PLUTONIUM DISPOSITION PROJECT (U)

Project M09A

SCOPE OF WORK

M-SOW-K-00026 Revision 0
for
Green Fuel Disassembly System (U)

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Date: 4/11/07

Revision Page

Revision	Revision Date	Affected Section	Description of Change
0	4/12/07	N/A	Initial Revision

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1.0 SCOPE

1.1 General Description

This Scope of Work (SOW) covers the Green Fuel Disassembly System (GFDS) for the Plutonium Disposition Project. The GFDS will receive Hanford Unirradiated Fuel Packages (HUFPs). Each HUFP contains one Core Component Container (CCC). There will be a total of 13 CCC's received by PUD

- 9 containing a total of 56 Fast Flux Test Facility (FFTF) Driver Fuel Assemblies (DFA) (217 pins per assembly totaling 12152 pins)
- 4 containing a total of 21 Ident-69s (4125 pins).

Each pin contains approximately 150 pressed and sintered mixed uranium/plutonium oxide pellets. One DFA or Ident will be removed from a CCC at a time and moved into the GFDS air hood. Either a pin bundle from a DFA or individual pins from an Ident-69 will be removed and transferred through an airlock into the GFDS glovebox. Once inside the glovebox, these pins will be disassembled and the fuel placed in Pin Fuel Cans for transport to the Feed Preparation System (FPS). The non-fuel metal will be discarded as waste.

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 Vitrification Facility (PVF) 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 ACRONYMS/ABBREVIATIONS

Acronym / Abbreviation	Definition
CCC	Core Component Container
DFA	Driver Fuel Assembly
DOE	Department of Energy
FDD	Facility Design Description
FFTF	Fast Flux Test Facility
FPS	Feed Preparation System
GFDS	Green Fuel Disassembly System
GS	General Support
HUFP	Hanford Unirradiated Fuel Package
I&C	Instrumentation and Controls
KAC	K Area Complex
MC&A	Material Control and Accountability
MCC	Motor Control Center
MT	Metric Tons
PS	Production Support
PUD	Plutonium Disposition
PUV	Plutonium Vitrification
PVF	Plutonium Vitrification Facility
SC	Safety Class
SDD	System Design Description
SOW	Scope of Work
SRS	Savannah River Site
SS	Safety Significant
TBD	To Be Determined
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 functions associated with the Green Fuel Disassembly System is PC-2 (Refer to G-FDD-K-00001).

3.1.2 Functional Classification

3.1.2.1 The Green Fuel Disassembly System 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”.

3.1.2.2 All equipment in the Green Fuel Disassembly System except the glovebox and air hood falls under the Functional Classification, Production Support (PS) (Refer to G-FDD-K-00001).

3.1.2.3 The Green Fuel Disassembly System Glovebox and Air Hood are Functional Classification Safety Significant (SS).

3.2 Mechanical/Nuclear/Process

3.2.1 Green Fuel Disassembly System

3.2.1.1 Refer to the basic block flow diagram M-M8-K-00019 and area layout drawing SK-DE-GFDS-0003 for the Green Fuel Disassembly System. This system is manually operated using hoists, cranes, saws, winches, etc. to disassemble HUFPs and load Pin Fuel Cans with Green Fuel to be transported to the Feed Preparation System (FPS). The major components (Quantity 1 each unless otherwise noted) are:

- Air Hood
  - Equipment No. GBS-HOOD-005
- Glovebox
  - Equipment No. GBS-GB-015
- Crane
  - Equipment No. GFDS-CRN-001
- DFA/Ident Handler
  - Equipment No. GFDS-MAN-001
- Portaband Saw
  - Equipment No. GFDS-SAW-001
- Winch
  - Equipment No. GFDS-HOI-001
- Glovebox Hoist
  - Equipment No. GFDS-HOI-002
- Rotary Saw (2 each)
  - Equipment No. GFDS-SAW-002 and GFDS-SAW-003
- Rod Press
  - Equipment No. GFDS-PRES-001

3.2.2 Air Hood

3.2.2.1 The Air Hood is designed to accept and disassemble a DFA or Ident-69. Refer to drawing SK-DE-GFDS-0001 for Air Hood dimensions and layout, drawing M-M5-

K-01968 for Air Hood air flow rate requirements, and specification M-SPP-K-00059 for the general air hood requirements.

