector VIT-VER-001

D. 1 ea.– Video Monitor VIT-MON-001

E. 1 ea.– Pan/Tilt Controller VIT-PTC-001

3.4.1.4 Work Scope includes installation of new grounding pigtails (approx. 10 ft. long with bolted connections) between new permanent electrical equipment and/or skids to the existing ground grid system. Small movable equipment shall be grounded in accordance with code and or industry practices.

3.4.1.5 Provide and install 23 ea. junction/pull boxes. Assume 12”X12”X6” junction boxes.

3.5 Plant Design

3.5.1 Piping quantities have been estimated in Attachment 1.

3.6 Civil/Structural/Architectural

3.6.1 Refer to C-SOW-K-00009 for other Civil/Structural/architectural scope (to be issued).

3.6.2 See Attachment 2 for C/S/A bulk material list. The bulk material list is based upon the installation of the equipment as detailed below:

3.6.2.1 <u>Melter Gloveboxes.</u> (10 ea.) Reference sketch no. SK-DE-VIT-0003.

There are 10 Gloveboxes with WEP and lead shielding. The size of the Glovebox is approximately 7’ X 4’ X 9’ high and each box weighs approximately 5000 lbs. Each Glovebox is supported on 4 legs with footprint = 6” X 6” square. Each foot will be welded to steel base plate 12” X 12” X ¾” thick, with ¾ “diameter bolts anchored to the -40 Level concrete floor.

3.6.2.2 HEPA Filter Housing (12 ea.)

There are 12 HEPA units to be supported. The size of the HEPA Filter Housing is approximately 3' X 3' X 3' high and each weighs approximately 300 lbs. Each housing will be strapped by steel L bents which are bolted by ¾" diameter bolts at all the attachment points to the ceiling, located below -20 Level concrete slab.

3.6.2.3 Can Feed Glovebox. (1 ea.) Reference sketch no. SK-DE-VIT-0007.

The size of the Can Feed Glovebox is approximately 12' X 3' X 11' high and weighs approximately 2000 lbs. It is supported on 4 legs with footprint = 6" X 6" square. Each foot will be welded to a steel base plate 12" X 12" X ¾ "thick with 1 " diameter bolts anchored to the -40 Level concrete floor. This glovebox has no shielding.

3.6.2.4 Cooling Area/Lag Storage Glovebox. (1 ea.) Reference sketch no. SK-DE-VIT-0006.

The size of the Cooling Area/Lag Storage Glovebox is approximately 9'-9" X 4-3"' X 12' high and weighs approximately 7000 lbs. It is supported on 4 legs with footprint = 6" X 6" square. Each foot will be welded to a steel base plate 12" X 12" X ¾ "thick with 1 " diameter bolts anchored to the -40 Level concrete floor. It will also be horizontally strapped around by steel L bents bolted by ¾" diameter bolts and anchored to the concrete wall near to it on the -40 Level floor. The Cooling Area/Lag Storage Glovebox has WEP and lead shielding.

3.6.2.5 Melter Power Supply Racks. (10 ea.) Reference sketch no. SK-DE-VIT-0008

There are 10 Racks to be supported. The size of each Rack is approximately 2'-6" X 2'-1½" X 5' high and each Rack weighs approximately 700 lbs. It will be horizontally strapped around by steel L bents attached by bolts at the bottom of Rack. The L bents will be bolted by ¾" diameter bolts and anchored on the -20 Level concrete floor.

3.6.2.6 Pumps. (3 ea.) Reference data sheet no. M-DS-K-00093

The pump is supported on the frame with bolt pattern of 4 bolts spaced 3.125" by 8.5". It weighs about 100 lbs. The frame will be anchored by ½" diameter bolts to the concrete floor.

3.6.2.7 Heat Exchangers. (2 ea.) Reference data sheet no. M-DS-K-00094

The Heat Exchanger is supported on the frame with bolt pattern of 4 bolts spaced 34.5" by 3.5". It weighs about 100 lbs. The frame will be anchored by ½" diameter bolts to the concrete floor.

3.6.2.8 Expansion Tank (1 ea.) Reference data sheet no. M-DS-K-00092

The size of tank is about 18" Dia. x 4' high and weighs 650 lbs. It is assumed to be supplied with 4 legs L 3 X 3 X 3/8 and the base plate 5"x 5" x ½" with 1 – 11 /16" diameter hole. Each base plate will be anchored by ¾" diameter bolts to the concrete floor.

3.6.2.9 Air inlet HEPA filter housing. (12 ea.) Reference sketch no. SK-DE-VIT-0003.

Under each Glovebox the inlet HEPA filter housing needs to be anchored (-40 level to the floor). These housings are conservatively 30"X30"X30" and weighing 100lbs. will be anchored on its frame by ½" Dia. anchor bolts on the -40 Level concrete floor.

3.6.2.10 Instrument cabinets. (2 ea.) Reference sketch no. SK-DE-VIT-0008

Two instrument cabinets will be part of the Vitrification scope on the -40 level in line with other instrument cabinets weighing approximately 100lbs. each. These cabinets will be anchored to the floor with ¾" bolts.

4.0 ASSUMPTIONS

4.1 General Assumptions

4.1.1 The Construction Agency will be the SRS Construction Group. Design Services will provide engineering documentation for the installation of this equipment and will rely on the use of SRS Guides and Standards.

4.1.2 SRS Construction Group will procure all bulk materials.

4.1.3 SRS Construction Group will procure all off-the-shelf components and equipment identified on engineering data sheets that do not require testing or quality documentation.

4.2 Specific Assumptions

4.2.1 Mechanical

4.2.1.1 The 6 inch cylindrical Induction Melter has not been tested. Development and testing of the melter is not within the scope of this document.

4.2.1.2 The induction heat stations to be collocated with the melter need to be shown to be compatible with the radiation environment inside the glovebox. Qualification of the induction heat stations and cable for radiation environment is not within the scope of this document.

4.2.1.3 Per Interoffice Memorandum M&O-PUD-2006-00033, the offgas system was deleted from the scope of the Conceptual Design. It is assumed no wet/special offgas system will be required.

4.2.1.4 All pressure vessels with an ID 6" or greater will be per ASME B&PVC Section VIII, Division 1 code stamped or an approved waiver

4.2.1.5 All piping will be per ASME B31.3.

4.2.2 Instrumentation and Controls

4.2.2.1 No specific assumptions have been made in this group.

4.2.3 Electrical

4.2.3.1 Assume that all permanently installed cabling will be routed in protected conduit/tray.

4.2.3.2 Cables installed within Gloveboxes will be routed within designated tray located within GB and/or supported from structural members within GB utilizing cable tie wraps.

