PLUTONIUM DISPOSITION PROJECT (U)

Project M09A

SCOPE OF WORK

M-SOW-K-00021 Revision 0

for

Balance of Plant – Air Systems (U)

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Revision Page

Revision	Revision Date	Affected Section	Description of Change
0	4/11/07	N/A	Initial Revision

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1.0 SCOPE

1.1 General Description

This Scope of Work (SOW) covers the compressed gas systems included in the Balance of Plant (BOP) for the Plutonium Disposition Project. BOP compressed gas systems include dry air, breathing air, instrument air, helium gas, argon gas, oxidizing gas, and regeneration gas. The instrument air piping system for the PuVit Facility will be connected to the existing K-Area Complex instrument air system. The dry air, breathing air, helium gas, argon gas, oxidizing gas and regeneration gas systems are completely new.

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 ACRONYMS/ABBREVIATIONS

2.1

Acronyms/Abbreviations	Definitions
ASME	American Society of Mechanical Engineers
B&PVC	Boiler and Pressure Vessel Code
BOP	Balance of Plant
C/S/A	Civil/Structural/Architectural
CDR	Conceptual Design Report
degF	Degrees Fahrenheit
DS	Design Services
DWPF	Defense Waste Processing Facility
EM	Environmental Management
FDD	Facility Design Description
GS	General Services
HLW	High Level Waste
ID	Inside Diameter
KAC	K-Area Complex
LaBS	Lanthanide BoroSilicate
MCC	Motor Control Center
MT	Metric Ton
NFPA	National Fire Protection Association
P&ID	Piping & Instrumentation Diagram
PC	Performance Category
PDF	Plutonium Disposition Facility
PFD	Process Flow Diagram
PS	Production Support
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
SV	Solenoid Valve
TBD	To Be Determined
WSRC	Washington Savannah River Company

3.0 DESCRIPTION OF PHYSICAL WORK

3.1 Performance Category and Functional Classification (PS)

3.1.1 Performance Category

3.1.1.1 Performance Category for all BOP Air Systems is PC-2 (Ref. G-FDD-K-00001).

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”. The Functional Classification for various components of BOP Air Systems is as follows:

A. Dry Air
Functional Classification – Production Support (PS)

B. Breathing Air
Functional Classification – Production Support (PS)

C. Instrument Air
Functional Classification – Production Support (PS)

D. Helium Gas
Functional Classification – Production Support (PS)

E. Argon Gas
Functional Classification – Production Support (PS)

F. Oxidizing Gas
Functional Classification – Production Support (PS)

G. Regeneration Gas
Functional Classification – Production Support (PS)

3.2 Mechanical/Nuclear/Process

3.2.1 Dry Air System

3.2.1.1 The Dry Air System provides dry air (-40 deg F dewpoint) to the following services:

A. Oxidation System Exit Staging Glove Box (GBS-GB-001E)

B. Feed Preparation System Glove Box (GBS-ALOK-002, GBS-GB-012B, GBS-ALOK-003, GBS-GB-012C/D)

C. Milling & Mixing System Glove Box (GBS-GB-017)

D. Sections of the Material Handling Tunnel associated or connected with the Gloveboxes in this section.

E. Vitrification Melters (VIT-TK-001 through VIT-TK-010)

3.2.1.2 Refer to M-M5-K-01960 for the Dry Air Flow Diagram. The major components of the Dry Air System are:

A. Dry Air Packaged Unit (2 each)

B. Dry Air Receiver Tank (1 each)

C. Filters at Vitrification Melters (20 each)

D. Piping/Valves. See Piping Isometrics for Bulk Material Quantities.

3.2.1.3 Dry Air Packaged Unit (DRY-DRY-001, DRY-DRY-002)

Each of the two Dry Air Packaged Units (rated for 500 scfm) includes an inlet air filter, centrifugal blower, refrigeration dryer, desiccant dryer, and an outlet air cooler. Each unit shall also include all necessary instruments and controls, and interconnecting piping and wiring. See Data Sheet M-DS-K-00156 for more details.

3.2.1.4 Dry Air Receiver Tank (DRY-VSL-001)

The Dry Air Receiver Tank is a 500 gallon, vertical tank constructed of carbon steel. The tank has design conditions of 10 psig @ 150 degF.

3.2.1.5 Filters at Vitrification Melters (DRY-FLT-003 through DRY-FLT-022)

Each of the twenty dry air filters are constructed of stainless steel and shall be equivalent to Swagelok TF Series filters (Size ½", Sintered Filter Element).

3.2.1.6 Piping/Valves

Piping material is designated by a "P-code" designation from SRS Document WSRC-IM-95-58. The piping material will be threaded, welded or utilize flange fittings. See Piping Isometrics for more details.