3.2.2.2 The Air Hood will contain a Portaband Saw and Winch to aid in disassembly.

3.2.2.3 The Air Hood will be provided with room air for ventilation and will be exhausted into the building exhaust sand filter.

3.2.3 Glovebox

3.2.3.1 The Glovebox is designed to accept and disassemble pin bundles or pins and fill pin fuel cans with the fuel before transporting them to the Feed Preparation System (FPS). Refer to drawing SK-DE-GFDS-0001 for glovebox dimensions and layout and specification M-SPP-K-00059 for the general glovebox requirements. Refer to M-M5-K-01968 for glovebox air flow rate requirements.

3.2.3.2 The Glovebox will contain a Glovebox Hoist, two Rotary Saws, and a Rod Press to aid in disassembly.

3.2.3.3 The Glovebox will be provided with room air for ventilation and will be exhausted through a HEPA filter into the building exhaust sand filter.

3.2.4 Crane

3.2.4.1 The Crane is designed to move HUFPs to and from storage, remove the CCC from the HUFP, and remove the DFA or Ident-69 from the CCC and transport it to the DFA/Ident Handler (Refer to M-DS-K-00112).

3.2.5 DFA/Ident Handler

3.2.5.1 The DFA/Ident Handler is designed to rotate the DFA or Ident-69 from a vertical to a horizontal position (Refer to M-DS-K-00113).

3.2.5.2 The DFA/Ident Handler will be equipped with wheels for easy movement over to the Air Hood where a forklift will be used to lift the DFA or Ident-69 into the Air Hood.

3.2.6 Portaband Saw

3.2.6.1 The Portaband Saw is located in the Air Hood and is designed to cut open a DFA or Ident-69 so that the pins can be removed (Refer to M-DS-K-00117).

3.2.7 Winch

3.2.7.1 The Winch is located inside the Air Hood. It is designed to remove the duct from around the fuel pin bundles or individual fuel pins from a DFA or Ident-69, respectively (Refer to M-DS-K-00119).

3.2.8 Rotary Saw

3.2.8.1 The Rotary Saws (2) are located inside the Glovebox and are designed to cut open each end of a fuel pin so that the fuel can be removed via the Rod Press (Refer to M-DS-K-00118).

3.2.9 Rod Press

3.2.9.1 The Rod Press is designed to push the fuel pellets from a pin after it has been cut at both ends by the Rotary Saws.

3.3 Instrumentation and Controls

3.3.1 Material Control and Accountability (MC&A)

Green Fuel Disassembly System contains the following instrumentation for MC&A. Refer to Attachment 1 – Bulk Electrical Materials for cable and conduit descriptions and quantities.

3.3.1.1 Cables and equipment associated with the MC&A system are designated as "Red" (i.e. classified) and shall be installed per requirements of S-SRI-K-00005 (e.g. marking, separation) and security plan documents (later).

3.3.1.2 One Gamma Isotopic System, GFDS-GRIS-001, for the MC&A system. Refer to data sheets J-JD-K-00046 and drawing J-J8-K-00048

3.3.1.3 One Pin Fuel Can Scale, GFDS-SCL-001, located in the Green Fuel Glovebox. Refer to Data Sheet J-JD-K-00047 and drawing J-J8-K-00048..

3.3.1.4 One Active/Passive Neutron Multiplicity Counter, GFDS-NCC-001, for measuring neutron activity of Green Fuel. Refer to Data Sheet J-JD-K-00048 and drawing J-J8-K-00048.

