Y-FDD-K-00001
Revision D
August 12, 2010

FACILITY DESIGN DESCRIPTION

FOR THE

PIT DISASSEMBLY AND CONVERSION PROJECT

IN THE

K-AREA COMPLEX

APPROVALS

KAC Pit Disassembly and Conversion Project	Y-FDD-K-00001
Prepared by: Vineet Goel Signature:	Systems Engineering & Integration Date:
Design Agency Approval: Mark W. Barlow Signature:	Engineering Integration Manager Date:
O&M Manager Approval: Timothy E. Worth Signature:	Operations & Maintenance Manager Date:
Design Authority Approval: David M. Grimm Signature:	Design Authority Manager Date:
Integration Project Management Approval: James F. (Ricky) Bell Signature:	Integration Project Manager Date:
NNSA Management Approval: Scott C. Cannon Signature:	Federal Project Director Date:

SUMMARY OF CHANGES

Revision No. and Date	Verified/Checked By and Date	Pages Affected by the Change	Reason for Change
A	1/31/10	Section 1.1 only	Initial internal review of Section 1.1
B	4/27/10	Section 1.1 only	Comment incorporation from Rev. A review
C	6/14/10 Robert J. Grimm	All Sections	Comment incorporation from Rev. A review, issued for Interim Design Review #1
D	8/12/10 Robert J. Grimm	All Sections	Comment incorporation from Rev. C review, issue for Team and Formal Design Review

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FDD SUMMARY

PURPOSE AND USE

The purpose of this Facility Design Description (FDD) is to define the functions and associated performance, interface, and design requirements for the Pit Disassembly and Conversion (PDC) Project that will be located in the K-Area Complex (KAC). This FDD establishes the facility level requirements on which all design decisions will be made. The FDD incorporates external requirements imposed on the facility design by the Program Requirements Document, G-PP-K-00001, which includes Department of Energy (DOE) orders and national consensus standards.

The FDD also provides a description of the overall plant and a summary description of the principal structures and systems associated with the PDC Project in KAC. Detailed design information for the associated systems, structures and components will be contained in the System Design Descriptions (SDDs). Detailed design information for external interfaces to the PDC Project in KAC will be contained in Interface Control Documents (ICDs).

This revision of the PDC Project FDD records facility level requirements and descriptions (directly or by reference) during the Conceptual Design Phase. As the PDC Project design evolves through Design phases, the information presented herein will be updated and confirmed based upon studies, analyses, calculations, and other technical baseline documents.

PDC Mission

The PDC Project is part of the Pu Disposition Program at the Savannah River Site (SRS). The mission of the PDC Project is to establish a capability to receive surplus plutonium, in the form of pits and other clean metals for the purpose of converting the plutonium metal into an oxide product that meets the feed specifications for the Mixed Oxide Fuel Fabrication Facility (MFFF). Once the plutonium is converted to plutonium oxide, and residual classified attributes are removed, the plutonium oxide will be packaged and stored for shipment to MFFF for conversion to Mixed Oxide (MOX) fuel. A limited quantity of surplus plutonium oxide will also be repackaged for shipment to MFFF for conversion to MOX fuel. The mission will also process Uranium components to decontaminate, oxidize, package and store the Uranium oxide product which meets feed specifications for the High Enriched Uranium (HEU) Disposition Program for shipment to Y-12. The mission will process non-nuclear components using sanitization (declassification) processes for disposition as waste. The mission also will establish the capability to stabilize and package plutonium oxide in accordance with DOE-STD-3013 for storage and disposition.

Additionally, the PDC Project will provide the necessary space and balance of plant support for future processing of non-pit surplus plutonium not suitable for MFFF.

The final disposition of plutonium and non-plutonium products will occur at other facilities.

The PDC Project will implement modifications in the F/H Analytical Laboratory to support sample analysis required by disposition paths. This FDD addresses the PDC Project in KAC only; the F/H Analytical Laboratory will be treated as an external interface to KAC. The F/H

Analytical Laboratory modifications will be identified in Task Requirements and Criteria (TR&C) documents.

To accomplish the PDC Project mission to ensure feed is produced and available to meet the MFFF Feed Schedule as shown in requirement R.0.C, the project will be executed in three phases. The three phases are:

- Phase 1A, Operation of the Stabilization and Packaging (S&P) capability including upgrades in F/H Analytical Laboratory

- Phase 1B, Operation of the Material Storage Area to enable the relocation of K-Area Material Storage (KAMS). Following KAMS relocation, the Receiving and Shipping Areas on 0' elevation will be upgraded.

- Phase 2, Operation of Pit Disassembly and Conversion capability, including additional upgrades to the F/H Analytical Laboratory

The completion of Phase 2 will mark the completion of the PDC Project installation.

This FDD is structured to facilitate this phased approach. Subsequent requirements documents, i.e. System Design Descriptions (SDDs), Interface Control Documents (ICDs), etc. are also structured to reflect phased turnover and operations.

ORGANIZATION AND CONTENT

Section 1 of the FDD provides the functions that are required to be performed to ensure that the PDC Project in KAC can achieve its intended mission and related facility level performance requirements. PDC Project functions are performed by Process and Balance of Plant Systems. Accompanying the Process System functions are the top level System performance requirements. The bases for these performance requirements are provided. The functions associated with the Balance of Plant Systems are also identified in Section 1.