4.2.3.3 Existing grounding grid is intact and adequate for grounding of new equipment.

4.2.3.4 Melter induction heater system will include all hardware and cabling necessary for on site assembly. Terminations will utilize vendor assembled connectors or detailed wiring/connection drawings will be provided.

4.2.4 Plant Design

4.2.4.1 No specific assumptions have been made in this group.

4.2.5 Civil/Structural/Architectural

4.2.5.1 Core drills will be required for routing electrical conduit through walls or floors. (Covered in C-SOW-K-00009, to be issued).

4.2.5.2 Assume all anchor bolts used for equipment and commodity supports will be A36 Drillco Maxi bolts.

4.2.5.3 Assume Functional Classification for drilling holes in concrete surface is SC.

4.2.5.4 For electrical conduits and equipment supports, use cookbook No. C-CI-G-0039. For routing and supports for NPS 2” and smaller piping, use cookbook No. C-CH-G-00004.

4.3 HBDER Scope

4.3.1 The Cooling Area/Lag Storage Glovebox is HBDER scope. It is likely that the filled Vit can cooling and lag storage can be accomplished by storing filled Vit cans on the turntables below the melters in the Melter Gloveboxes.

4.3.2 Radiation hardened video cameras may be required in the gloveboxes if non-rad hardened cameras cannot withstand the radiation environment. Total number of cameras is 30.

5.0 REFERENCES

5.1 Drawing List

5.1.1 PUD Project Drawings & Sketches

5.1.1.1 M-M8-K-00001, Rev. A,Plutonium Disposition Facility, Level 1
5.1.1.2 M-SPP-K-00059, Rev.B, Plutonium Disposition Gloveboxes
5.1.1.3 P-PG-K-02142, Rev. B, Plutonium Disposition Project General Arrangement Plan at Level -20
5.1.1.4 P-PG-K-02143, Rev. B, Plutonium Disposition Project General Arrangement Plan at Level -40
5.1.1.5 E-DS-K-00021, Rev. A, Milling & Mixing and Vitrification area Viewing Camera System.
5.1.1.6 E-EB-K-00705, Rev. C, Vitrification Viewing System Block Diagram
5.1.1.7 E-E2-K-02229, Rev. D, Milling/Mixing and Vitrification Motor Control Center - ELNH-MCC-24M Single Line Diagram
5.1.1.8 E-E2-K-02230, Rev. D, Milling/Mixing and Vitrification Motor Control Center - ELNH-MCC-31M Single Line Diagram
5.1.1.9 J-J2-K-01553, Rev. A, Vitrification Logic Description
5.1.1.10 J-J8-K-00017, Rev. B, Vitrification MC&A Control Block Diagram
5.1.1.11 J-J8-K-00024, Rev. B, Vitrification System Control Block Diagram
5.1.1.12 J-JD-K-00068, Rev. A, Vitrification Barcode Readers
5.1.1.13 J-JD-K-00069, Rev. A, Vitrification Holdup Monitors
5.1.1.14 J-JD-K-00070, Rev. A, Vitrification Vit Can Weigh Scale.
5.1.1.15 M-CLC-K-00695, Rev. A, Vitrification Glovebox Cooling.
5.1.1.16 M-CLC-K-00697, Rev. A, Vitrification - Pump and Heat Exchanger Sizing Calculation
5.1.1.17 M-ESR-K-00017, Rev. 0, Maintenance & Replacement Strategy
5.1.1.18 M-DS-K-00088, Rev. C, Plutonium Disposition Melter Components
5.1.1.19 M-DS-K-00090, Rev. B, Pu Disposition Vitrification Heaters
5.1.1.20 M-DS-K-00091, Rev. B, Pu Disposition Vitrification Turntable/Actuator
5.1.1.21 M-DS-K-00092, Rev. A, Pu Disposition Vitrification Make-Up Water and Pressurization Tank
5.1.1.22 M-DS-K-00093, Rev. B, Pu Disposition Vitrification Cooling Water Pump
5.1.1.23 M-DS-K-00094, Rev. B, Pu Disposition Vitrification Heat Exchanger
5.1.1.24 M-ESR-K-00012, Rev. 0, Facility Material Transport System Strategy Report
5.1.1.25 M-M5-K-01947, Rev. B, Vitrification System Glovebox Air Flow Diagram
5.1.1.26 M-M5-K-01948, Rev. B, Vitrification System Dry Air Airflow Diagram
5.1.1.27 M-M5-K-01949, Rev. A, Vitrification System Cooling Water Flow Diagram
5.1.1.28 M-M5-K-01976, Rev. A, Vitrification Can Feed Glovebox Airflow Diagram
5.1.1.29 M-M5-K-01977, Rev. A, Vitrification Cooling Station/Lag Storage Glovebox Airflow Diagram
5.1.1.30 M-M6-K-02271, Rev. B, Plutonium Disposition Project - Vitrification System Dry Air Piping and Instrumentation Diagram
5.1.1.31 M-M6-K-02272, Rev. B, Glovebox Piping and Instrumentation Diagram
5.1.1.32 M-M6-K-02294, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Distribution Melters 1 thru 4 Piping & Instrumentation Diagram
5.1.1.33 M-M6-K-02295, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Distribution Melters 5 thru 10 Piping & Instrumentation Diagram
5.1.1.34 M-M6-K-02296, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Pump Station Piping & Instrumentation Diagram
5.1.1.35 M-M6-K-02297, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Heat Exchanger Piping & Instrumentation Diagram
5.1.1.36 M-M6-K-02298, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Distribution Melters 1 thru 4 Piping & Instrumentation Diagram