3.3.1.5 Four Gamma Holdup Monitors, GFDS-RE/RT-001 through 004, are installed in the Green Fuel Glovebox. Refer to Data Sheet J-JD-K-00163 and drawing J-J8-K-00048.

3.4 Electrical

3.4.1 The GFDS System will contain the 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. Approximately 6 Glovebox Feed-thru Penetrations Connector Assemblies are required for service to electrical and I&C components/equipment located within the glovebox.

3.4.1.1. Electrical power distribution will be as shown on single line drawings E-E2-K-02232. The following two power panels will be located in the GFDS general area (refer drawing SK-DE-GFDS-0003) to feed the Electrical, I & C and Mechanical loads.

1. 480 Volts, 3 phase, 4 wire, Green Fuel Power Panel ELNH-PNL-001

2. 208/120 Volts, 100 A, Green Fuel Power Panel ELNH-PNL-012

3.4.1.2 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 will be grounded in accordance with code and or industry practices.

3.4.1.3 Provide and install Junction boxes, pull boxes, cables, conduits.

3.4.1.4 Refer to Attachment 3, Bulk Electrical Materials for cable and conduit descriptions and quantities. Unless otherwise stated, it is the responsibility of the installer to provide these commodities.

3.5 Plant Design

3.5.1 No piping is associated with this Scope of Work.

3.6 Civil/Structural/Architectural

3.6.1 The C/S/A scope of work required for installation of supports for the major components of Green Fuel Disassembly System is as follows.

3.6.2 Glovebox
The size of the Glovebox is approximately 16'x 4' x 7' high and weighs approximately 36100 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. Follow the manufacturer's recommendations for the support details.

3.6.3 Air Hood
The size of the Air Hood is approximately 25' x 4' x 7' high and weighs approximately 26700 lbs. It is supplied with a mounting frame. It will be anchored with ½" diameter bolts to the concrete slab. Follow the manufacturer's recommendations for the support details.

3.6.4 HUFP Handler
The size of the HUFP Handler is approximately 7' x 8' x 19' high and weighs approximately 13300 lbs. It is supplied with a mounting frame. It will be anchored with ¾" diameter bolts to the concrete slab. Follow the manufacturer's recommendations for the support details.

3.6.5 DFA Handler
The size of the DFA Handler is approximately 2' x 2' x 14' high with the capacity to handle one DFA weighing approximately 400 lbs. It is supplied with a mounting frame. It will be anchored with ½" diameter bolts to the concrete slab. Follow the manufacturer's recommendations for the support details.

3.6.6 Crane
The frame of structural steel beams and columns will be erected to support the crane. The columns will be welded to 15" x 15" x 1" thick base plates with 1"diameter bolts anchored to the concrete ceiling. Follow the manufacturer's recommendations for the support details for the Crane.

3.6.7 Storage Rack
The size of the Storage Platform with Bottom Rack is 25' x 13' x 10' high. The weight is approximately 20,000 lbs. based on Richardson's platform guide of 30 lbs/SF of surface area adjusted by factor of 2 to account for increased member size and height above floor.

3.6.8 Platform for HUFP
The size of the HUFP Platform is 30' x 13' x 25' high. The weight is approximately 30,000 lbs. based on Richardson's platform guide of 30 lbs/SF of surface area adjusted by factor of 3 to account for increased member size and height above floor.

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 Construction scope includes initial calibration of instruments installed per this SOW.

4.2.2 Electrical

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

4.2.2.2 Cables installed within Glove boxes will be routed within designated tray, located within GB and/or supported from structural members within GB utilizing cable tie wraps

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

4.2.2.4 Pull/junction boxes will be required at 100 ft. run minimum intervals. Assume box size to be 18” X18” X 6”.

4.2.2.5 Engineered Equipment 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.

4.2.3 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 commodities through existing walls or floors, which is covered in C-SOW-K-00009.

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 Any components inside any equipment like the Glovebox, Air Hood etc. are the integral parts of that equipment as one unit.