Section 2 of the FDD provides facility level design requirements and corresponding bases. Design requirements include the constraints and criteria imposed on the facility design by authoritative sources, such as federal and state regulations, DOE Orders, national consensus codes and standards, and engineering standards developed for unique design situations not adequately covered by other authorities.

Section 3 of the FDD identifies the interfaces at the KAC PDC Project boundary. These interfaces may be with KAC, on-site facilities or with off-site facilities, and are designated as external interfaces.

Section 4 of the FDD provides a design description of the PDC Project in KAC.

Section 5 of the FDD describes the operational concepts, facility-wide operations philosophy, and operating modes for the PDC Project in KAC.

Section 6 of the FDD presents overall maintenance philosophy for the PDC Project in KAC, and describes special features, limitations and/or capabilities included in the facility design to permit an effective maintenance program.

RELATIONSHIP OF THE PDC PROJECT TO THE PU DISPOSITION PROGRAM

The Pu Disposition Program scope includes capabilities provided by the PDC Project (in KAC and F/H Analytical Laboratory), the Waste Solidification Building (WSB), and the MFFF. Figure 0A shows the integration of the Pu Disposition Program with other facilities relative to product and waste handling.

The Pu Disposition Program boundary begins when Pu-bearing material in a shipping container from SRS or another DOE Site is received into the KAC (either the current K-Area Material Storage (KAMS*)* for Phase 1A or into the new KAC Material Storage provided by Phase 1B installation) and ends when a) the MFFF ships reactor fuel to a commercial nuclear reactor, b) by-products and packaged HEU from PDC are sent to Disposition sites, and c) waste materials are sent to the WSB or SRS Solid Waste Management (SWM).

The following facilities are included in the scope of the Pu Disposition Program:

- Pit Disassembly and Conversion in KAC – the PDC Project will expand on current capabilities and provide new capabilities in KAC
- PDC Project upgrades to the F/H Analytical Laboratory – Pu oxide and HEU oxide samples will be sent to F/H Analytical Laboratory for moisture, isotopic and chemical impurity analyses, and tap and bulk density measurements to validate MFFF and HEU Disposition specifications are met. Other samples that will be sent to F/H Analytical Laboratory include beryllium filters and swipes, alpha swipes, and uranium decontamination samples.
- The Disposition Program will also use the following existing KAC Operations:
    - Purification Area Vault (PAV) – The PAV will be used for storage as part of KAMS during Phase 1A. This area will be modified to provide expanded shipping/receiving capabilities after the KAMS and PAV areas are deinventoried in Phase 1B.
    - 910-B Water Seal Shuffler – This shuffler will be used for waste assay and theft diversion check to allow material from the MAA to exit to waste management operations. It will also continue to provide Uranium (U) accountability/verification measurements for material stored in KAC.
    - 910-B Vault – It will continue to be used for the storage of miscellaneous materials in shipping containers as well as lag storage for items entering and leaving K-Area Interim Surveillance (KIS) and the S&P process.
    - K-Area Interim Surveillance (KIS) – KIS will continue to operate to support the 3013 surveillance mission. KIS will provide shipping container unpacking and packing capability for Phase 1A operations, and use of the non-destructive assay (NDA) equipment suite for DOE-STD-3013 requirements and Material Control and Accountability measurements. The KIS Can Puncture Device (CPD) will be used for puncturing oxide containers prior to opening and processing in S&P in Phase 1A.

  - o 910-A - The 910-A room adjacent to KIS will continue to provide temporary staging of samples and waste awaiting shipment to F/H Analytical Laboratory and SWM, if necessary.
- MFFF – Pu oxide meeting MFFF specifications will be transported from the KAC PDC to the MFFF for processing into commercial nuclear reactor fuel. This fuel will be shipped by MFFF to commercial nuclear reactor(s).
- WSB – Liquid waste from MFFF and F/H Analytical Laboratory (PDC liquid sample waste) is processed and packaged into TRU or LLW and shipped to the SRS SWM for on-site or off-site final disposition.

The PDC Project in KAC will require interfaces with existing KAC, SRS site systems, utilities, and services. For details on these external interfaces refer to Section 3.0 of the FDD.