5.1.1.37 M-M6-K-02299, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Distribution Melters 5 thru 10 Piping & Instrumentation Diagram
5.1.1.38 M-M6-K-02300, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 1 Piping & Instrumentation Diagram
5.1.1.39 M-M6-K-02301, A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 2 Piping & Instrumentation Diagram
5.1.1.40 M-M6-K-02302, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 3 Piping & Instrumentation Diagram
5.1.1.41 M-M6-K-02303, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 4 Piping & Instrumentation Diagram
5.1.1.42 M-M6-K-02304, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 5 Piping & Instrumentation Diagram
5.1.1.43 M-M6-K-02305, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 6 Piping & Instrumentation Diagram
5.1.1.44 M-M6-K-02306, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 7 Piping & Instrumentation Diagram
5.1.1.45 M-M6-K-02307, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 8 Piping & Instrumentation Diagram
5.1.1.46 M-M6-K-02308, Rev. A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 9 Piping & Instrumentation Diagram
5.1.1.47 M-M6-K-02309, Rev.A, Plutonium Disposition Project Vitrification Cooling Water Melter No. 10 Piping & Instrumentation Diagram
5.1.1.48 M-M6-K-02315, Rev. A, Vitrification Cooling Station/Lag Storage Glovebox Piping & Instrumentation diagram
5.1.1.49 M-M6-K-02317, Rev. A, Vitrification Can Feed Glovebox Piping & Instrumentation Diagram
5.1.1.50 M-M8-K-00007, Rev. A, Vitrification System Block Flow Diagram
5.1.1.51 M-M8-K-00015, Rev. A, Vitrification System Material Handling Block Flow Diagram
5.1.1.52 SK-DE-ISO-0001, Rev. A, System Piping Isometric, Vitrification System Cooling Water Supply for Power Supplies and Melters.
5.1.1.53 SK-DE-ISO-0002, Rev. A, System Piping Isometric, Vitrification System Cooling Water Return from Power Supplies and Melters.
5.1.1.54 SK-DE-ISO-0003, Rev. A, System Piping Isometric, Vitrification System Cooling Water Supply
5.1.1.55 SK-DE-VIT-0003, Rev. D, Plutonium Disposition Project Vitrification Melter Glovebox and Shielding Layout
5.1.1.56 SK-DE-VIT-0005, Rev. A, Melter Room Arrangement -40
5.1.1.57 SK-DE-VIT-0006, Rev. B, Cooling Area/Lag Storage Glovebox Layout
5.1.1.58 SK-DE-VIT-0007, Rev. B, Vitrification Can Feed Glovebox Layout
5.1.1.59 SK-DE-VIT-0008, Rev. A, Vitrification Mezzanine Arrangement -20
5.1.1.60 SK-DE-VIT-0014, Rev. A, Vitrification Partial floor Plan @ Elev -40’-0”
5.1.1.61 SK-DE-VIT-0015, Rev. A, Vitrification Building Sections

5.1.2 Existing Savannah River Site (SRS) Drawings

5.1.2.1 W134828, Rev. 44, Process Area Bldg. #[KAC] Power Transformer Rm. #2 Electrical & Concrete
5.1.2.2 W134850, Rev. 19, Process Area Bldg #[KAC] Power Transformer Rm.#3 Electrical
5.1.2.3 W825664, Rev. 54, Process Area – Bldg. {KAC] Reactor Elect. Distr. System T.R.2, 480V
5.1.2.4 W825665, Rev. 55, Reactor Elect. Distr. System T.R.3, 480V. SWGR-Single Line Diagram Electrical

5.2 Design Input Documents

The following Facility Design Description and System Design Descriptions are the baseline documents used to develop this SOW.

5.2.1 Facility Design Description

5.2.1.1 G-FDD-K-00001, Rev B "PUV Facility Design Description", (to be issued)

5.2.2 System Design Description

5.2.2.1 X-SYD-K-00006, Rev. B "Vitrification System (VIT) SDD", (to be issued)

5.2.3 Safeguards and Security Requirements Identification document

5.2.3.1 S-SRI-K-00005, Rev. 0, "KAC Safeguards and Security Requirements Identification Document for Plutonium Disposition".

5.3 Applicable SRS & Industry Codes, Guides and Standards

5.3.1 Industry Codes and Standards

5.3.1.1 ASME B31.3, 2006 - Chemical Plant and Petroleum Refinery Piping
5.3.1.2 ASME Boiler and Pressure Vessel Code, Sect. VIII, Div. 1, 2006
5.3.1.3 NFPA 70, 2006 – National Electrical Code

See Functional Design Description and System Design Descriptions for more codes and standards. (Ref. G-FDD-K-00001 and X-SYD-K-00006, both to be issued).

5.3.2 SRS Guides & Standards

5.3.2.1 WSRC-TM-95-1, Standard no. 03010, Rev: 1, Coring, Chipping, and Drilling in Concrete.
5.3.2.2 WSRC-TM-95-1, Standard no. 05057, Rev: 1, Control of Welding.
5.3.2.3 WSRC-TM-95-1, Standard no. 15980, Rev. 0, Mechanical Installation of Safety Class and Safety Significant Instrumentation.
5.3.2.4 WSRC-IM-95-58, Guide 03252-G, Rev: 1, Installation and Testing of Concrete Anchors.
5.3.2.5 WSRC-IM-95-58, Guide 15060-G, Rev. 5, Application of ASME B31.3.
5.3.2.6 WSRC-IM-95-58, Guide no. 15980-G, Rev.3, "Installation and Calibration of Instruments"
5.3.2.7 WSRC-IM-95-58, Guide no. 16051-G, Rev.2, "Installation of Electrical Raceway Systems and Cable Trays"
5.3.2.8 WSRC-IM-95-58, Guide no. 16052-G, Rev.3, "Installation of Electrical Wires, Cables and Terminations"
5.3.2.9 WSRC-IM-95-58, Guide no. 16053-G, Rev.2, "Installation of Electrical Equipment"
5.3.2.10 WSRC-IM-95-58, Guide no. 16056-G, Rev.2, "Installation of Grounding Systems"

5.4 Related Scopes of Work (SOW)

5.4.1 C-SOW-K-00009, Rev. 0, Scope of Work for Structural and Architectral Modifications for Process Building, (to be issued).

5.4.2 E-SOW-K-00017, Rev. 0, Electrical General Scope of Work, (to be issued).

5.4.3 J-SOW-K-00002, Rev. 0, Scope of work for ICS & MC&A Network, (to be issued).

5.4.4 M-SOW-K-00020, Rev. 0, Scope of Work for HVAC System, (to be issued).

5.4.5 M-SOW-K-00021, Rev. 0, Scope of Work for Dry Air System, (to be issued).

5.4.6 M-SOW-K-00022, Rev. 0, Scope of Work for Balance of Plant Water Systems, (to be issued).

5.5 Miscellaneous

5.5.1 C-CI-G-0039, Rev: 0, Electrical Conduit and Equipment Supports.
5.5.2 C-CH-G-00004, Rev. 0, Routing & Supports for NPS 2 and Smaller Piping.
5.5.3 M&O-PUD-2006-00033, Deletion of Offgas activities from the current schedule of Pu Disposition Project M09A.

