PLUTONIUM DISPOSITION PROJECT (U)

Project M09A

SCOPE OF WORK

M-SOW-K-00015 Revision 0
For
Bagless Transfer System (U)

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Revision Page

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1.0 SCOPE

1.1 General Description

This Scope of Work (SOW) covers the Bagless Transfer System for the Plutonium Disposition Project. The Bagless Transfer System encases the Vit Can produced in Vitrification System into a Bagless Can.

The Bagless Transfer System (BTS) consists of one glovebox and three identical air hoods. The three identical air hoods are connected to the glovebox through specially designed septum like partitions called sphincter seals. These seals maintain the helium / air atmosphere in the glovebox and prevent the spread of contamination into the air hoods. The glovebox also contains three resistance welders and three pneumatic jacks to apply a force of about a ton during the brief period of resistance welding process. A can cutter is available in the glovebox to cut open Bagless Cans that failed either the leak check or visual inspection. The bagless can caps are also stored in the glovebox. Each of the three air hoods contain equipment to test for leakage and alpha contamination and a rack to house a supply of bagless cans.

The Vit can is remotely inserted into an empty Bagless Can, a hollow double partitioned lid (bagless can cap) is inserted into the open end of the Bagless Can and the pneumatic press is activated. While the cap is pushed tight into the bagless can with about a ton of force, resistance welding is completed by applying pulses of very high amperage (~2000 amps) current through the Bagless Can. After the welding, the orbiting Can cutter (one can cutter is located in each airhood) will cut the hollow cap between the two partitions. The Bagless Can will be separated from the remaining stub and moved for leak and alpha contamination tests. The remaining portion of the cap (bung) will stay in the sphincter seal until a new Bagless Can is pushed from the air hood side through the sphincter seal dislodging the bung from the sphincter seal into the glovebox for disposal as waste. This operating sequence maintains the integrity of the glovebox and insures the Bagless Can remains contamination free.

1.2 Background

The Office of Environmental Management has approximately 13 metric tons (MT) of plutonium in approximately 21 MT 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 intent 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 GENERAL ACRONYMS/ABBREVIATIONS OFR THE PROJECT MO9A.

DCS	Distributed Control System
DS	Design Services
DWPF	Defense Waste Processing Facility
GIS	Gamma Isotopic System
GS	General Services
IMC	Intermediate Metallic Conduit
KAC	K-Area Complex
LaBS	Lanthanide Borosilicate
LLW	Low Level Waste
MC&A	Material Control and Accountability
MCC	Motor Control Center
MT	Modification Traveler
NFPA	National Fire Protection Association
PC	Performance Category
PC&S	Process and Control Services Department
PU	Plutonium
PUD	Plutonium Disposition
PuVit	Plutonium Vitrification
SC	Safety Class
SDD	System Design Description
SOW	Scope Of Work
SRS	Savannah River Site
SS	Safety Significant
SSC	Structure, System, Component
TBD	To Be Determined
UCNI	Unclassified Controlled Nuclear Information
UNO	Unless Noted Otherwise
WSRC	Washington Savannah River Company

3.0 DESCRIPTION OF PHYSICAL WORK

3.1 Performance Category and Functional Classification (SS, PS,)

3.1.1 Performance Category

3.1.1.1 The performance category for all systems, structures and components associated with the Bagless Transfer System is PC-2. (Reference 6.2.2.1 X-SYD-K-00007, Rev. C)

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:

A. Can cutter

1. Functional Classification – Production Support (PS)

B. Resistance Welder

1. Functional Classification – Production Support (PS)

C. Leak Tester

1. Functional Classification - Production Significant (PS)

D. Alpha Contamination Tester

1. Functional Classification - Safety Significant (SS)

3.2 Mechanical/Nuclear/Process

3.2.1 Bagless Transfer Air Hood Components

3.2.1.1 Refer to M-M8-K-00014 for the basic block flow diagram for the Bagless transfer System. The system consists of one (1) Glovebox and three (3) Air Hoods: Major components within the Air Hoods are

A. Can Cutter (3 each)

B. Alpha Contamination Tester (3 each)

C. Leak Tester (3 each)

D. Manual RemoteHoists (3 each)

3.2.2 Glovebox

M-SPP-K-00059 describes the requirements of a standard glovebox. Drawing SK-DE-BTS-0002 shows the glovebox layout. The present glovebox arrangement allows access to only one side. Glovebox will contain the following major items:

3.2.2.1 Can Cutter (1 each)

3.2.2.2 Resistance Welder (3 each)

Refer to M-M8-K-00014 for the basic block flow diagram.