3.2.2 Breathing Air System

3.2.2.1 The breathing air system provides CGA Grade D compressed air to the following breathing air manifold locations:

A.	Green Fuel Disassembly Airlock	(-40 elev.)
B.	Bagless Transfer/NDA Room	(-40 elev.)
C.	Oxidation Room	(-40 elev.)
D.	Feed Preparation Room Airlock	(-40 elev.)
E.	Feed Preparation Room	(-40 elev.)
F.	Milling & Mixing Room Airlock	(-40 elev.)
G.	Vitrification Room #1 Airlock	(-40 elev.)
H.	Vitrification Room #3	(-40 elev.)

I. Vitrification Room #2 (-40 elev.)

J. Vitrification Room #5 (-40 elev.)

K. Vitrification Room #4 (-40 elev.)

L. Feed Prep/Oxidation Cont Room Airlock (-40 elev.)

M. Oxidation Room Airlock (-40 elev.)

N. Vitrification Room #3 Airlock (-40 elev.)

O. Bagless Transfer Room Airlock (-40 elev.)

P. Glovebox HEPA Fltr/Mech Equip Rm Airlock (-20 elev.)

Q. TRU Waste Loading Room (-20 elev.)

3.2.2.2 Refer to M-M5-K-01980 for Breathing Air System flow diagram.The major components of the Breathing Air System are:

A. Breathing Air Compressor Package (1 each)

B. Breathing Air Receiver Tank (1 each)

C. Breathing Air Purification System Package (1 each)

D. Breathing Air Particulate Filter (1 each)

E. Breathing Air Bottle Station (1 each)

F. Breathing Air Distribution Manifolds (15 Each)

G. Piping/Valves. See Piping Isometrics for Bulk Material Quantities.

3.2.2.3 Breathing Air Compressor Package (BA-CMP-001)

The breathing air compressor shall be an air-cooled, oil-free, rotary screw compressor capable of providing 280 scfm @ 125 psig. The compressor shall include an inlet filter (BA-FLT-001), aftercooler (BA-HTEX-001), moisture separator (BA-MSR-001), and all required interconnecting piping and instruments/controls. See Data Sheet M-DS-K-00155 for more details.

3.2.2.4 Breathing Air Receiver Tank (BA-VSL-001)

The breathing air receiver tank shall be a 200 gallon, carbon steel vessel with design conditions of 200 psig @ 150 deg F. See Data Sheet M-DS-K-00155 for more details.

3.2.2.5 Breathing Air Purification System Package

The breathing air purification system shall purify 280 scfm (@125 psig) of air to CGA Grade D requirements. The purification system shall include coalescing filter (BA-FLT-003), particulate filter (BA-FLT-004), charcoal filter (BA-FLT-005), air dryer (BA-DRY-001), and CO Monitor (BA-MON-001). See Data Sheet M-DS-K-00155 for more details.

3.2.2.6 Breathing Air Particulate Filter (BA-FLT-002)

The breathing air particulate filter removes particulate sizes 1 micron and greater from a breathing air flow rate of 280 scfm. Design conditions are 150 psig at 150 degF. Suggested Manufacturers include Ingersoll-Rand, Hankison, and Atlas Copco or approved equal.

3.2.2.7 Breathing Air Bottle Station (BA-STAT-001)

The breathing air bottle station is assumed be a station consisting of 8-10 bottles **[HOLD]** of high pressure air manifolded together.

3.2.2.8 Breathing Air Distribution Manifolds

Provide Breathing Air Distribution Manifolds per Engineering Standard 11595, at locations identified in section 3.2.2.1 above.

3.2.2.9 Piping/Valves

Piping material is designated by a “P-code” designation from SRS Document WSRC-IM-95-58. The piping material will be welded, threaded or utilize flange fittings. See Piping Isometrics for more details.

3.2.3 Instrument Air System

3.2.3.1 The Instrument Air System shall be connected to the existing KAC instrument air system. The new Instrument Air System piping provides instrument air to the following locations:

A. Oxidation Room

B. Bagless Transfer Room

C. Milling & Mixing Room

D. Feed Preparation Room

E. Vitrification Rooms

3.2.3.2 Refer to M-M5-K-01961 for PFD for the Instrument Air System. The major components of the Instrument Air System are:

A. Piping/Valves. See Piping Isometrics for Bulk Material Quantities.

B. Wall mounted SV Cabinet (for pneumatic controlled components).

3.2.3.3 Piping/valves

Piping material is designated by a “P-code” designation from SRS Document WSRC-IM-95-58. The piping material will be welded, threaded or utilize flange fittings. See Piping Isometrics for more details.

3.2.3.4 SV Cabinets

Total of five cabinets with distribution manifolds with each containing twelve (12) 3 way solenoid valves. Cabinet size is 24”x24”x10”.

3.2.4 Helium Gas

The Helium Gas System provides helium gas to the bagless transfer glovebox.

3.2.4.1 The major components of the Helium Gas System are:

A. Compressed Helium Gas Bottles (2 each **[HOLD]**)

Piping/Valves. See Piping Isometrics for Bulk Material Quantities.

3.2.5 Argon Gas

The Argon Gas System provides argon to the metal oxidation glove box and to the metal oxidation furnaces.