6.0 ATTACHMENTS

6.1 Attachment 1, Bulk Material List, Piping/valves
6.2 Attachment 2, C/S/A Bulk Material List
6.3 Attachment 3, Electrical Bulk Material List
6.4 Vitrification Room 3D Room Layout Drawing

6.1 ATTACHMENT 1
BULK MATERIAL LIST PIPING/VALVES

Melter gloveboxes

Item No.	Description of Item	Spec	Size	Quantity	Remarks
1	Dry Air Piping	PS204A	¼”	150 ft.	Ref. Dwg. M-M6-K-02271
2	Distilled Water Service for Cooling	PS204A	3/8”	150 ft.	Ref. Dwg’s M-M6-K-02300 to -02309 Insulated with elastomeric foam.
3	Offgas ducting	PS210B	1”	30 ft.	Ref. Dwg. M-M6-K-02272 **HOLD** (see Assumptions)
4	Stainless braided hoses	Swagelok	3/8” X 3 ft.	40 ea.	Connections to melter
5	PEEK Hose		3/8”	50 ft	Non-conductive radiation resist. hose
6	Manual ball valves, SS	Swagelok H83 series	¼”	40 ea.	Isolation valves
7	Quick disconnect	Swagelok QC series	3/8”	40 ea.	
8					

Cooling water piping system bulks (distilled water service)

Item No.	Description of Item	Spec	Size	Quantity	Remarks
1	Piping	PS200A			See sketches SK-DE-ISO-0001 to -0003 for lengths, sizes and fittings. Has elastomeric foam insulation.
2	Gate valve	300 series stainless	1-1/2”	15 ea.	
3	Bypass pressure reducing valve	300 series stainless	1-1/2”	2 ea..	Robson Industries, West Chester, PA, Model BPR-1 ½-SS
4	Check valve	300 series stainless	1-1/2”	3 ea..	
5	Globe valve	300 series stainless	1-1/2”	2 ea..	
6	Manual ball valves, SS	300 series stainless	½”	40 ea.	Swagelok H83 series
7	Three way control valve	300 series stainless	1-1/2”	2 ea.	Fisher/Baumann “Little Scotty”, model 24003
8	Automatic globe valve	300 series stainless	1-1/2”	20 ea.	

6.2 ATTACHMENT 2
C/S/A BULK MATERIAL LIST

Note: Table below includes the bulk material for installing/supporting major equipment. Bulk material for piping and conduit support is not included in the table below.

Item No.	Description of Item	Size	Quantity	Remarks
1	Base Plates	12” X 12” X ¾” Thick	48 ea.	Galvanized Carbon steel
2	Anchor Bolts	½” Dia.	68 ea.	
3	Anchor Bolts	¾” Dia.	260 ea.	
4	Anchor Bolts	1” Dia.	32 ea.	
5	Structural Steel L	L 3 X 3 X ½	340 Feet	Cut to Suit, Galvanized carbon steel.

6.3 ATTACHMENT 3, ELECTRICAL BULK MATERIAL LIST

Scope Set: Vitrification System

Date: 2/28/2007

Prepared By: G.S. Rao

Reviewed By: Rod King

Exterior Glovebox Cables

Sum of Qty XGB (ft)	
Ext. Cable Size/Type	Total
3/C#4 w/1-#10gnd	7,650
3/C #12 w/1-#12gnd	660
2/C #12	5,610
1 PR #16 SH.	119,960
Vendor Cable - 5/C #22	4,750
Vendor Cable Sensor/Control	4,800
Vendor Cable RF cable	4,800
Vendor Cable RG6 + 6/c # 16 Control Cable	6,320
Vendor Cable Data Cable	320
2/0 Gnd	900
50 - PR # 16 SH	1,200
16 - PR # 16 SH	120
Grand Total	157,090

Interior Glovebox Cables

Sum of Qty NGB (ft)	
GB Cable Size/Type	Total
2/C #12	315
1 PR #16 SH.	9460
Vendor Cable Sensor/Control	600
Vendor Cable RF cable	600
Vendor Cable RG6 + 6/c # 16 Control Cable	310
Grand Total	11285

All Raceway Types

Sum of Qty Rcwy (ft)	
RCWY	Total
WIRE WAY 6"X6"X4"	1150
1" IMC	600
3/4" IMC	8810
2" IMC	5835
1-1/2" IMC	3750
3" IMC	3290
Grand Total	23435

All Raceway Types Grouped by Red Designation

Sum of Qty Rcwy (ft)		
Red	RCWY	Total
N	WIRE WAY 6"X6"X4"	1,150
	1" IMC	600
	3/4" IMC	1,665
	2" IMC	5,835
	3" IMC	3,290
Y*	3/4" IMC	7,145
	1-1/2" IMC	3,750
Grand Total		23,435

*Red conduit contains wiring for classified systems, and installation and support is more difficult than for “black”, unclassified wiring systems.

6.3 ATTACHMENT 3, ELECTRICAL BULK MATERIAL LIST

Description: Vitrification Bulk Materials, Cable and Conduit
Reference: E-E2-K-02229 (MCC-24M), E-E2-K-02230 (MCC-31M), E-EB-K-00705, J-J8-K-00017, E-EB-K-00705, E-EB-K-00024

All Conduits are IMC type.