4.2.4.4 Functional Classification for drilling holes in concrete surface is SC.

4.3 High Business Decision Estimate Range (BDER)

4.3.1 HUFP requalification for drop testing.

4.4 Maintenance Strategy

4.4.1 Maintenance and replacement of Green Fuel equipment will be manual/hands on. If any Green Fuel equipment fails during operation it will be manually removed and replaced (Refer to M-ESR-K-00017).

5.0 TECHNOLOGY DEVELOPMENT ISSUES

There are no technology development issues associated with the Green Fuel Disassembly System.

6.0 REFERENCES

6.1 Drawing List

6.1.1 PUD Project Drawings & Sketches

6.1.1.1 E-E2-K-02232 – Plutonium Disposition Project Motor Control Center ELNH-MCC-11M

6.1.1.2 J-J8-K-00048 – Green Fuel MC & A Control Block Diagram

6.1.1.3 J-JD-K-00046 – Green Fuel Disassembly Gamma Isotopic System Data Sheet

6.1.1.4 J-JD-K-00047 – Green Fuel Disassembly Pin Fuel Can Weigh Scale Data Sheet

6.1.1.5 J-JD-K-00048 – Green Fuel Disassembly APNMC Data Sheet

6.1.1.6 J-JD-K-00163 – Green Fuel Holdup Monitors

6.1.1.7 M-DS-K-00112 – Green Fuel Disassembly Overhead Bridge Crane Data Sheet

6.1.1.8 M-DS-K-00113 – Green Fuel Disassembly DFA Handler Data Sheet

6.1.1.9 M-DS-K-00117 – Green Fuel Disassembly Band Saw Data Sheet

6.1.1.10 M-DS-K-00118 – Green Fuel Disassembly Rotary Saw Data Sheet

6.1.1.11 M-DS-K-00119 – Green Fuel Disassembly Winch Data Sheet

6.1.1.12 M-M5-K-01968 – Green Fuel Disassembly System Glovebox Airflow Diagram

6.1.1.13 M-M8-K-00019 – Plutonium Disposition Facility Green Fuel Disassembly Material Handling Block Flow Diagram

6.1.1.14 M-SPP-K-00059 – Procurement Specification- Plutonium Disposition Gloveboxes

6.1.1.15 SK-DE-GFDS-0001 – Plutonium disposition Project Green Fuel Disassembly Glovebox and Air Hood Layout

6.1.1.16 SK-DE-GFDS-0002 – Green Fuel System Pin Fuel Can

6.1.1.17 SK-DE-GFDS-0003 – Plutonium Disposition Project Green Fuel Disassembly Area Facility Layout -40 Level

6.1.1.18 SK-DE-GFDS-0004 – Plutonium Disposition Project Green Fuel Storage Rack Plan, Sections, and Details

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-00002, Rev. C, “Green Fuel Disassembly System (GFDS) SDD”

6.2.3 Safeguards and Security Requirements Identification document

6.2.3.1 S-SRI-K-00005, KAC Safeguards and Security Requirements Identification Document for Plutonium Disposition.

6.3 Applicable SRS & Industry Codes, Guides and Standards

6.3.1 Industry Codes and Standards

6.3.1.1 NFPA – 70, 2005 Edition, National Electrical Code.

6.3.2 SRS Guides & Standards

6.3.2.1 WSRC-IM-95-58, Standard 03252-G, Rev: 1, Installation and Testing of Concrete Anchors, December 19, 2005

6.3.2.2 WSRC-IM-95-58, Standard 15980-G, Rev: 3, Installation and Calibration of Instruments, July 16, 2004

6.3.2.3 WSRC-IM-95-58, Standard 16051-G, Rev: 2, Installation of Electrical Raceway Systems and Cable Trays, April 24, 2003

6.3.2.4 WSRC-IM-95-58, Standard 16052-G, Rev: 3, Installation of Electrical Wires, Cables and Terminations, August 15, 2005