3.2.5.1 The major components of the Argon Gas System are:

A. Compressed Argon Gas Bottles (2 each **[HOLD]**)

B. Piping/Valves. See Piping Isometrics for Bulk Material Quantities.

3.2.6 Oxidizing Gas

The Oxidizing Gas System provides a helium/oxygen gas mixture to the metal oxidation furnaces.

3.2.6.1 The major components of the Oxidizing Gas System are:

A. Compressed Oxidizing Gas Bottles (2 each **[HOLD]**)

Piping/Valves. See Piping Isometrics for Bulk Material Quantities.

3.2.7 Regeneration Gas

The regeneration gas system provides an argon/hydrogen gas mixture to the argon purification system.

3.2.7.1 The major components of the Regeneration Gas System are:

A. Compressed Regeneration Gas Bottles (2 each **[HOLD]**)

B. Piping/Valves. See Piping Isometrics for Bulk Material Quantities.

3.3 Instrumentation and Controls

3.3.1 Install five Solenoid Valve Cabinets furnished by Engineering within respective process rooms. Each Solenoid Valve Cabinet will contain a remote controller which communicates with Facility ICS via RS485 or similar protocol.

3.3.2 In addition to the instrument air and communications signal interface connections, the SV racks will receive SV control power from a dedicated branch circuit and control power from a UPS backed source.

3.3.3 Skid mounted instrumentation associated with Dry Air Packaged Unit, Breathing Air Compressor, and other Gas Systems will be connected to ICS System via Air Systems I/O Cabinet to allow system status conditions to be communicated to main CCR.

3.3.4 Bulk Cable/Raceway quantities for I & C components are included in Attachment 1.

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. Electrical power distribution shall be as shown on single line drawings E-E2-K-02232. A 208/120 V Panel is provided to feed the Breathing Air System loads.

3.4.1.2 A total of four Electrical Relay Cabinets (by Engineering) will be required for this Scope. Three will be located on Elevation -40'-0" and one on Elevation -20'-0" for control of the Horns/Strobes and indicating lights on the Breathing Air Manifolds and associated process work areas.

3.4.1.3 Provide and Install 11 Indicating Lights, 11 Breathing Air Acknowledge Push Buttons and 18 Horn/Strobes on Elevation -40"-0" as shown on drawing SK-DE-BOP-0018.

3.4.1.4 Provide and Install 2 Indicating Lights, 2 Breathing Air Acknowledge Push Buttons and 2 Horn/Strobes on Elevation -20'-0" as shown on drawing SK-DE-BOP-0017.

3.4.1.5 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.

3.4.1.6 Provide and install 6-junction boxes of 24" x 24" x 6".

3.4.1.7 Provide and install pull boxes, cables and conduits.

3.4.1.8 See Attachment 1 for listing of Electrical Bulk Materials.

3.5 Plant Design

3.5.1 Piping quantities have been estimated per Piping Isometrics. Add 10% contingency factor to the estimated piping lengths shown on the piping isometrics.

3.6 Civil/Structural/Architectural

3.6.1 The C/S/A scope of work required for installation of supports for the equipments for Compressed Gas System is as follows:

3.6.1.1 Solenoid Valve Cabinets (5 each)
The size of each cabinet will be approx. 24" x 24" x 10" deep and will weigh approx. 100 lbs. It will be provided with the bolt holes for mounting the cabinet. Each cabinet will be supported by a frame made of P1000 unistruts (24"x24") and anchored with ½" dia. bolts to the concrete walls.

3.6.1.2 Relay Cabinets (4 Each)
The size of each Cabinet will be approx. 24” x 10” x 36” high and will weigh approx. 200 lbs. It will be provided with the frame with the bolt holes for mounting the cabinet. Each cabinet will be supported by a frame made of P1000 unistruts (24”x24”) and anchored with ½” dia. bolts to the concrete wall.

3.6.1.3 Breathing Air Purifier System Package (1 Each)
The size of each unit will be approx. 36” x 62” x 71” high and will weigh approx. 1400 lbs. It will be provided with the bolt holes for mounting the cabinet.The unit will be supported by a steel frame made of 4”x4’x1/2” angles and anchored with ½” dia. bolts to the concrete floor.

3.6.1.4 Dry/Breathing Air Receiver Tanks (2 Total)
The size of each tank will be approx. 30” Diameter x 72” high and will weigh approx. 600 lbs. It will be provided with the bolt holes for mounting the tank. It will be anchored with ½” dia. bolts to the concrete floor.

3.6.1.5 Air Compressor[1]
The size of the Unit will be approx. 89” x 54” x 76” high and will weigh approx. 5400 lbs. It will be provided with the bolt holes for mounting the unit. It will be anchored with ¾ ” Dia. bolts to the concrete floor.

3.6.1.6 Dry Air Packaged Units [2]
The size of each Unit will be approx. 7’ x 17’ and will weigh approx. 8500 lbs. It will be provided with the bolt holes for mounting the cabinet. Each unit will be anchored with ¾ ” dia. bolts to the concrete floor.