				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates				
Item #	**From Equipment**	**To Equipment**	**XGB Length (A) (ft)**	**Qty (A)**	**Cable size/type**	**Conn. (Qty)**	**NGB Length (B) (ft)**	**Length (C) (ft)**	**Length (D) (ft)**	**Qty (D)**	**Size/Desc. (D)**	**Red**	**Notes/Comments**
1	ELNH-MCC-31M/24M	Power Supply VIT-JX-001A,B,C thru' 010A,B,C	255	30	3/C#4 w/1-#10gnd			220	15	10	WIRE WAY 6"X6"X4"	N	Ref:E-E2-K-02229 E-E2-K-02230
2	ELNH-MCC-31M/24M	Circulating Pump VIT-P-001. 002 and 003	220	3	3/C #12 w/1-#12gnd	0			200	3	1" IMC	N	Ref:E-E2-K-02229 E-E2-K-02230
3	120/208 V Power Panel ELLV-PNL-009	Video Equip Rack VIT-VER-001	60	1	2/C #12	0			40	1	3/4" IMC	N	Ref:E-E2-K-02229 E-E2-K-02230 E-EB-K-00705
4	120/208 V Power Panel ELLV-PNL-009	Pan/Tilt Controller VIT-PTC-001	60	1	2/C #12				40	1	3/4" IMC	N	Ref:E-E2-K-02229 E-E2-K-02230 E-EB-K-00705
5	120/208 V Power Panel ELLV-PNL-009	Main Video Mon Rack ICS-VER-001	300	1	2/C #12				280	1	3/4" IMC	N	Ref:E-E2-K-02229 E-E2-K-02230 E-EB-K-00705
6	120/208 V Power Panel ELLV-PNL-009	Vit Can Weigh Scale	170	1	2/C #12	1	15		135	1	3/4" IMC	N	Ref:E-E2-K-02229 J-J8-K-00017
7	120/208 V Power Panel ELLV-PNL-009	I/O Cabinets	220	6	2/C #12			55	145	6	3/4" IMC	N	Ref:E-E2-K-02229 J-J8-K-00017
8	120/208 V Power Panel ELLV-PNL-010	Can Transfer Device	185	10	2/C #12	5	15		150	10	2" IMC	N	Ref:E-E2-K-02229 J-J8-K-00017
9	120/208 V Power Panel ELLV-PNL-010	Can Turn Table	185	10	2/C #12	5	15		150	10	2" IMC	N	Ref:E-E2-K-02230
10	MCA-CAB-002 thru' MCA-CAB-006	Melter Gamma Monitors/GB Monitors/Exhaust Gamma Monitors	95	50	Vendor Cable - 5/C #22				75	50	1-1/2" IMC	Y	Ref:E-E2-K-02229 J-J8-K-00017 Vendor cable size is assumed (5C #22)

6.3 ATTACHMENT 3, ELECTRICAL BULK MATERIAL LIST

Description: Vitrification Bulk Materials, Cable and Conduit
Reference: E-E2-K-02229 (MCC-24M), E-E2-K-02230 (MCC-31M), E-EB-K-00705, J-J8-K-00017, E-EB-K-00705, E-EB-K-00024

All Conduits are IMC type.

				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates				
Item #	**From Equipment**	**To Equipment**	**XGB Length (A) (ft)**	**Qty (A)**	**Cable size/type**	**Conn. (Qty)**	**NGB Length (B) (ft)**	**Length (C) (ft)**	**Length (D) (ft)**	**Qty (D)**	**Size/Desc. (D)**	**Red**	**Notes/Comments**
11	MCA-CAB-002 thru' MCA-CAB-006	Melter Hopper/Melter Vit Can Bar Code Readers A & B, Empty Vit Can and Full Vit Can Bar Code Readers	95	22	1 PR #16 SH.				75	95	3/4" IMC	Y	Ref: J-J8-K-00017
12	MCA-CAB-002	Vit Can Weigh Scale VIT-SCL-001	120	1	1 PR #16 SH.			80	20	1	3/4" IMC	Y	Ref: J-J8-K-00017
13	NOT USED												
14	Power Supply VIT-JX-001A,B,C thru' 010A,B,C	Melter # 1 thru' 10 Heating Coil VIT-HTR-001A, B, C thru' 010A, B, C	80	60	Vendor Cable RF cable	60	10		50	10	WIRE WAY 6"X6"X4"	N	Ref:E-E2-K-02229 E-E2-K-02230 Vendor cable size is assumed (Two Power cables per Heater Coil))
15	Power Supply VIT-JX-001A,B,C thru' 010A,B,C	Melter # 1 thru' 10 Heating Coil VIT-HTR-001A, B, C thru' 010A, B, C	80	60	Vendor Cable Sensor/Control	60	10		50	10	WIRE WAY 6"X6"X4"	N	Ref:E-E2-K-02229 E-E2-K-02230 Vendor cable size is assumed (One Control + One Sensor per Heater Coil))
16	Video Equip Rack VIT-VER-001	Vitrification Melter Glovebox # 1 - # 4	290	12	Vendor Cable RG6 + 6/c # 16 Control Cable	12	10	220	40	4	2" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed. 1-3" Conduit (220' long) to a Pull Box near the GBs assumed.
17	Video Equip Rack VIT-VER-001	Vitrification Melter Glovebox # 5 - # 10	295	18	Vendor Cable RG6 + 6/c # 16 Control Cable	18	10	175	90	6	2" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed. 1-3" Conduit (175' long) to a Pull Box near the GBs assumed.

6.3 ATTACHMENT 3, ELECTRICAL BULK MATERIAL LIST

Description: Vitrification Bulk Materials, Cable and Conduit
Reference: E-E2-K-02229 (MCC-24M), E-E2-K-02230 (MCC-31M), E-EB-K-00705, J-J8-K-00017, E-EB-K-00705, E-EB-K-00024

All Conduits are IMC type.

				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates				
Item #	**From Equipment**	**To Equipment**	**XGB Length (A) (ft)**	**Qty (A)**	**Cable size/type**	**Conn. (Qty)**	**NGB Length (B) (ft)**	**Length (C) (ft)**	**Length (D) (ft)**	**Qty (D)**	**Size/Desc. (D)**	**Red**	**Notes/Comments**
18	Video Equip Rack VIT-VER-001	Main Video Mon Rack ICS-VER-001	320	1	Vendor Cable Data Cable				300	1	3/4" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed
19	Video Equip Rack VIT-VER-001	Video Monitor VIT-MON-001	20	1	Vendor Cable RG6 + 6/c # 16 Control Cable					0	0	N	Ref: E-EB-K-00705 Vendor cable size is assumed. Internal bare cable. No raceway required.
20	Video Equip Rack VIT-VER-001	Vit Rm 1 Pan/Tilt Camera VIT-CCTV-001 thru' 005	280	5	Vendor Cable RG6 + 6/c # 16 Control Cable			200	60	5	2" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed. 1-3" Conduit (200' long) to a Pull Box near the room cameras assumed.
21	Pan/Tilt Controller VIT-PTC-001	Vit Rm 1 Pan/Tilt Camera VIT-CCTV-001 thru' 005	280	5	Vendor Cable RG6 + 6/c # 16 Control Cable			200	60	5	2" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed. 1-3" Conduit (200' long) to a Pull Box near the room cameras assumed.
22	Main Video Mon Rack ICS-VER-001	Video Monitor ICS-MON-001	20	1	Vendor Cable RG6 + 6/c # 16 Control Cable				0	0	0	N	Ref: E-EB-K-00705 Vendor cable size is assumed. Internal bare cable. No raceway required.
23	ICS-CAB-001 I/O	Vitrification Melter VIT-TK-001	134	40	1 PR #16 SH.	1	10		104	1	2" IMC	N	Ref: J-J8-K-00024
24	ICS-CAB-002 I/O	Vitrification Melter VIT-TK-002	144	40	1 PR #16 SH.	1	10		114	1	2" IMC	N	Ref: J-J8-K-00024
25	ICS-CAB-003 I/O	Vitrification Melter VIT-TK-003	155	40	1 PR #16 SH.	1	10		125	1	2" IMC	N	Ref: J-J8-K-00024
26	ICS-CAB-004 I/O	Vitrification Melter VIT-TK-	180	40	1 PR #16 SH.	1	10		150	1	2" IMC	N	Ref: J-J8-K-00024