3.2.3 Piping

3.2.3.1 Piping material is designated by a “P-code” designation from SRS Document WSRC-IM-95-58. The piping material will be welded or utilize flange fittings.

Process piping connected to equipment will have double valving for safety and ease of maintenance.

3.3 Instrumentation and Controls

3.3.1 Material Control and Accountability (MC&A)

3.3.1.1 Refer to Control Block Diagram J-J8-K-00035 for MC&A instrumentation associated with the Bagless Transfer building block. Refer to MC&A Network Drawing, J-J8-K-00049 for connectivity with the MC&A System.

3.3.1.2 Scale (1 each)

The bagless can weigh scale, BTS-SCL-001 (Data Sheet J-JD-K-00065) weighs the bagless can in the input section of the glovebox.

3.3.1.3 Barcode Reader (1 each)

Details for barcode reader, BTS-RDR-001 are contained in Data Sheet J-JD-K-00064.

3.3.1.4 Calorimeters (13 each)

Details for the calorimeters, BTS-CALM-001 throughBTS-CALM-013 are contained in Data Sheet J-JD-K-00062. The calorimeter measuring wells are located on the -40 bagless process area and the calorimeter computer racks, BTS-CALM-001A through BTS-CALM-001G are located at the -20 level in the NDA Electrical Room.

3.3.1.5 Gamma Isotopic System (4 each)

Details for the Gamma Isotopic Systems, BTS-GRIS 001 through BTS-GRIS-004 are contained in Data Sheet J-JD-K-00063. The isotope measuring detectors are located on the -40 level bagless process area and the GIS computer racks BTS-GRIS-001A and BTS-GRIS-001B, for these items are located at the -20 level in the NDA Electrical Room. The Gamma Isotopic Systems have mechanical coolers instead of the normally 30 liter nitrogen dewars to eliminate the need for nitrogen cooling.

3.4 Electrical

3.4.1 The scope will include following 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 field equipment and local controls. Provide onsite setup and assembly of the referenced Engineered Equipment. Refer to the attached Bulk Takeoff for cable and conduit descriptions and quantities.

3.4.1.1 Provide power feeds to three laser cutters BTS-CUTR-001, 002 & 003 located in Bagless transfer area from motor control center ELNH-MCC-24E located at -20' level in Electrical Room #2. See single line diagram E-E2-K-02244.

3.4.1.2 Provide power to three weld controllers BTS-JC-001, 002 & 003 from ELNH-MCC-24E. Extend feeders from weld controllers to welder transformers BTS-XFMR-001, 002 & 003 located on -40' level. See E-E2-K-02244.

3.4.1.3 Provide power to three welders located in glove box from welding transformers by bus connections as provided by manufacturer.

3.4.1.4 Provide 20A, 120V power circuits to Alpha Contamination Tester (3 each) from panel ELLV-PNL-11.

3.4.1.5 Provide 20A, 120V power circuits to Leak Tester (3 each) from panel ELLV-PNL-11.

3.4.1.6 Provide 20A, 120V power circuit to one can cutter located in glow box from panel ELLV-PNL-11.

3.4.1.7 Provide general convenience 20A, 120V power duplex receptacles and other instrument power circuits located in the glow box and in NDA equipment room from panel ELLV-PNL-11 (30 each).

3.5 Plant Design

3.5.1 There is no piping involved inside the glovebox and airhoods.

3.6 Civil/Structural/Architectural

3.6.1 Refer to C-SOW-K-00009.

3.6.2 The C/S/A scope of work required for installation of supports for the major components of Bagless Transfer System is as follows.

3.6.3 <u>Glovebox</u>
The size of the Glovebox is L-shaped 12’ & 10’ long x 4’wide x 6’ high and weighs approximately 53000 lbs. It is supplied with 10 legs with a 6”x6” plate at the bottom. Each leg will be welded to a base plate 12”x12”x ¾” thick and anchored with ¾” diameter bolts to the concrete slab.

3.6.4 Air Hoods [3]
The size of <u>each</u> Air Hood is 16’ long x 4’wide x 6’ high and weighs approximately 16000 lbs. It is supplied with 6 legs with a 6”x6” plate at the bottom. Each leg will be welded to a base plate 12”x12”x ¾” thick and anchored with ¾” diameter bolts to the concrete slab.