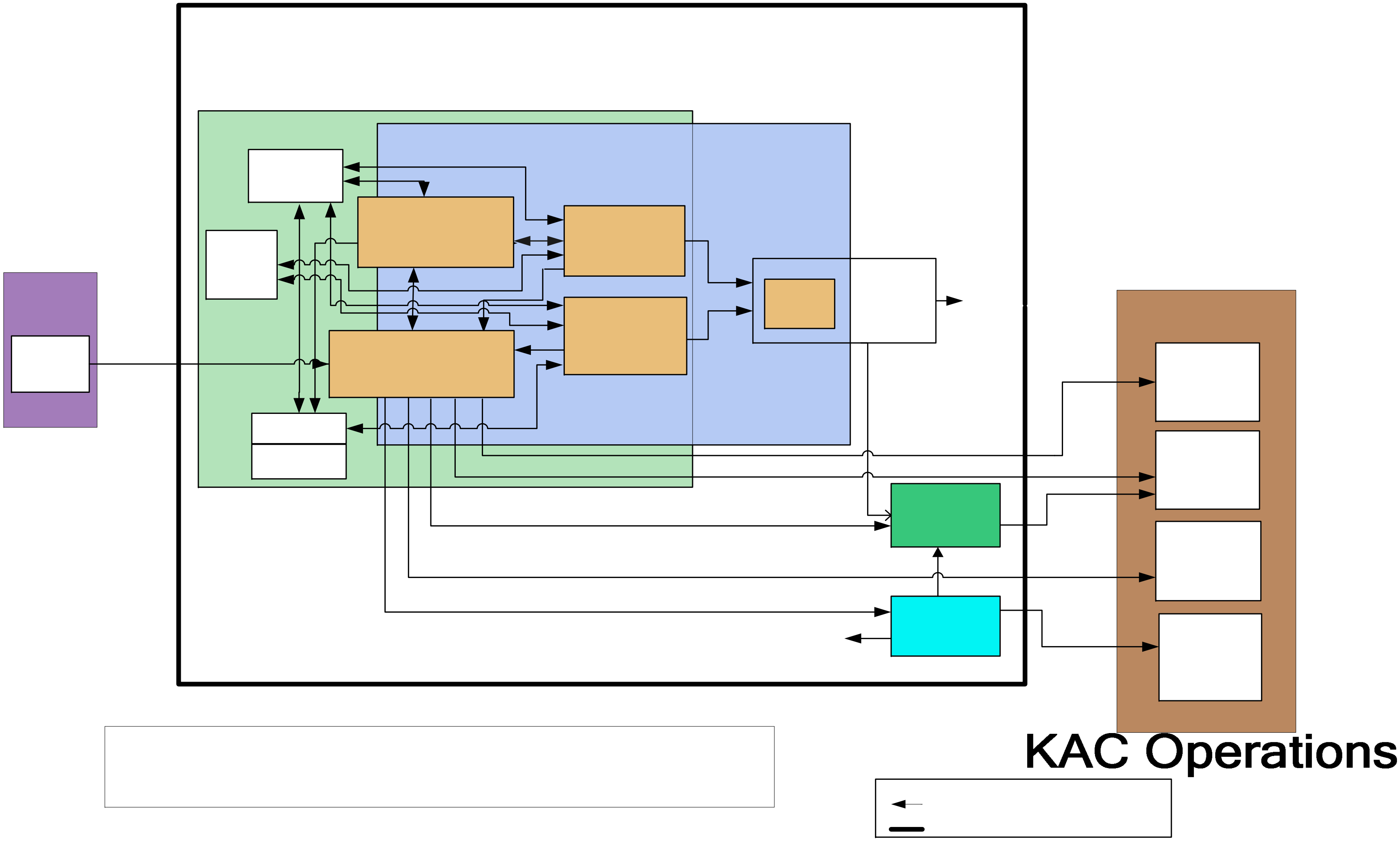

Figure 0.A Pu Disposition Program, PDC Project and Interfaces

PDC CAPABILITY IN KAC FUNCTIONS AND PERFORMANCE REQUIREMENTS

The top level PDC Project mission function, designated as Level 0, is prepare surplus Pu-bearing material for disposition as feed material for mixed oxide fuel fabrication at MFFF and prepare non-pit surplus plutonium not suitable for MFFF for final disposition. The Mission function is decomposed into Level 1 functions. The Level 1 functions are:

- F.1 Convert Surplus Non-Pit Pu Bearing material to Pu Oxide
  Function F.1 provides the Stabilization and Packaging (S&P) capability to prepare non-pit material for MFFF.

- F.2 Convert Surplus Pu Pit and Non-Pit Pu Bearing material to Pu Oxide
  Function F.2 provides the Pit Processing capability to prepare pit material for MFFF and uranium oxide product for the High Enriched Uranium (HEU) Disposition Program for

- F.3 Provide Receiving, Storage and Shipping
  Function F.3 provides storage capability for pit and non-pit materials and upgrades shipping and receiving capabilities.

- F.4 Provide Infrastructure
  Function F.4 provides a facility and modular spaces to house and support project personnel and later Operations personnel and glovebox/equipment assembly and test areas.

- F.5 Disposition surplus non-pit Pu not suitable for MOX fuel
  Function F.5 is a placeholder function for the Conceptual Design phase. This function will be developed in subsequent FDD revisions. This function will provide the capability to disposition non-pit Pu not suitable for MFFF disposition.

- F.9 Perform NDA
  Function F.9 will support each of the three project phases. The NDA System Design Description will be structured to identify the NDA requirements needed to support the three project phases.

- Function F.10 Provide Balance of Plant (BOP)
  Function F.10 is further decomposed into sub-functions identifying specific services, utilities, and structures.

In the subsequent System Design Description (SDDs), these sub-functions will be structured to identify those functions and requirements needed in each of the three project phases.

1.0 FACILITY FUNCTIONS AND PERFORMANCE REQUIREMENTS

This section provides the functions that are required to be performed to ensure that the PDC Project in KAC can achieve its intended mission and the related facility level performance requirements. The basis for each performance requirement is also provided.

A function is a statement that describes the capability necessary for the facility to fulfill its mission. A performance requirement defines how well the function must be performed in order to fulfill the facility mission. Performance requirements provide parameters that are specific to the facility.