6.3 ATTACHMENT 3, ELECTRICAL BULK MATERIAL LIST

Description: Vitrification Bulk Materials, Cable and Conduit
Reference: E-E2-K-02229 (MCC-24M), E-E2-K-02230 (MCC-31M), E-EB-K-00705, J-J8-K-00017, E-EB-K-00705, E-EB-K-00024

All Conduits are IMC type.

				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates				
Item #	**From Equipment**	**To Equipment**	**XGB Length (A) (ft)**	**Qty (A)**	**Cable size/type**	**Conn. (Qty)**	**NGB Length (B) (ft)**	**Length (C) (ft)**	**Length (D) (ft)**	**Qty (D)**	**Size/Desc. (D)**	**Red**	**Notes/Comments**
		004											
27	ICS-CAB-005 I/O	Vitrification Melter VIT-TK-005	160	40	1 PR #16 SH.	1	10		130	1	2" IMC	N	Ref: J-J8-K-00024
28	ICS-CAB-006 I/O	Vitrification Melter VIT-TK-006	150	40	1 PR #16 SH.	1	10		120	1	2" IMC	N	Ref: J-J8-K-00024
29	ICS-CAB-007 I/O	Vitrification Melter VIT-TK-007	135	40	1 PR #16 SH.	1	10		105	1	2" IMC	N	Ref: J-J8-K-00024
30	ICS-CAB-008 I/O	Vitrification Melter VIT-TK-008	142	40	1 PR #16 SH.	1	10		112	1	2" IMC	N	Ref: J-J8-K-00024
31	ICS-CAB-009 I/O	Vitrification Melter VIT-TK-009	175	40	1 PR #16 SH.	1	10		145	1	2" IMC	N	Ref: J-J8-K-00024
32	ICS-CAB-010 I/O	Vitrification Melter VIT-TK-010	155	40	1 PR #16 SH.	1	10		125	1	2" IMC	N	Ref: J-J8-K-00024
33	ICS-CAB-011 I/O	Vitrification GB I/O (-40 EL)	165	30	1 PR #16 SH.	1	10		135	1	2" IMC	N	Ref: J-J8-K-00024
34	I/O Cabinet ICS-CAB-001 thru' 004	VIT-INST-100	120	4	50 - PR # 16 SH				100	4	3" IMC	N	Ref: J-J8-K-00024
35	I/O Cabinet ICS-CAB-005 thru' 010	VIT-INST-200	120	6	50 - PR # 16 SH				100	6	3" IMC	N	Ref: J-J8-K-00024
36	I/O Cabinet ICS-CAB-011	VIT-INST-200	120	1	16 - PR # 16 SH				100	1	2" IMC	N	Ref: J-J8-K-00024
37	VIT-INST-100	Vitrification Melter VIT-TK-001	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
38	VIT-INST-100	Vitrification Melter VIT-TK-002	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
39	VIT-INST-100	Vitrification Melter VIT-TK-003	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
40	VIT-INST-100	Vitrification Melter VIT-TK-004	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024

6.3 ATTACHMENT 3, ELECTRICAL BULK MATERIAL LIST

Description: Vitrification Bulk Materials, Cable and Conduit
Reference: E-E2-K-02229 (MCC-24M), E-E2-K-02230 (MCC-31M), E-EB-K-00705, J-J8-K-00017, E-EB-K-00705, E-EB-K-00024

All Conduits are IMC type.

				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates				
Item #	**From Equipment**	**To Equipment**	**XGB Length (A) (ft)**	**Qty (A)**	**Cable size/type**	**Conn. (Qty)**	**NGB Length (B) (ft)**	**Length (C) (ft)**	**Length (D) (ft)**	**Qty (D)**	**Size/Desc. (D)**	**Red**	**Notes/Comments**
41	VIT-INST-200	Vitrification Melter VIT-TK-005	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
42	VIT-INST-200	Vitrification Melter VIT-TK-006	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
43	VIT-INST-200	Vitrification Melter VIT-TK-007	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
44	VIT-INST-200	Vitrification Melter VIT-TK-008	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
45	VIT-INST-200	Vitrification Melter VIT-TK-009	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
46	VIT-INST-200	Vitrification Melter VIT-TK-010	100	50	1 PR #16 SH.	1	10		70	1	3" IMC	N	Ref: J-J8-K-00024
47	VIT-INST-200	Vitrification GB I/O (-40 EL)	100	16	1 PR #16 SH.	1	10		70	1	2" IMC	N	Ref: J-J8-K-00024
48	Video Equip Rack VIT-VER-001	Pull Box near Vitrification Melter Glovebox # 1 - # 4							220	2	3" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed. 1-3" Conduit (220' long) to a Pull Box near the GBs assumed.
49	Video Equip Rack VIT-VER-001	Pull Box near Vitrification Melter Glovebox # 5 - # 10							175	2	3" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed. 1-3" Conduit (175' long) to a Pull Box near the GBs assumed.
50	Video Equip Rack VIT-VER-001	Pull Box (Vit Rm 1 Pan/Tilt Camera VIT-CCTV-001 thru' 005)							200	2	3" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed. 1-3" Conduit (200' long) to a Pull Box near the room cameras assumed.