3.6.1.7 Estimated number of ½” diameter bolts= 60 Nos.

3.6.1.8 Estimated number of 3/4” diameter bolts= 120 Nos.

3.6.1.9 P1000 Unistrut = 64 ft

3.6.1.10 L 4x4x1/2” Angle = 172 ft

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.

4.1.4 All vessels with an ID 6" or greater shall be per ASME B&PVC Section VIII, Division 1 code stamped or an approved waiver. An appropriate SRS verification record will be competed for each vessel and pressure protection device (disk or valve).

4.1.5 All piping will be per ASME B31.3.

4.2 Specific Assumptions

4.2.1 Instrumentation and Controls

No specific assumptions have been made.

4.2.2 Electrical

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

4.2.2.2 The existing grounding grid is intact and adequate for grounding of new equipment.

4.2.3 Plant Design

No specific assumptions have been made.

4.2.4 Mechanical

4.2.4.1 The existing KAC Facility Instrument Air system has sufficient capacity to meet both the existing KAC facility instrument air demands and the new PuVit Facility instrument air demands.

4.2.5 Civil/Structural/Architectural

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

4.2.5.2 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.

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

4.2.5.4 Any components inside any equipment like Glove Box Cabinets etc. are the integral parts of this equipment as one unit.

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

4.2.5.6 For electrical conduits and equipment supports, use cookbook No. C-CI-G-0039, Rev 0.

4.2.5.7 For routing and supports for NPS 2” and smaller piping, use cookbook no. C-CH-G-00004 Rev. 0.

5.0 TECHNOLOGY DEVELOPEMNT ISSUES

There are currently no technology issues for the DA, BA, and IA systems.

6.0 REFERENCES

6.1 Drawing List

6.1.1 PUD Project Drawings & Sketches

6.1.1.1 M-M5-K-01960, Rev B, Dry Air PFD
6.1.1.2 M-M5-K-01961, Rev A, Instrument Air PFD
6.1.1.3 M-M5-K-01980, Rev A, Breathing Air PFD Exchanger
6.1.1.4 M-DS-K-00155, Rev A, Breathing Air System Data Sheet
6.1.1.5 M-DS-K-00156, Rev B, Dry Air System Data Sheet
6.1.1.6 SK-DE-ISO-0004, Rev A, Breathing Air Piping Isometric
6.1.1.7 SK-DE-ISO-0010, Rev A, Breathing Air Piping Isometric
6.1.1.8 SK-DE-ISO-0011, Rev A, Dry Air Piping Isometric
6.1.1.9 SK-DE-ISO-0012, Rev A, Instrument Air Piping Isometric
6.1.1.10 SK-DE-ISO-0038, Rev A, Oxygen/Helium Gas Piping Isometric
6.1.1.11 SK-DE-ISO-0039, Rev A, Oxygen/Helium Gas Piping Isometric
6.1.1.12 SK-DE-ISO-0040, Rev A, Regeneration Gas Piping Isometric
6.1.1.13 SK-DE-ISO-0041, Rev A, Regeneration Gas Piping Isometric
6.1.1.14 SK-DE-ISO-0042, Rev A, Argon Gas Piping Isometric
6.1.1.15 SK-DE-ISO-0043, Rev A, Argon Gas Piping Isometric
6.1.1.16 SK-DE-ISO-0044, Rev A, P-10 Gas Piping Isometric
6.1.1.17 SK-DE-ISO-0045, Rev A, P-10 Gas Piping Isometric
6.1.1.18 SK-DE-ISO-0046, Rev A, Helium Gas Piping Isometric
6.1.1.19 SK-DE-ISO-0047, Rev A, Helium Gas Piping Isometric
6.1.1.20 SK-DE-ISO-0051, Rev A, Regeneration Gas Piping Isometric
6.1.1.21 SK-DE-ISO-0052, Rev A, Regeneration Gas Piping Isometric
6.1.1.22 SK-DE-ISO-0053, Rev A, Breathing Air Piping Isometric
6.1.1.23 SK-DE-BOP-0017, Rev. A, Breathing Air Manifold Location Plan, Elevation -20
6.1.1.21 SK-DE-BOP-0018, Rev. A, Breathing Air Manifold Location Plan, Elevation -40
6.1.1.22 E-E2-K-02232, Rev. C, HVAC Motor Single Line Diagram Motor Control Center - ELNH-MCC-11M
6.1.1.23 SK-DE-EA-0001, Rev. A, 480V Standby Backup Power, Power Plan 108-1K
6.1.1.24 SK-DE-BOP-0017, Rev. A, Breathing Air Manifold Location Plan, Elevation -20
6.1.1.21 SK-DE-BOP-0018, Rev. A, Breathing Air Manifold Location Plan, Elevation -40

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 B “PUV Facility Design Description”