This section is arranged to show linking of (1) performance requirements to related functions and (2) basis to performance requirements. Performance requirements are listed directly beneath the functions and basis statements are listed directly after the performance requirements. The functions and associated performance requirements have been allocated to systems as presented in Table 1-1. Consequently, each requirement can be imposed on the system to which the function is allocated.

Terminology has been defined to point out information that is missing, needs to be confirmed, or is classified. This terminology is explained as follows:

A 'TBD' (to be determined) is used to identify places in the text where numeric values or descriptive information is not available at the time the FDD is being developed.

A 'HOLD' is used to identify information presented in the FDD that:

- Is preliminary,
- Involves an uncertain design feature,
- Has insufficient technical justification,
- Needs verification, or
- Creates a discrepancy or inconsistency.

A [CLASSIFIED] is used to identify information that is contained in a classified document.

Unless specifically stated otherwise, all requirements in this FDD (including those with "HOLD") are approved for the purpose of conceptual design. TBDs and HOLDs will be resolved by revision of the FDD.

In this revision of the FDD only top-level functions and performance requirements for the process and process support systems are provided. These top-level functions and performance requirements will be transferred and further decomposed into the appropriate System Design Description upon its development.

FUNCTIONAL HIERARCHY AND ENHANCED FUNCTIONAL FLOW BLOCK DIAGRAMS

Appendix C Figures C.1 .C.2, and C.3 contain the functional hierarchy and functional flow block diagrams that graphically show the hierarchical and logical interrelationship between the functions presented in this section.

The functional hierarchy diagram C.3 shows functions F.1, F.2, and F.3 broken down into sub-functions. The sub-functions are the actions or capabilities necessary to perform the top level facility functions. The facility level functions are further broken down into more specific sub-functions and documented in the System Design Descriptions.

FUNCTION AND PERFORMANCE REQUIREMENTS

F.0 Prepare Surplus Pu-Bearing Material for Disposition

Prepare surplus Pu-bearing material for disposition as feed material for mixed oxide fuel fabrication at MFFF and non-pit Pu not suitable for MFFF for disposition.

R.0.A The PDC Project shall provide the capability of converting a minimum 25 metric tons of surplus plutonium metal from pits and clean metal.

Basis: PDC Program Requirements Document, G-PP-K-00001, states the PDC mission capability requirements related to inventory quantities of input material.

R.0.B The PDC Project shall provide the capability of converting/repackaging a minimum of 3.74 metric tons of AFS-2 plutonium to plutonium oxide.

Basis: PDC Program Requirements Document, G-PP-K-00001, states the PDC mission capability requirements related to inventory quantities of input material.

R.0.C The PDC Project shall provide the capability to convert plutonium metal from pits and other clean metal into MFFF acceptable Pu oxide at a rate of metric tons Pu per year that meets the MFFF demand shown in Table 1.0-1. **HOLD**

Table 1.0-1 MFFF Feed Material Request Schedule – Pu Basis

CY	Source of Feed Used in MFFF, kg of Pu [1]				MFFF Request [3]
	LANL [2]	AFS-1	AFS-2	Pit Pu	
2016	290.8	43.6	0	0	334.4
2017	154.2	352.4	0	0	506.6
2018	176.2	793	0	0	969.2
2019	176.2	793	0	0	969.2
2020	264.3	1369.2	0	0	1633.5
2021	497.8	748.8	1022	0	2268.6
2022	440.5	0	1762.1	0	2202.6
2023	0	0	955.9	2127.8	3083.7
2024	0	0	0	3500	3500
2025	0	0	0	3500	3500
2026	0	0	0	3500	3500
2027	0	0	0	3500	3500
2028	0	0	0	3500	3500
2029	0	0	0	3500	3500
2030	0	0	0	1872.2 [4]	1872.2
TOTAL	2000	4100	3740	25000	34840

[1] Pu metal to oxide conversion factor = 1.135.
[2] Unpolished ARIES oxide not yet processed and packaged.
[3] Steady state operation at 3.5 MT Pu oxide per year delivered to utilities.
[4] Assumed transfer at end of conversion program.

Basis: PDC Pu oxide feed rate to support MFFF operations schedule. PDC Program Requirements Document, G-PP-K-00001, Appendix 2.
HOLD – Table to be revised.

R.0.D The Pu oxide feed product designated as AFS-2 from PDC shall meet the following established MFFF specifications for fabrication into mixed oxide fuel:

- Pu oxide designated as AFS-2 - Alternate Feedstock (AFS) Plutonium Oxide Transfers from the K-Area Complex (KAC) to MFFF Interface Control Document (ICD-07-025-01) **HOLD**

Basis: PDC Pu oxide feed acceptance and packaging requirements to support MFFF operations. PDC Program Requirements Document, G-PP-K-00001.
HOLD – ICD-07-025-01 to be revised to address AFS-2 Pu oxide,

R.0.E The Pu oxide feed product from pits from PDC shall meet the following established MFFF specifications for fabrication into mixed oxide fuel:

- Pu Oxide from pits – Plutonium Dioxide Powder Interface Control Document (ICD-02-001-01) **HOLD**

Basis: PDC Pu oxide feed acceptance and packaging requirements to support MFFF operations. PDC Program Requirements Document, G-PP-K-00001.
HOLD – ICD-02-001-01 to be revised to address processing small quantities of fuel grade material through the PDC Project for disposition to MFFF.