6.3 ATTACHMENT 3, ELECTRICAL BULK MATERIAL LIST

Description: Vitrification Bulk Materials, Cable and Conduit
Reference: E-E2-K-02229 (MCC-24M), E-E2-K-02230 (MCC-31M), E-EB-K-00705, J-J8-K-00017, E-EB-K-00705, E-EB-K-00024

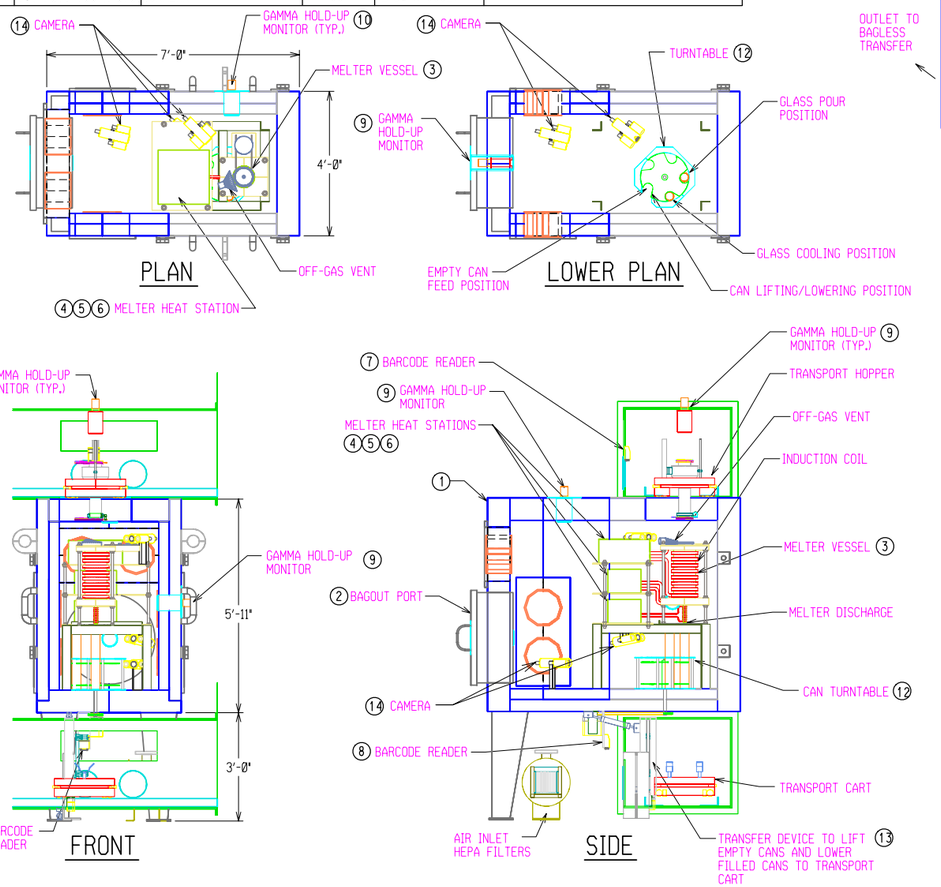
All Conduits are IMC type.

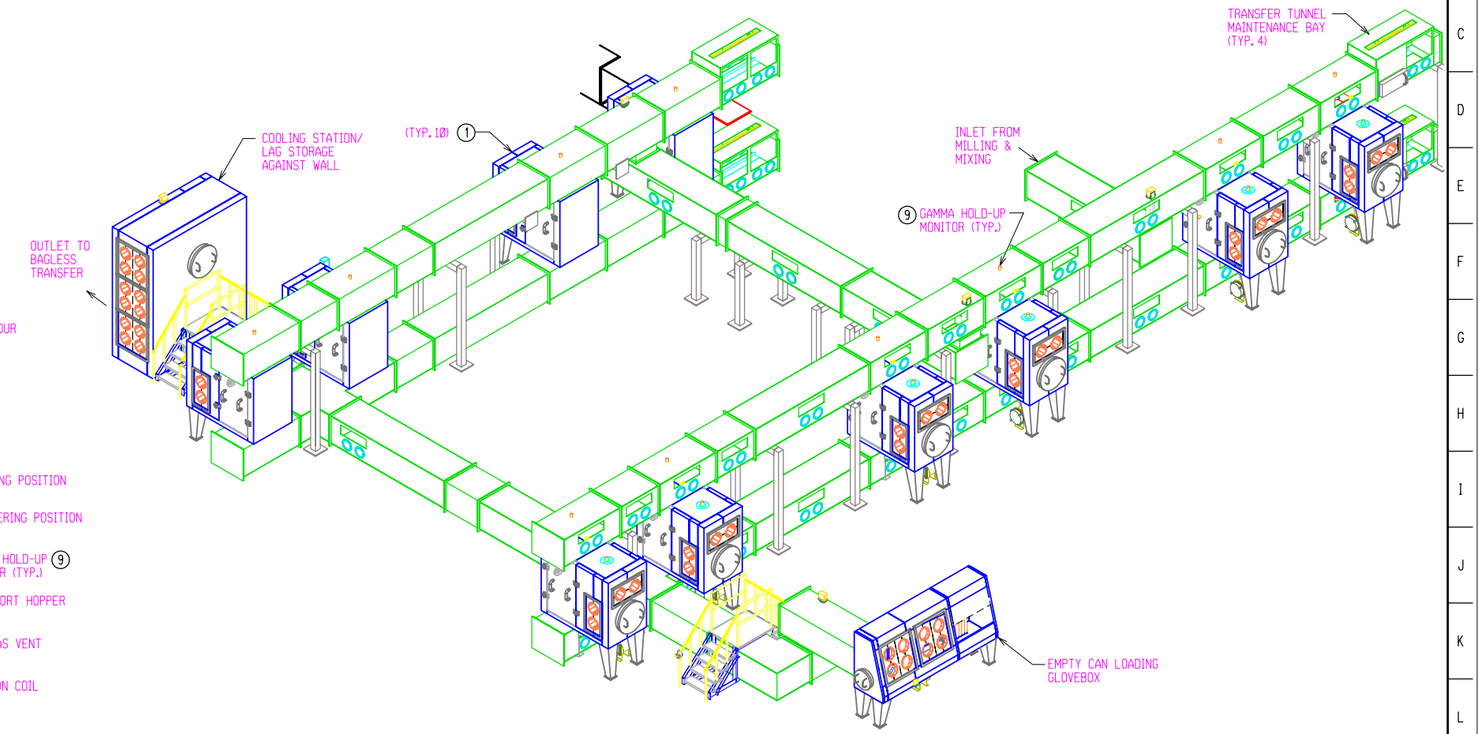
				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates				
Item #	**From Equipment**	**To Equipment**	**XGB Length (A) (ft)**	**Qty (A)**	**Cable size/type**	**Conn. (Qty)**	**NGB Length (B) (ft)**	**Length (C) (ft)**	**Length (D) (ft)**	**Qty (D)**	**Size/Desc. (D)**	**Red**	**Notes/Comments**
51	Pan/Tilt Controller VIT-PTC-001	Pull Box (Vit Rm 1 Pan/Tilt Camera VIT-CCTV-001 thru' 005)							200	2	3" IMC	N	Ref: E-EB-K-00705 Vendor cable size is assumed. 1-3" Conduit (200' long) to a Pull Box near the room cameras assumed.
52	Equipment	Ground Grid	900	1	2/0 Gnd							N	Grounding
53	TOTAL NO. OF GB PENETRATIONS					172							