4.0 ASSUMPTIONS

4.1 General Assumptions

4.1.1 The Construction Agency will be the SRS Construction Group. DS 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 Instrumentation and Controls

4.2.1.1 No specific assumptions have been made in this group.

4.2.2 Electrical

4.2.2.1 Connections from the welding transformers to welders in the glow box will be custom manufactured and will be provided by the vendor and installed by the construction.

4.2.3 Plant Design

4.2.3.1 No specific assumptions have been made in this group

4.2.4 Civil/Structural/Architectural

4.2.4.1 Core drills will be required for routing electrical conduit through walls or floors.

4.2.4.2 Assume all anchor bolts used for equipment and commodity supports will be A36 Drillco Maxi bolts. Alternatively, Hilti Kwik Bolts -TZ are acceptable for anchoring items.

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

4.2.4.4 Standard HVAC Duct support and details.

4.2.4.5 Any components inside Air Hoods, Glovebox etc. are considered as integral parts of the Air Hoods and Glovebox.

4.2.4.6 The material for all the base plates and structural steel components shall be Galvanized Carbon Steel.

5.0 Technology Development Issues

There are several issues such as Laser Cutter, Resistance Welder – Vertical vs Horizontal, new technology etc.

6.0 REFERENCES

6.1 Drawing List

6.1.1 PUD Project Drawings & Sketches

6.1.1.1 M-M8-K-00014 – Bagless Transfer System Block Flow Diagram
6.1.1.2 M-M8-K-00008 – Bagless Transfer
6.1.1.3 M-M5-K-01972 – Bagless Transfer System Glovebox Ventilation Diagram
6.1.1.4 J-J8-K-00035, Rev. B – Bagless Transfer MC&A Control Block Diagram
6.1.1.5 J-JD-K-00062, Rev. A - Bagless Transport Calorimetrs
6.1.1.6 J-JD-K-00063, Rev. A - Bagless Transfer Gamma Isotopic System
6.1.1.7 J-JD-K-00064, Rev. A - Bagless Transfer Barcode Reader
6.1.1.8 J-JD-K-00065, Rev. A - Bagless Transfer Bagless Can Weigh Scale
6.1.1.9 SK-DE-BTS-0002 - Bagless Transfer Glovebox Layout Drawing (2 pages)
6.1.1.10 SK-DE-BTS-0003, Rev. A - Bagless Transfer Facility Layout
6.1.1.11 M-DS-K-00157 Bagless Can Cutter
6.1.1.12 E-E2-K-02244 – Motor Control Center ELNH-MCC-02244 Single Line Diagram
6.1.1.13 E-E2-K-02233 – Motor Control Center ELNH-MCC-18M Single Line Diagram

6.1.1.14 J-J8-K-00049 – Material Control and Accountability (MC&A) Network Block Diagram

6.1.2 Existing Savannah River Site (SRS) Drawings

6.2 Design Input Documents

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

6.2.1 Facility Design Description

6.2.1.1 G-FDD-K-00001, Rev C "PUV Facility Design Description"

6.2.2 System Design Description

6.2.2.1 X-SYD-K-00007, Rev. C "Bagless Transfer System (07) (BTS)"

6.3 Applicable SRS & Industry Codes, Guides and Standards

6.3.1 Industry Codes and Standards

6.3.1.1 NFPA 70, 2005 – National Electrical Cod

6.3.2 SRS Guides & Standards

6.3.2.1 WSRC-TM-95-1, Standard no. 15060, Rev. 14 "ASME B31.3 Additional Requirements of SRS Piping Systems"
6.3.2.2 WSRC-TM-95-1, Standard no. 15980, Rev. 6, "Mechanical Installation of Safety Class and Safety Significant Instrumentation"
6.3.2.3 WSRC-IM-95-58, Guide no. 15980-G, Rev.3, "Installation and Calibration of Instruments"
6.3.2.4 WSRC-IM-95-58, Guide no. 16051-G, Rev.2, "Installation of Electrical Raceway Systems and Cable Trays"
6.3.2.5 WSRC-IM-95-58, Guide no. 16052-G, Rev.3, "Installation of Electrical Wires, Cables and Terminations"
6.3.2.6 WSRC-IM-95-58, Guide no. 16053-G, Rev.2, "Installation of Electrical Equipment"
6.3.2.7 WSRC-IM-95-58, Guide no. 16056-G, Rev.2, "Installation of Grounding Systems"