R.0.F The PDC Project shall provide the capability to decontaminate and convert Highly Enriched Uranium (HEU) metal from pits into HEU oxide that meets the requirements of the "Interface between the HEU Disposition Program and PDCF Project for Disposition of Highly Enriched Uranium" Interface Control Document (ICD-04-021-01).

Basis: ICD identifies purity and packaging requirements. Agreement between the Office of Disposition Projects and the Office of Materials and Conversion for the Disposition of Highly Enriched Uranium. PDC Project Program Requirements Document, G-PP-K-00001.

R.0.G The PDC Project shall provide a minimum of 6,600 **HOLD** storage positions for non-pit, pit, oxide product materials, by-products, etc.

Basis: Storage to meet the PDC process needs and Pantex program needs. PDC Program Requirements Document, G-PP-K-00001.
HOLD – Quantities and types of storage to be verified during Conceptual Design. To incorporate information from PDCF Classified Addendum to the FDD, WSRC-TR-2001-00525 **HOLD**
HOLD – confirm whether a new document will be developed.

R.0.H The PDC Project shall provide the necessary space and balance of plant support to allow future processing of the 5 metric tons (MT) of non-pit surplus Pu oxide and metal not suitable for MFFF.

Basis: To support future decisions regarding the 5 MT. The PDC Project will include allowances in the KAC footprint and BOP systems supporting F.2 based on a disposition path to WIPP for the 5 MT. This WIPP operation will occur during pit processing. PDC Program Requirements Document, G-PP-K-00001.

This draft does not address the disposition of 5 MT details.

F.1 Convert Surplus Non-Pit Pu Bearing Material to Pu Oxide

Convert surplus non-pit Pu metal and oxide into AFS-2 Pu oxide feed suitable for MFFF. (***Phase 1A***)

R.1.A The PDC Project shall provide the capability of converting a minimum of 3.74 non-pit metric tons of Pu to AFS-2 plutonium oxide that supports the MFFF feed request schedule for “AFS-2” material as identified in R.0.C.

Basis: MFFF material request rate for “AFS-2” feed per the PDC Project Program Requirements Document, G-PP-K-00001, Appendix 2.

R.1.B The Pu oxide product from the non-pit Pu material designated as AFS-2, shall meet the Alternate Feedstock (AFS) Plutonium Oxide Transfers from the K-Area Complex (KAC) to MFFF Interface Control Document (ICD-07-025-01). **HOLD**

Basis: PDC Pu oxide feed acceptance and packaging requirements to support MFFF operations. The PDC Project Program Requirements Document, G-PP-K-00001 identifies ICD-07-025-01 acceptance requirements for AFS-2 feed.
HOLD – ICD to be revised to address AFS-2 Pu oxide; currently addresses only AFS-1 oxide material.

F.1.1 Unpack Shipping Container and Open 3013 and Non-3013 Containers

Unpack shipping container and open 3013 and non-3013 containers.
*(Function is performed by the **Stabilization and Packaging System** and external interface, K-Area Interim Surveillance (KIS). KIS will only perform the unpacking of 3013s from 9975 shipping containers.)*

R.1.1.A The capability to unpack a loaded 9975 shipping container to remove its material container for further processing shall be provided.

Basis: Incoming non-pit material for AFS-2 feed product and KIS material will be in 3013 and non-3013 containers packaged in 9975 shipping containers.

R.1.1.B The capability to handle and open DOE-STD-3013 containers and non-3013 containers to remove material for processing shall be provided.

Basis: Incoming non-pit material for AFS-2 feed product will be packaged in 3013 containers. KIS daughter material containers will be non-3013 containers. The material container configurations that will be handled by PDC are identified in Design Section – Configuration and Essential Features 2.2.4, Requirement R.2.2.4.1.

R.1.1.C The capability to unpack loaded Type A Croft SafDrums to remove sample returns for processing shall be provided.

Basis: Disposition path for F/H Laboratory solid sample returns.

R.1.1.D The rate of shipping container unpacking and 3013 and non-3013 container handling and disassembly shall support the rate needed to supply AFS-2 material to MFFF per R.0.C.

Basis: See R.0.C basis statement

F.1.2 Oxidize Non-pit Pu Metal

Provide direct metal oxidation capability of non-pit Pu metal.
(Function is allocated to the ***Stabilization and Packaging System****)*

R.1.2.A The Stabilization and Packaging System shall be capable of oxidizing non-pit Pu metal to supply Pu oxide product at a rate that supports the MFFF feed requirement schedule for AFS-2 material as identified in R.0.C.

Basis: See R.0.C basis statement.

R.1.2.B The Stabilization and Packaging System shall be capable of oxidizing metal feed such that the produced AFS-2 Pu oxide product meets the requirements per R.1.B.

Basis: See R.1.B basis statement.

F.1.3 Stabilize and Package Non-Pit Pu Oxide

Stabilize and package non-pit Pu oxide. KIS daughters will be re-combined, stabilized, and packaged into new 3013s.
(Function is allocated to the ***Stabilization and Packaging System****)*

R.1.3.A The Stabilization and Packaging System shall stabilize and package AFS-2 Pu oxide, including F/H Laboratory returns at a rate needed to supply AFS-2 material to MFFF per R.0.C.