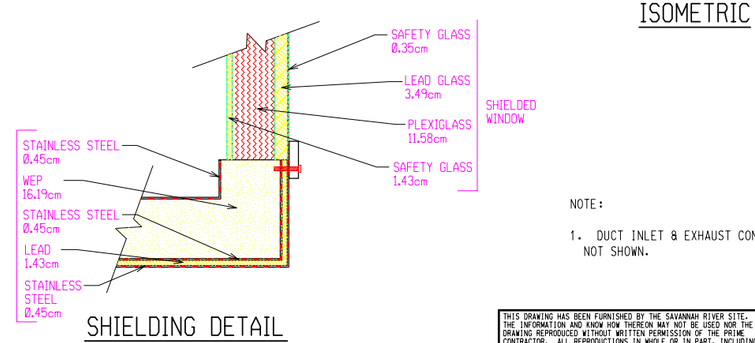
SRP DRAWING NO. N/A

EQUIPMENT: BILL OF MATERIAL

ITEM NO	EQUIPMENT NUMBER	EQUIPMENT NAME	REQUIRED	REF. DOCUMENT	DETAILS
1	GBS-GB-(002-011)	MELTER GLOVEBOX	10	M-SPP-K-00059	
2		BAGOUT PORT	10		
3	VIT-TK-(001-010)	MELTER VESSEL	10	M-DS-K-00088	
4	VIT-HTR-(001-010)A	25KW INDUCTION HEATER	10	M-DS-K-00090	
5	VIT-HTR-(001-010)B	25KW INDUCTION HEATER	10	M-DS-K-00090	
6	VIT-HTR-(001-010)C	25KW INDUCTION HEATER	10	M-DS-K-00090	
7	VIT-RDR-(011-020)	CAN BAR CODE READER	10	J-JD-K-00068	
8	VIT-RDR-(001-010)	HOPPER BAR CODE READER	10	J-JD-K-00068	
9	VIT-RE-(001A-001V)	GAMMA HOLD-UP MONITOR	20	J-JD-K-00069	
10	VIT-RE-(002A-002V)	GAMMA HOLD-UP MONITOR	20	J-JD-K-00069	
11	VIT-RE-(003A-003K)	GAMMA HOLD-UP MONITOR	10	J-JD-K-00069	FOR EXHAUST DUCTS. (NOT SHOWN)
12	VIT-TUTB-(001-010)	CAN TURNTABLE	10	M-DS-K-00091	
13	VIT-GRIP-(001-010)	CAN TRANSFER DEVICE	10	M-DS-K-00091	
14	VIT-PCTV-(001A-010C)	CAMERA	30	E-DS-K-00021	







NOTE:

1. DUCT INLET & EXHAUST CONNECTIONS NOT SHOWN.

UNCLASSIFIED

DOES NOT CONTAIN UNCLASSIFIED CONTROLLED NUCLEAR INFORMATION

ADC &/or Reviewing Official: E.C. TEFT III S. ENG

Date: 2/26/07

LATEST REVISION D

SKETCH NUMBER: SK-DE-VIT-0003

PROJ.	REV. NO.	DATE	REVISION	PRP①	LEAD ENG	CHK①	APRV①	APRV①	APRV①
M09A	A	9/27/06	ISSUED FOR PROJECT USE - SHIELDING CONCEPT - PUDE1350		(SIGNATURES ON FILE)				
M09A	B	10/17/06	ISSUED FOR CDR (PRELIMINARY), ACTIVITY - PUDE1430	VMS	DN	ECT	DF	BCP	NA
M09A	C	1/18/07	ISSUED FOR CDR (PRELIMINARY), ACTIVITY - PUDE71T10	VS	ECT	DN	DF	BCP	N/A
M09A	D	2/26/07	ISSUED FOR CDR (PRELIMINARY) REISSUED FOR DOCUMENT ALIGNMENT	HCC	ECT	DN	DF	BCP	N/A

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REFERENCE DRAWINGS

M-M8-K-00007	VITRIFICATION BLOCK FLOW DIAGRAM
M-M8-K-00015	MATERIAL HANDLING BLOCK FLOW DIAGRAM
M-M5-K-01947	AIR FLOW DIAGRAM
M-M5-K-01948	DRY AIR FLOW DIAGRAM
M-M6-K-02271	DRY AIR P&ID
M-M6-K-02272	GLOVEBOX P&ID

REFERENCE STANDARDS

UNITED STATES DEPARTMENT OF ENERGY

SAVANNAH RIVER SITE

BLDG. NO.	SITE CLEARANCE NO.	DESIGN AREA NO.	DESIGN GROUP
KAC	N/A	100-K	PD&CS

TITLE

PLUTONIUM DISPOSITION PROJECT

VITRIFICATION SYSTEM GLOVEBOX & SHIELDING LAYOUT

PLAN & SECTIONS

SCALE	SRP DRAWING NO.	SHEET NO.	LATEST REVISION
1/2"=1'-0"	N/A	1 OF 1	D

W.S. # ( ) . LEVELS 1111111111222222222333333333444444444555555555666666 PSC-
REF FILES VHBSMon Feb 26 11:03:20 2007 123456789012345678901234567890123456789012345678901234567890123456789012 PLOT DATE

DRAWN BY (ORIG): V. SCHICK LAST CADD REV. BY: V. SCHICK
TIME DATE: 01/16/07

Scale shown on this drawing is only applicable when plotted at 22"x34" (actual drawing size)