6.3.2.5 WSRC-IM-95-58, Standard 16053-G, Rev: 2, Installation of Electrical Equipment, February 12, 2004

6.3.2.6 WSRC-IM-95-58, Standard 16056-G, Rev: 2, Installation of Grounding Systems, August 19, 2003

6.3.2.7 WSRC-TM-95-1, Standard 03010, Rev: 1, Coring, Chipping, and Drilling in Concrete, December 19, 2005

6.3.3 DOE Orders & Standards

6.3.3.1 DOE Manual 470.4-6, Rev: Chg.1, Nuclear Materials Control and Accountability, August 14, 2006

6.4 Related Scopes of Work (SOW)

6.4.1 M-SOW-K-00013, Feed Preparation System – This related SOW provides information on the Feed Preparation System. The Feed Preparation System receives 3013's and Pin Fuel Cans and prepares the contents for Oxidation.

6.4.2 E-SOW-K-00017, Electrical Power Supply System – This related SOW provides information on the electrical power supply for all systems. Electrical power is supplied to main electrical distribution equipment, which is utilized to service process and BOP equipment electrical needs.

6.4.3 C-SOW-K-00009, Scope of Work for Structural & Architectural Modifications for the K-Area Complex.

6.4.4 J-SOW-K-00002, Integrated Control System – This related SOW provides the interface to (automated) process control systems and/or MC&A network equipment included associated with this work scope.

6.4.5 M-SOW-K-00027, Material Handling System – This related SOW provides details on how material is transported between systems.

6.4.6 S-SOW-K-00002, Safeguards and Securities – This related SOW provides details on safeguard and security measures being implemented for each of the systems.

6.5 Miscellaneous

6.5.1 C-CI-G-0039, Rev: 0, Electrical Conduit and Equipment Supports, February 9, 2005.

6.5.2 WSRC-TR-06-0043, Rev: 0, Plutonium Vitrification Facility Consolidated Hazard Analysis, January 2007.

7.0 ATTACHMENTS

Attachment 1 – Bulk Electrical Materials

Attachment 2 – Bulk C/S/A Materials

Attachment 1 – Bulk Electrical Materials

Scope Set: Green Fuel Disassembly System **Date:** 4/5/2007

Prepared By: G.S. Rao **Reviewed By:** Rod King

Exterior Glovebox Cables

Sum of Qty XGB (ft)	
Ext. Cable Size/Type	Total
Cat 5E (4 PR#24)	100
3/C #12	715
USB Cable	220
2/C #16	480
2/0 Gnd	200
12/C Cable w/connectors at both ends Vendor Cable	100
1 PR # 16 SH	480
Grand Total	2,295

Interior Glovebox Cables

Sum of Qty NGB (ft)	
GB Cable Size/Type	Total
3/C #12	120
Cat 5E (4 PR#24)	20
Grand Total	140

All Raceway Types

Sum of Qty Rcwy (ft)	
RCWY	Total
3/4" IMC	695
1-1/2" IMC	60
1" IMC	800
Grand Total	1555

All Raceway Types Grouped by Red Designation

Sum of Qty Rcwy (ft)		
Red	RCWY	Total
N	3/4" IMC	495
	1" IMC	800
Y	3/4" IMC	200
	1-1/2" IMC	60
Grand Total		1,555

NOTE: Red designated raceways are associated with (classified) protected transmission system. Installation and (independent) inspection of these components and their associated wiring shall be per Project