6.2.2 System Design Description

6.2.2.1 N/A

6.3 Applicable SRS & Industry Codes, Guides and Standards

6.3.1 Industry Codes and Standards

6.3.1.1 ASME B31.3, 2006 - Chemical Plant and Petroleum Refinery Piping
6.3.1.2 ASME Boiler and Pressure Vessel Code, Sect. VIII, Div. 1, 2006
6.3.1.3 NFPA 70, 2005 – National Electrical Code

6.3.2 SRS Guides & Standards

6.3.2.1 WSRC-TM-95-1, Standard no. 15980, Rev. 6, “Mechanical Installation of Safety Class and Safety Significant Instrumentation”
6.3.2.2 WSRC-TM-95-1, Standard no. 11595, Rev. 2, “Breathing Air Distribution Systems”
6.3.2.3 WSRC-IM-95-58, Guide No. 15060-G, Rev. 5, “Application of ASME B31.3”
6.3.2.4 WSRC-IM-95-58, Guide No. 15980-G, Rev.3, “Installation and Calibration of Instruments”
6.3.2.5 WSRC-IM-95-58, Guide No. 16051-G, Rev.2, “Installation of Electrical Raceway Systems and Cable Trays”
6.3.2.6 WSRC-IM-95-58, Guide No. 16052-G, Rev.3, “Installation of Electrical Wires, Cables and Terminations”
6.3.2.7 WSRC-IM-95-58, Guide No. 16053-G, Rev.2, “Installation of Electrical Equipment”
6.3.2.8 WSRC-IM-95-58, Guide No. 16056-G, Rev.2, “Installation of Grounding Systems”
6.3.2.9 WSRC-IM-95-58, Guide No. 03251-G, Rev: 1, Concrete Anchors.
6.3.2.10 WSRC-IM-95-58, Guide No. 03252-G, Rev: 1, Installation and Testing of Concrete Anchors.
6.3.2.11 WSRC-IM-95-58, Guide No. 09900-G, Rev. 2, Architectural Field Painting.
6.3.2.12 WSRC-IM-95-58, Guide No. 09901-G, Rev. 2, Protective Coatings - Concrete and Masonry.

6.4 Related Scopes of Work (SOW)

6.4.1 C-SOW-K-00009, Rev 0, Civil/Structural/Architectural Scope of Work

6.4.2 M-SOW-K-00011, Rev 0, Vitrification Scope of Work

6.4.3 M-SOW-K-00013, Rev 0, Feed Preparation Scope of Work

6.4.3 M-SOW-K-00014, Rev 0, Milling & Mixing Scope of Work.

6.4.4 M-SOW-K-00015, Rev 0, Bagless Transfer and NDA Scope of Work.

6.4.5 M-SOW-K-00019, Rev 0, Metal Oxidation Scope of Work

6.4.6 M-SOW-K-00020, Rev 0, HVAC System Scope of Work

6.4.7 E-SOW-K-00017, Rev 0, Electrical Power System Scope of Work

6.5 Miscellaneous

6.5.1 M&O-NMM-2006-00101, Plant Support System Assessment (Mechanical) for the Plutonium Disposition Project

7.0 ATTACHMENTS

7.1 Attachment 1, Electrical Bulk Material List (4 pages)

ATTACHMENT No. 1
(Bulk Material Summary-Electrical)
BOP - AIR SYSTEMS

Scope Set: Balance of Plant - Air Systems **Date:** 4/3/2007

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

Exterior Glovebox Cables

Sum of Qty XGB (ft)	
Ext. Cable Size/Type	Total
3/C # 2/0	80
3/C # 8	280
7/C #14	300
5/C #14	3,805
2/0 Gnd	200
3/C #12	4,520
4-20 mA Instrument Cable	900
3/C #14	1,700
2 PR #16	725
3 PR #16	300
Grand Total	12,810

All Raceway Types

Sum of Qty Rcwy (ft)	
RCWY	Total
1-1/2" IMC	540
2" IMC	260
3/4" IMC	7920
1" IMC	480
Grand Total	9200

Description: BOP-Compressed Gas Systems Bulk Materials, Cable and Conduit

Reference: E-E2-K-02232 (MCC-11M), J-J8-K-00050, SK-DE-EA-0001, SK-DE-BOP-0017, SK-DE-BOP-0018, M-M5-K-01961

All Conduits are IMC (Intermediate Metallic Conduit) type.