Basis: See R.0.C basis statement.

R.1.3.B The Stabilization and Packaging System shall be capable of stabilizing and packaging Pu oxide product to DOE-STD-3013 requirements. **HOLD**

Basis: Pu oxide feed materials for MFFF are required to meet DOE-STD-3013. ICD-07-025-01 includes packaging acceptance requirements to DOE-STD-3013 for AFS-2 feed.
HOLD – Applicable 3013 standard to be determined.

R.1.3.C The Stabilization and Packaging System shall be capable of re-combining, stabilizing, and packaging KIS daughter cans into new 3013s.

Basis: PDC Program Requirements Document, G-PP-K-00001.

F.1.4 Package in Shipping Container

Package 3013 containers (AFS-2 product and KIS oxide) and sample containers into shipping containers for storage or for shipment from PDC. *(Function is performed by the **Stabilization and Packaging System** and external interface, KIS. KIS will only package a 3013 container into a 9975 shipping container.)*

R.1.4.A The capability to package a 3013 container into a 9975 shipping container shall be provided.

Basis: Shipping container configuration required to safely ship material to other facilities.

R.1.4.B The Stabilization and Packaging System shall be capable of preparing and packaging samples for analysis per the requirements of G-ESR-K-00117, PDC Interfaces with F/H Analytical Laboratory **HOLD**.

Basis: Samples will be sent to F/H Analytical Laboratory. The ICD identifies the sample and sample packaging requirements.
HOLD – An ICD based on MFFF driven requirements will be developed to address sample requirements between PDC and F/H Analytical Laboratory.

F.2 Convert Surplus Pit and Non-Pit Pu Bearing Material to Pu Oxide

Convert surplus weapons plutonium in the form of pits and other plutonium metals and recycled oxides to plutonium oxide feed material suitable for mixed oxide fuel fabrication at MFFF. (***Phase 2***)

R.2.A The PDC Project shall provide the capability of converting a minimum 25 metric tons of surplus plutonium metal from pits and clean metal to plutonium oxide at a rate that supports the MFFF feed request schedule for “Pit Pu” material as identified in R.0.C.

Basis: MFFF material request rate for “Pit Pu” feed per the PDC Project Program Requirements Document, G-PP-K-00001, Appendix 2.
Reference: PDC Project Program Requirements Document, G-PP-K-00001, Revision 0

R.2.B The Pu oxide product from the pit and non-pit feeds referred to as “Pit Pu” (R.0.C Table) shall meet Plutonium Dioxide Powder Interface Control Document (ICD-02-001-01). **HOLD**

<u>*Basis*</u>: PDC Pu oxide feed acceptance and packaging requirements to support MFFF operations. The PDC Project Program Requirements Document, G-PP-K-00001 identifies ICD-02-001-01 acceptance requirements for “Pit Pu” feed.
HOLD - ICD to be revised to address processing small quantities of fuel grade material through the PDC Project for disposition to MFFF.

F.2.1 Unpack Pits, Disassemble Pits, and Open 3013 Containers

Unpack material from shipping/storage containers, unpack pits from Sealed Inserts, determine the absence or presence of tritium contamination, open inner 3013 containers containing non-pit Pu metal, disassemble contaminated and uncontaminated pits, and package samples for analysis.
*(Function is allocated to the **Pit Disassembly System**)*

R.2.1.A The Pit Disassembly System shall be capable of unpacking an AL-R8 container to remove a Sealed Insert (SI).

<u>*Basis*</u>: The material for processing will be received into the Pit Disassembly System in shipping containers that require unpacking.

R.2.1.B The Pit Disassembly System shall be capable of disassembling all of the pits scheduled to be received, including any tritium contaminated pits, at a rate that supports the MFFF feed request schedule for “Pit Pu” material as identified in R.0.C.

<u>*Basis*</u>: The system must be sized to support the PDC mission function, facility throughput, and the receipt schedule. The specific pit types and quantities are identified in the classified addendum of G-PP-K-00001, G-PP-K-00002.

R.2.1.C The Pit Disassembly System shall be capable of unloading pits from the shipping container sealed inserts using confinement controls to address potential tritium contamination.

<u>*Basis*</u>: To protect the worker, environment and public from tritium hazard. Basis for this requirement is DOE Order 420.1B, Facility Safety and DOE Handbook 1129-99, Tritium Handling and Safe Storage.

R.2.1.D The Pit Disassembly System shall provide the capability to determine the absence or presence of tritium contamination of pits.

<u>*Basis*</u>: Some pits may be contaminated with tritium and will need special processing as required per 10 CFR 835.

R.2.1.E The Pit Disassembly System shall be capable of opening inner 3013 containers, containing non-Pit Pu metal, identified in R.2.2.4.7.

Basis: PDC non-pit feed material will be packaged in 3013 containers. The 3013 configurations that will be handled are identified in Design Section – Configuration and Essential Features 2.2.4, Requirement R.2.2.4.7.