6.3.2.8 WSRC-IM-95-58, Guide 03251-G, Rev: 1, Concrete Anchors.
6.3.2.9 WSRC-IM-95-58, Guide 03252-G, Rev: 1, Installation and Testing of Concrete Anchors.
6.3.2.10 WSRC-IM-95-58, Guide 09900-G, Rev. 2, Architectural Field Painting.
6.3.2.11 WSRC-IM-95-58, Guide 09901-G, Rev. 2, Protective Coatings - Concrete and Masonry

6.4 Related Scopes of Work (SOW)

6.4.1 C-SOW-K-00009, Civil/Structural/Architectural Systems.

6.4.2 M-SOW-K-00020, HVAC System.

6.4.3 E-SOW-K-00017, Electrical Power Supply System.

6.4.4 J-SOW-K-00002, Integrated Control System/ and MC&A Network.

6.5 Miscellaneous

6.5.1 C-CI-G-0039, Rev: 0, Electrical Conduit and Equipment Supports.
6.5.2 C-CH-G-00004, Rev. 0, Routing & Supports for NPS 2 and Smaller Piping.

7.0 ATTACHMENTS.

7.1 Attachment 1, Bulk material List – C/S/A
7.2 Attachment 2, Bulk Material List – Electrical Cable and Conduit.

7.1 Attachment 1, Bulk material List – C/S/A

Base Plates	12” x 12” x ¾” thick	16 Ea.
Anchor Bolts	¾” Diameter	64 Ea.

7.2 Attachment 2, Bulk Material List – Electrical Cable and Conduit.

Scope Set: Bagless Transfer System **Date:** 4/11/2007

Prepared By: G. S. Rao **Reviewed By:** Suman Shah

Exterior Glovebox Cables

Sum of Qty XGB (ft)	
Ext. Cable Size/Type	Total
3/C # 6 with #10 ground	360
1/C # 4/0 with 1/C # 4 gnd	1,800
3/C #12	5,980
Vendor Cable	12
Vendor Cable 12/C Cable w/connectors at both ends	3,570
3/C #18	240
2/0 Gnd	200
Grand Total	12,162

Interior Glovebox Cables

Sum of Qty NGB (ft)	
GB Cable Size/Type	Total
3/C #12	140
Vendor Cable	12
Grand Total	152

All Raceway Types

Sum of Qty Rcwy (ft)	
RCWY	Total
0	0
3/4" IMC	7950
2" IMC	60
2-1/2" IMC	200
Grand Total	8210

All Raceway Types Grouped by Red Designation

Sum of Qty Rcwy (ft)		
Red	RCWY	Total
N	0	0
	3/4" IMC	7,950
	2" IMC	60
	2-1/2" IMC	200
Grand Total		8,210