DO NOT ENTER DATA IN THIS TABLE (BELOW ARE CALCUATED FIELDS)

				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates					XGB Cable Sum.		NGB Cable Sum.		Raceway Summary		
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**	*Ext. Cable Size/Type*	*Qty XGB (ft)*	*GB Cable Size/Type*	*Qty NGB (ft)*	*RCWY*	**Red**	*Qty Rcwy (ft)*
1	Motor Control Center ELNH-MCC-11M	Dry Air Skid DRY-DRY-001	140	1	3/C # 8				120	1	1-1/2" IMC	N	Ref: E-E2-K-02232 SK-DE-EA-0001	*3/C # 8*	*140*	*N/A*	*0*	*1-1/2" IMC*	*N*	*120*
2	Motor Control Center ELNH-MCC-11M	Dry Air Skid DRY-DRY-002	140	1	3/C # 8				120	1	1-1/2" IMC	N	Ref: E-E2-K-02232 SK-DE-EA-0001	*3/C # 8*	*140*	*N/A*	*0*	*1-1/2" IMC*	*N*	*120*
3	Motor Control Center ELNH-MCC-11M	Breathing Air Compressor BA-CMP-001	80	1	3/C # 2/0				60	1	2" IMC	N	Ref: E-E2-K-02232 SK-DE-EA-0001	*3/C # 2/0*	*80*	*N/A*	*0*	*2" IMC*	*N*	*60*
4	Dry Air Skid DRY-DRY-001	Air System, I/O Cabinet ICS-CAB-050	100	1	7/C #14				80	1	3/4" IMC	N	Ref: E-E2-K-02232 SK-DE-EA-0001	*7/C #14*	*100*	*N/A*	*0*	*3/4" IMC*	*N*	*80*
5	Dry Air Skid DRY-DRY-002	Air System, I/O Cabinet ICS-CAB-050	100	1	7/C #14				80	1	3/4" IMC	N	Ref: J-J8-K-00050 SK-DE-EA-0001	*7/C #14*	*100*	*N/A*	*0*	*3/4" IMC*	*N*	*80*
6	Breathing Air Compressor BA-CMP-001	Air System, I/O Cabinet ICS-CAB-050	100	1	7/C #14				80	1	3/4" IMC	N	Ref: J-J8-K-00050 SK-DE-EA-0001	*7/C #14*	*100*	*N/A*	*0*	*3/4" IMC*	*N*	*80*
7	Dry Air Skid DRY-DRY-001	Air System, I/O Cabinet ICS-CAB-050	100	3	4-20 mA Instrument Cable				80	1	1" IMC	N	Ref: J-J8-K-00050 SK-DE-EA-0001	*4-20 mA Instrument Cable*	*300*	*N/A*	*0*	*1" IMC*	*N*	*80*
8	Dry Air Skid DRY-DRY-002	Air System, I/O Cabinet ICS-CAB-050	100	3	4-20 mA Instrument Cable				80	1	1" IMC	N	Ref: J-J8-K-00050 SK-DE-EA-0001	*4-20 mA Instrument Cable*	*300*	*N/A*	*0*	*1" IMC*	*N*	*80*
9	Breathing Air Compressor BA-CMP-001	Air System, I/O Cabinet ICS-CAB-050	100	3	4-20 mA Instrument Cable				80	1	1" IMC	N	Ref: J-J8-K-00050 SK-DE-EA-0001	*4-20 mA Instrument Cable*	*300*	*N/A*	*0*	*1" IMC*	*N*	*80*
10	Dry Air Skid DRY-DRY-001	Air System, I/O Cabinet ICS-CAB-050	100	1	3 PR #16				80	1	1" IMC	N	Ref: J-J8-K-00050 SK-DE-EA-0001	*3 PR #16*	*100*	*N/A*	*0*	*1" IMC*	*N*	*80*
11	Dry Air Skid DRY-DRY-002	Air System, I/O Cabinet ICS-CAB-050	100	1	3 PR #16				80	1	1" IMC	N	Ref: J-J8-K-00050 SK-DE-EA-0001	*3 PR #16*	*100*	*N/A*	*0*	*1" IMC*	*N*	*80*