F.2.2 Chemically Separate Plutonium

Chemically and thermally separate plutonium from bonded pit pieces, and package beryllium samples for analysis.
*(Function is allocated to the **Plutonium Separation System**)*

R.2.2.A The Plutonium Separation System shall be capable of processing bonded pits as documented in the Pit Campaign Schedule at a rate that supports the MFFF feed request schedule for “Pit Pu” material as identified in R.0.C.

Basis: MFFF material request rate for “Pit Pu” feed per the PDC Project Program Requirements Document, G-PP-K-00001, Appendix 2. The Pit Campaign Schedule, BC# 2221/990008, documents the pit types required to be processed.

R.2.2.B The Plutonium Separation System shall be capable of removing plutonium metal bonded to other metals such that the final plutonium oxide product from plutonium conversion is within the impurity limits stated in the Plutonium Dioxide Powder Interface Control Document, ICD-02-001-01. **HOLD**

Basis: Pu oxide leaving PDC must meet the purity requirements of the Plutonium Dioxide Powder ICD and the acceptable performance objectives of removing plutonium from other metals is necessary to meet sanitization and waste requirements as well as HEU disposition requirements.
HOLD – ICD to be revised to address processing small quantities of fuel grade material through the PDC Project for disposition to MFFF.

F.2.3 Oxidize Plutonium Metal

Oxidize Pu metal from pit components and non-pit Pu metal, remove tritium from tritium contaminated pit pieces, open outer 3013 containers containing non-Pit Pu metal, reprocess recycled plutonium oxide, and stabilize oxide to DOE-STD-3013 requirements.
*(Function is allocated to the **Plutonium Conversion System**. The turned over PDC to KAC **S&P System** (111), will open the 3013s containing recycled plutonium oxide.)*

R.2.3.A The Plutonium Conversion System shall be capable of opening outer 3013 containers, containing non-Pit Pu metal, identified in R.2.2.4.7.

Basis: PDC non-pit feed material will be packaged in 3013 containers. The 3013 configurations that will be handled are identified in Design Section – Configuration and Essential Features 2.2.4, Requirement R.2.2.4.7.

R.2.3.B The Plutonium Conversion System shall be capable of converting metal feed entirely to oxide at a rate that supports the MFFF feed request schedule for "Pit Pu" as identified in R.0.C.

Basis: PDC Program Requirements Document, G-PP-K-00001

R.2.3.C The Plutonium Conversion System shall be capable of converting metal feed to oxide such that the final Pu oxide product meets the specifications identified in the Plutonium Dioxide Powder Interface Control Document, ICD-02-001-01. **HOLD**

Basis: Specific criteria are important to achieving consistent results in the conversion of plutonium metal to oxide. Process function completeness is an issue with regards to meeting the production schedule and goals. The Plutonium Dioxide Powder Interface Control Document specifies the required characteristics of the Pu Oxide product acceptable to the MFFF.
HOLD – ICD to be revised to address processing small quantities of fuel grade material through the PDC Project for disposition to MFFF.

R.2.3.D The Plutonium Conversion System shall be capable of thermally stabilizing oxide to meet the applicable requirements of the DOE-STD-3013 - **TBD**.

Basis: Material containing water or volatiles might cause pressurization or corrosion of the sealed package during long-term storage. All Pu oxide product packaging sent to MFFF will be per DOE-STD-3013.
TBD - Applicable 3013 standard to be determined.

F.2.4 Blend and Sanitize Plutonium Oxide

Blend oxide product to meet MFFF and classification guide requirements and prepare samples for analysis.
*(Function is allocated to the **Oxide Product Handling System**)*

R.2.4.A The Oxide Product Handling System shall be capable of blending the Pu oxide product to meet the classification requirements as directed by CG-MD-2.

Basis: To prevent the release of classified information to unauthorized personnel per DOE Classification Guide for the Fissile Materials Disposition Program, CG-MD-2.

R.2.4.B The Oxide Product Handling System shall be capable of obtaining a representative sample(s) of blended Pu oxide and analyzing for moisture.

Basis: To validate that DOE-STD-3013 was met. **TBD**
TBD - Applicable 3013 standard to be determined.

R.2.4.C The Oxide Product Handling System shall be capable of producing blended plutonium oxide for MFFF that meets the Plutonium Dioxide Powder Interface Control Document, ICD-02-001-01, specifications which include Pu isotopics, chemical impurities, uranium content, Am-241 content and particle size. **HOLD**

Basis: The Pu oxide product produced by PDC must be acceptable for producing a MOX fuel.
HOLD – ICD to be revised to address processing small quantities of fuel grade material through the PDC Project for disposition to MFFF.

R.2.4.D The Oxide Product Handling System shall be capable of preparing and packaging samples for analysis per the requirements of G-ESR-K-00117 **HOLD**.

Basis: Samples will be sent to F/H Analytical Laboratory. The ICD identifies the sample and sample packaging requirements.
HOLD – An ICD based on MFFF driven requirements will be developed to address sample requirements between PDC and F/H Analytical Laboratory.

R.2.4.E The Interim Storage Module (ISM) for produced plutonium oxide product shall accommodate a minimum of [CLASSIFIED] storage positions of this product, in individual interim containers. **HOLD**

Basis: See classified addendum to the FDD.
HOLD – Confirm whether the classified addendum of the PDCF FDD is now included in the classified addendum to the PDC Project PRD or whether a classified addendum to the PDC FDD will be generated.