Attachment 1 – Continued

	Description:	Green Fuel Disassembly System Bulk Materials, Cable and Conduit											
	Reference:	E-E2-K-02232 (MCC-11M), J-J8-K-00048, M-DS-K-00117, M-DS-K-00118, J-DS-K-0011											
		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	GFDS Power Panel ELLV-PNL-012	GIS Computer Rack GFDS-GRIS-001A	75	1	3/C #12				55	1	3/4" IMC	N	Ref: E-E2-K-02232 J-J8-K-00048
2	GFDS Power Panel ELLV-PNL-012	Pin Fuel Can Weigh Scale GFDS-SCL-001	110	1	3/C #12	1	20		70	1	3/4" IMC	N	Ref: E-E2-K-02232 J-J8-K-00048
3	GFDS Power Panel ELLV-PNL-012	APNMC - Computer Rack GFDS-NCC-001A	50	1	3/C #12				30	1	3/4" IMC	N	Ref: E-E2-K-02232 J-J8-K-00048
4	GFDS Power Panel ELLV-PNL-012	Greeen Fuel Disassembly Winch GFDS-HOI-001	150	1	3/C #12	1	40		90	1	3/4" IMC	N	Ref: E-E2-K-02232 J-DS-K-00119
5	GFDS Power Panel ELLV-PNL-012	Abrasive Rotary Saw GFDS-SAW-002	110	1	3/C #12	1	20		70	1	3/4" IMC	N	Ref: E-E2-K-02232 M-DS-K-00118
6	GFDS Power Panel ELLV-PNL-012	Abrasive Rotary Saw GFDS-SAW-003	110	1	3/C #12	1	20		70	1	3/4" IMC	N	Ref: E-E2-K-02232 M-DS-K-00118
7	GFDS Power Panel ELLV-PNL-012	Band Saw GFDS-SAW-001	110	1	3/C #12	1	20		70	1	3/4" IMC	N	Ref: E-E2-K-02232 M-DS-K-00117
8	GIS - Computer Rack GFDS-GRIS-001A	Gamma Isotopic System GFDS-GRIS-001	55	1	12/C Cable w/connectors at both ends Vendor Cable				35	1	1-1/2" IMC	Y	Ref: E-E2-K-02232 J-J8-K-00048 Vendor cable size is assumed
9	APNMC - Electronics Rack GFDS-NCC-001A	Active/Passive Neutron Multiplicity Counter GFDS-NCC-001	45	1	12/C Cable w/connectors at both ends Vendor Cable				25	1	1-1/2" IMC	Y	Ref: E-E2-K-02232 J-J8-K-00048 Vendor cable size is assumed
10	MCA-CAB-004	Pin Fuel Can Weigh Scale GFDS-SCL-001	100	1	Cat 5E (4 PR#24)	1	20		60	1	3/4" IMC	Y	Ref: E-E2-K-02232 J-J8-K-00048
11	MCA-CAB-004	Gamma Holdup Monitors GFDS-RT/RE-001 thru 004	55	4	USB Cable				35	4	3/4" IMC	Y	Ref: E-E2-K-02232 J-J8-K-00048
12	Green Fuel Glove Box	Green Fuel I/O Cabinet ICS-CAB-090	120	4	1 PR # 16 SH				100	4	1" IMC	N	Ref: E-E2-K-02232 J-J8-K-00048
13	Green Fuel Glove Box	Green Fuel I/O Cabinet ICS-CAB-090	120	4	2/C #16				100	4	1" IMC	N	Ref: E-E2-K-02232 J-J8-K-00048
14	GFDS Power Panel ELLV-PNL-012	GIS Mechanical Cooler GFDS-CHU-001	60		3/C #12				40	1	3/4" IMC	N	Ref: E-E2-K-02232 J-J8-K-00048
15	Equipment	Ground Grid	200	1	2/0 Gnd								
16	TOTAL NO. OF GB PENETRATIONS					6							

Attachment 2 – Bulk C/S/A Materials

Plates	12” x 12” x ¾” thick	10 Ea.
Plates	15” x 15” x 1” thick	28 Ea. (For Crane)
Anchor Bolts	½” Diameter	60 Ea.
Anchor Bolts	¾” Diameter	66 Ea.
Anchor Bolts	1” Diameter	112 Ea. (For Crane)
Storage Rack	25’ x 13’ x 10’ high	20,000 lbs. of steel
HUFP Platform	30’ x 13’ x 25’ high	30,000 lbs. of steel
Steel Beams	W12 x 22	100 Ft. (For Crane)
Steel Columns	TS 8 x 8 x 0.5	60 Ft. (For Crane)