12	Breathing Air Compressor BA-CMP-001	Air System, I/O Cabinet ICS-CAB-050	100	1	3 PR #16				80	1	1" IMC	N	Ref: J-J8-K-00050 SK-DE-EA-0001	*3 PR #16*	*100*	*N/A*	*0*	*1" IMC*	*N*	*80*
13	Relay Panel No.1	120 V Power Panel	70	1	3/C #12				50	1	3/4" IMC	N	Ref: SK-DE-BOP-0017	*3/C #12*	*70*	*N/A*	*0*	*3/4" IMC*	*N*	*50*
14	Relay Panel No.1	Air System I/O Cabinet ICS-CAB-050	170	1	5/C #14				150	1	3/4" IMC	N	Ref: SK-DE-BOP-0018 J-J8-K-00050	*5/C #14*	*170*	*N/A*	*0*	*3/4" IMC*	*N*	*150*
15	Relay Panel No.1	Horns/Strobes (2)	205	2	5/C #14				185	2	3/4" IMC	N	Ref: SK-DE-BOP-0017	*5/C #14*	*410*	*N/A*	*0*	*3/4" IMC*	*N*	*370*
16	Relay Panel No.1	Indicating lights (2)	205	2	3/C #12				185	2	3/4" IMC	N	Ref: SK-DE-BOP-0017	*3/C #12*	*410*	*N/A*	*0*	*3/4" IMC*	*N*	*370*
17	Relay Panel No.1	BA Ack. Buttons(2) (via JB No.1)	170	2	3/C #14			75	75	2	3/4" IMC		Ref: SK-DE-BOP-0017 (shared conduit)	*3/C #14*	*340*	*N/A*	*0*	*3/4" IMC*	*N*	*150*
18	Relay Panel No.2	120 V Power Panel	70	1	3/C #12				50	1	3/4" IMC	N	Ref: SK-DE-BOP-0018	*3/C #12*	*70*	*N/A*	*0*	*3/4" IMC*	*N*	*50*
19	Relay Panel No.2	Air System I/O Cabinet ICS-CAB-050	220	1	5/C #14				200	1	3/4" IMC	N	Ref: SK-DE-BOP-0018 J-J8-K-00050	*5/C #14*	*220*	*N/A*	*0*	*3/4" IMC*	*N*	*200*
20	Relay Panel No.2	Horns/Strobes (6)	150	6	5/C #14				130	6	3/4" IMC	N	Ref: SK-DE-BOP-0018	*5/C #14*	*900*	*N/A*	*0*	*3/4" IMC*	*N*	*780*
21	Relay Panel No.2	Indicating lights (3)	160	3	3/C #12				140	3	3/4" IMC	N	Ref: SK-DE-BOP-0018	*3/C #12*	*480*	*N/A*	*0*	*3/4" IMC*	*N*	*420*
22	Relay Panel No.2	BA Ack. Buttons(3) (via JB No.2)	170	3	3/C #14			75	75	3	3/4" IMC		Ref: SK-DE-BOP-0018 (shared conduit)							
23	Relay Panel No.3	120 V Power Panel	70	1	3/C #12				50	1	3/4" IMC	N	Ref: SK-DE-BOP-0018	*3/C #12*	*70*	*N/A*	*0*	*3/4" IMC*	*N*	*50*
24	Relay Panel No.3	Air System I/O Cabinet ICS-CAB-050	195	1	5/C #14				175	1	3/4" IMC	N	Ref: SK-DE-BOP-0018 J-J8-K-00050	*5/C #14*	*195*	*N/A*	*0*	*3/4" IMC*	*N*	*175*
25	Relay Panel No.3	Horns/Strobes (6)	155	6	5/C #14				135	6	3/4" IMC	N	Ref: SK-DE-BOP-0018	*5/C #14*	*930*	*N/A*	*0*	*3/4" IMC*	*N*	*810*
26	Relay Panel No.3	Indicating lights (4)	150	4	3/C #12				130	4	3/4" IMC	N	Ref: SK-DE-BOP-0018	*3/C #12*	*600*	*N/A*	*0*	*3/4" IMC*	*N*	*520*