7.2 Continued

	Description:	Bagless Transfer System Bulk Materials, Cable and Conduit											
	Reference:	E-E2-K-02244 (MCC-24E)											
		All Conduits are IMC (Intermediate Metallic Conduit) 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)**	**Length (B) (ft)**	**Length (C) (ft)**	**Length (D) (ft)**	**Qty (D)**	**Size/Desc. (D)**	**Red**	**Notes/Comments**
1	MOTOR CONTROL CENTER ELNH-MCC-24E	Laser Cutter BTS-CUTR-001	120	1	3/C # 6 with #10 ground				100	1	3/4" IMC	N	E-E2-K-02244
2	MOTOR CONTROL CENTER ELNH-MCC-24E	Laser Cutter BTS-CUTR-002	120	1	3/C # 6 with #10 ground				100	1	3/4" IMC	N	E-E2-K-02244
3	MOTOR CONTROL CENTER ELNH-MCC-24E	Laser Cutter BTS-CUTR-003	120	1	3/C # 6 with #10 ground				100	1	3/4" IMC	N	E-E2-K-02244
4	MOTOR CONTROL CENTER ELNH-MCC-24E	Weld Controller BTS-JC-001	40	3	1/C # 4/0 with 1/C # 4 gnd				20	1	2" IMC	N	E-E2-K-02244
5	MOTOR CONTROL CENTER ELNH-MCC-24E	Weld Controller BTS-JC-002	40	3	1/C # 4/0 with 1/C # 4 gnd				20	1	2" IMC	N	E-E2-K-02244
6	MOTOR CONTROL CENTER ELNH-MCC-24E	Weld Controller BTS-JC-003	40	3	1/C # 4/0 with 1/C # 4 gnd				20	1	2" IMC	N	E-E2-K-02244
7	Weld Controller BIS-JC-001	Welder Transformer BTS-XFMR-001	120	4	1/C # 4/0 with 1/C # 4 gnd				100	1	2-1/2" IMC	N	E-E2-K-02244
8	Weld Controller BIS-JC-002	Welder Transformer BTS-XFMR-002	120	4	1/C # 4/0 with 1/C # 4 gnd				100	1	2-1/2" IMC	N	E-E2-K-02244
9	Weld Controller BIS-JC-003	Welder Transformer BTS-XFMR-003	120	4	1/C # 4/0 with 1/C # 4 gnd				100	1	2-1/2" IMC	N	E-E2-K-02244
10	Welder Transformer BTS-XFMR-001	WELDER # 1 BTS-WELD-001	4	1	Vendor Cable	1	4						E-E2-K-02244
11	Welder Transformer BTS-XFMR-002	WELDER # 1 BTS-WELD-002	4	1	Vendor Cable	1	4						E-E2-K-02244
12	Welder Transformer BTS-XFMR-003	WELDER # 1 BTS-WELD-003	4	1	Vendor Cable	1	4						E-E2-K-02244
13	120 V Power Panel ELLV-PNL-11	Alpha Contamination Tester No.1	115	1	3/C #12	1	20		75	1	3/4" IMC	N	
14	120 V Power Panel ELLV-PNL-11	Alpha Contamination Tester No.1	115	1	3/C #12	1	20		75	1	3/4" IMC	N	
15	120 V Power Panel ELLV-PNL-11	Alpha Contamination Tester No.3	115	1	3/C #12	1	20		75	1	3/4" IMC	N	
16	120 V Power Panel ELLV-PNL-11	Leak Tester No.1	115	1	3/C #12	1	20		75	1	3/4" IMC	N	
17	120 V Power Panel ELLV-PNL-11	Leak Tester No.2	115	1	3/C #12	1	20		75	1	3/4" IMC	N	
18	120 V Power Panel ELLV-PNL-11	Leak Tester No.3	115	1	3/C #12	1	20		75	1	3/4" IMC	N	

7.2 Continued

19	120 V Power Panel ELLV-PNL-11	Can Cutter (in GB)	190	1	3/C #12	1	20		150	1	3/4" IMC	N	
20	120 V Power Panel ELLV-PNL-11	Duplex Receptacles & Equipments	170	30	3/C #12				150	30	3/4" IMC	N	
21	CALORIMETER COMPUTER RACKS 1 THRU' 7 BTS-CALM-001A THRU' BTS-CALM-001G	CALORIMETERS (13)	170	13	Vendor Cable 12/C Cable w/connectors at both ends				150	13	3/4" IMC	N	J-J8-K-00035
22	GIS Computer Rack # 1 BTS-GRIA-001A	GAMMA ISOTOPIC SYSTEM # 1 BTS-GRIS-001	170	1	Vendor Cable 12/C Cable w/connectors at both ends				150	1	3/4" IMC	N	J-J8-K-00035
23	GIS Computer Rack # 1 BTS-GRIA-001A	GAMMA ISOTOPIC SYSTEM # 2 BTS-GRIS-002	170	1	Vendor Cable 12/C Cable w/connectors at both ends				150	1	3/4" IMC	N	J-J8-K-00035
24	GIS Computer Rack # 1 BTS-GRIA-001A	GAMMA ISOTOPIC SYSTEM # 3 BTS-GRIS-003	170	1	Vendor Cable 12/C Cable w/connectors at both ends				150	1	3/4" IMC	N	J-J8-K-00035
25	GIS Computer Rack # 1 BTS-GRIA-001A	GAMMA ISOTOPIC SYSTEM # 4 BTS-GRIS-004	170	1	Vendor Cable 12/C Cable w/connectors at both ends				150	1	3/4" IMC	N	J-J8-K-00035
26	GIS Computer Rack # 1 BTS-GRIA-001A	GAMMA ISOTOPIC SYSTEM # 5 BTS-GRIS-005	170	1	Vendor Cable 12/C Cable w/connectors at both ends				150	1	3/4" IMC	N	J-J8-K-00035
27	MCA-CAB-8	CAN WEIGH SCALE BTS-SCL-01	120	1	3/C #18				100	1	3/4" IMC	N	J-J8-K-00035
28	MCA-CAB-8	BAR CODE READER BTS-RDR-001	120	1	3/C #18				100	1	3/4" IMC	N	J-J8-K-00035
29	Equipment	Ground Grid	200	1	2/0 Gnd								
30	TOTAL GB PENETRATIONS					20							