				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates					XGB Cable Sum.		NGB Cable Sum.		Raceway Summary		
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	Ext. Cable Size/Type	Qty XGB (ft)	GB Cable Size/Type	Qty NGB (ft)	RCWY	Red	Qty Rcwy (ft)
27	Relay Panel No.3	BA Ack. Buttons(4) (via JB No.3)	170	4	3/C #14			75	75	4	3/4" IMC		Ref: SK-DE-BOP-0018 (shared conduit)	3/C #14	680	N/A	0	3/4" IMC	N	300
28	Relay Panel No.4	120 V Power Panel	70	1	3/C #12				50	1	3/4" IMC	N	Ref: SK-DE-BOP-0018	3/C #12	70	N/A	0	3/4" IMC	N	50
29	Relay Panel No.4	Air System I/O Cabinet ICS-CAB-050	170	1	5/C #14				150	1	3/4" IMC	N	Ref: SK-DE-BOP-0018 J-J8-K-00050	5/C #14	170	N/A	0	3/4" IMC	N	150
30	Relay Panel No.4	Horns/Strobes (6)	135	6	5/C #14				115	6	3/4" IMC	N	Ref: SK-DE-BOP-0018	5/C #14	810	N/A	0	3/4" IMC	N	690
31	Relay Panel No.4	Indicating lights(4)	150	4	3/C #12				130	4	3/4" IMC	N	Ref: SK-DE-BOP-0018	3/C #12	600	N/A	0	3/4" IMC	N	520
32	Relay Panel No.4	BA Ack. Buttons(4) (via JB No.4)	170	4	3/C #14			75	75	4	3/4" IMC	N	Ref: SK-DE-BOP-0018 (shared conduit)	3/C #14	680	N/A	0	3/4" IMC	N	300
33	Solenoid Valve Cabinet (Feed Prep)	120 V Power Panel -UPS (via JB No.5)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961 (shared conduit)	3/C #12	220	N/A	0	3/4" IMC	N	100
34	Solenoid Valve Cabinet (Feed Prep)	120 V Power Panel (Normal) (via JB No.6)	170	1	3/C #12			100	50	1	3/4" IMC	N	Ref: M-M5-K-01961 (shared conduit)	3/C #12	170	N/A	0	3/4" IMC	N	50
35	Solenoid Valve Cabinet (Feed Prep)	Air System I/O Cabinet ICS-CAB-050	145	1	2 PR #16				125	1	3/4" IMC	N	Ref: M-M5-K-01961	2 PR #16	145	N/A	0	3/4" IMC	N	125
36	Solenoid Valve Cabinet (Oxidation)	120 V Power Panel -UPS (via JB No.5)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961 (shared conduit)	3/C #12	220	N/A	0	3/4" IMC	N	100
37	Solenoid Valve Cabinet (Oxidation)	120 V Power Panel (Normal) (via JB No.6)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961 (shared conduit)	3/C #12	220	N/A	0	3/4" IMC	N	100
38	Solenoid Valve Cabinet (Oxidation)	Air System I/O Cabinet ICS-CAB-050	145	1	2 PR #16				125	1	3/4" IMC	N	Ref: M-M5-K-01961 J-J8-K-00050	2 PR #16	145	N/A	0	3/4" IMC	N	125
39	Solenoid Valve Cabinet (Milling & Mixing)	120 V Power Panel -UPS (via JB No.5)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961 (shared conduit)	3/C #12	220	N/A	0	3/4" IMC	N	100
40	Solenoid Valve Cabinet (Milling & Mixing)	120 V Power Panel (Normal) (via JB No.6)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961 (shared conduit)	3/C #12	220	N/A	0	3/4" IMC	N	100
41	Solenoid Valve Cabinet (Milling & Mixing)	Air System I/O Cabinet ICS-CAB-050	145	1	2 PR #16				125	1	3/4" IMC	N	Ref: M-M5-K-01961 J-J8-K-00050	2 PR #16	145	N/A	0	3/4" IMC	N	125
42	Solenoid Valve Cabinet (Vitrification)	120 V Power Panel -UPS (via JB No.5)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961	3/C #12	220	N/A	0	3/4" IMC	N	100
43	Solenoid Valve Cabinet (Vitrification)	120 V Power Panel (Normal) (via JB No.6)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961	3/C #12	220	N/A	0	3/4" IMC	N	100
44	Solenoid Valve Cabinet (Vitrification)	Air System I/O Cabinet ICS-CAB-050	145	1	2 PR #16				125	1	3/4" IMC	N	Ref: M-M5-K-01961 J-J8-K-00050	2 PR #16	145	N/A	0	3/4" IMC	N	125
45	Solenoid Valve Cabinet (Bagless Transfer)	120 V Power Panel -UPS (via JB No.5)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961 (shared conduit)	3/C #12	220	N/A	0	3/4" IMC	N	100
46	Solenoid Valve Cabinet (Bagless Transfer)	120 V Power Panel (Normal) (via JB No.6)	220	1	3/C #12			100	100	1	3/4" IMC	N	Ref: M-M5-K-01961 (shared conduit)	3/C #12	220	N/A	0	3/4" IMC	N	100
47	Solenoid Valve Cabinet (Bagless Transfer)	Air System I/O Cabinet ICS-CAB-050	145	1	2 PR #16				125	1	3/4" IMC	N	Ref: M-M5-K-01961 J-J8-K-00050	2 PR #16	145	N/A	0	3/4" IMC	N	125
48	Relay Panel No.1	Junction Box No.1 (BA Ack. Buttons)							75	1	1-1/2" IMC	N	Shared Conduit	0	0	N/A	0	1-1/2" IMC	N	75
49	Relay Panel No.2	Junction Box No.2 (BA Ack. Buttons)							75	1	1-1/2" IMC	N	Shared Conduit	0	0	N/A	0	1-1/2" IMC	N	75
50	Relay Panel No.3	Junction Box No.3 (BA Ack. Buttons)							75	1	1-1/2" IMC	N	Shared Conduit	0	0	N/A	0	1-1/2" IMC	N	75
51	Relay Panel No.4	Junction Box No.4 (BA Ack. Buttons)							75	1	1-1/2" IMC	N	Shared Conduit	0	0	N/A	0	1-1/2" IMC	N	75

				Cable Estimates (Exterior GB)		GB Pentr	(Interior. GB)	Shared Rcwy/Tray	Raceway Estimates					XGB Cable Sum.		NGB Cable Sum.		Raceway Summary		
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**	***Ext. Cable Size/Type***	***Qty XGB (ft)***	***GB Cable Size/Type***	***Qty NGB (ft)***	***RCWY***	**Red**	***Qty Rcwy (ft)***
52	120 V Power Panel (UPS)	Junction Box No.5 (SV Cabinets)							100	1	2" IMC	N	Shared Conduit	*0*	*0*	*N/A*	*0*	*2" IMC*	*N*	*100*
53	120 V Power Panel (Normal)	Junction Box No.6 (SV Cabinets)							100	1	2" IMC	N	Shared Conduit	*0*	*0*	*N/A*	*0*	*2" IMC*	*N*	*100*
54	Equipment		200	1	2/0 Gnd									*2/0 Gnd*	*200*	*N/A*	*0*	*0*	*N*	*0*