R.2.4.F The ISM shall store plutonium oxide materials pending blending and sanitization in a **TBD** environment.

Basis: It is desired to handle the oxide product blending and sanitization in a manner such that the material avoids moisture pickup and does not have to be restabilized to meet the 3013 acceptance specification.
TBD - The glovebox atmosphere requirements to avoid moisture pickup must be defined.

F.2.5 Process Uranium Metal

Process uranium metal, including HEU, into uranium oxide products, package uranium oxide products, and prepare samples for analysis.
*(Function is allocated to the **Uranium Processing & Staging System**)*

R.2.5.A The Uranium Processing and Staging System shall be capable of processing the uranium components of the surplus pit types listed in Part B of the FDD classified addendum at a rate that supports the MFFF feed request schedule for "Pit Pu" material as identified in R.0.C. **HOLD**

Basis: NNSA-HQ letter, R. Mukunda to R. Raaz, Cost Reduction Measures, 5/01/2002 and the Classified Addendum to the FDD, Document No.WSRC-TR-2001-00525. The uranium process must maintain throughput capability with the Pu process to avoid a backlog which could affect the ability to meet the MFFF feed request schedule.
HOLD – Confirm whether Part B of the PDCF FDD Classified Addendum is now included in the classified Addendum to the PDC Project PRD or another classified addendum to the PDC FDD will be generated. Confirm whether 5/1/02 NNSA-HQ letter is applicable.

R.2.5.B The Uranium Processing and Staging System shall be capable of producing a HEU oxide byproduct leaving the PDC Project that meets the HEU Disposition Program Office (HDPO) purity and packaging requirements of the Interface Between the HEU Disposition Program and PDC Project for Disposition of Highly Enriched Uranium Interface Control Document, (ICD-04-021-01).

Basis: This is in accordance with the *Agreement between the Office of Disposition Projects and the Office of Materials and Conversion for the Disposition of Highly Enriched Uranium*. PDC Project Program Requirements Document, G-PP-K-00001 and NNSA Letter from R. Mukunda to R. Raaz, 10/29/2003, Transportation Package for Highly Enriched Uranium Oxide, identifying the ES-3100 package.

R.2.5.C The Uranium Processing and Staging System shall be capable of preparing and packaging samples for analysis per the requirements of G-ESR-K-00117 **HOLD**.

Basis: Samples will be sent to F/H Analytical Laboratory. The ICD identifies the sample and sample packaging requirements.
HOLD – An ICD will be developed to address sample requirements between the PDC Facility in KAC and F/H Analytical Laboratory.

F.2.6 Package Pu Oxides and Other By-Products

Package plutonium oxide, other by-products, and plutonium oxide product samples (MOX samples) into safe containers for storage and transportation to MFFF.
(Function is allocated to the ***Product Canning System****)*

R.2.6.A The Product Canning System shall be capable of packaging Pu oxide, other by-products, and MOX samples to DOE-STD-3013-**TBD**.

<u>Basis</u>: Packaging standard for Pu oxide product for shipment to MFFF identified in ICD and long term storage. Packaging agreement for MOX samples. Packaging standard for by-products identified in the ICD.
TBD - Applicable 3013 standard to be determined.

R.2.6.B The By-Product material leaving the Product Canning System shall meet the requirements of the Facility By-Products Interface Control Document (ICD-08-029-01). **HOLD**

<u>Basis</u>: Interface Control Document G-ESR-F-00061, PDC Interface with Los Alamos National Laboratory (LANL).
HOLD – ICD to be written.

F.2.7 Package 3013s into 9975s

Package 3013s into 9975s.
*(Function is allocated to the **Unpacking and Packaging System**)*

R.2.7.A The Unpacking and Packaging System shall be capable of packing 3013 containers into 9975 shipping containers.
<u>Basis</u>: Packaging standard for 3013s for shipment from the PDC Facility in KAC or for storage in KAC.

F.2.8 Sanitize Non-SNM

Sanitize classified non-SNM Pit components and package beryllium samples for analysis.
*(Function is allocated to the **Sanitization System**)*

R.2.8.A The Sanitization System shall be capable of sanitizing and/or processing all non-SNM components for disposition.

<u>Basis</u>: Physical attributes of components which reveal classified information must be destroyed prior to discarding the materials in unclassified waste streams. The Atomic Energy Act of 1954, as amended. The facility must disposition all materials from all pit types received; there is no disposition for classified components.

F.3 Provide Receiving, Storage, and Shipping

Handle material containers, including: receipt, unpacking, inspection, accountability measurement, storage, packaging, and shipping of Special Nuclear Material (SNM). (***Phase 1B***)

R.3.A The PDC Project shall provide the capability of handling the following containers:

- MD-2
- 9975 shipping containers
- AL-R8 storage containers
- ES-3100 shipping containers (Uranium only)
- Sealed Inserts
- Cargo Restraint Transports (CRTs)
- Cargo Pallet Assemblies (CPAs)
- Type A Croft SafDrums (samples to/from F/H Analytical Lab)

Basis: Containers that are planned for receipt, storage and shipment. PDC Project Program Requirements Document, G-PP-K-00001. Accepted F/H Analytical Laboratory sample containers.

F.3.1 Receive Incoming Materials

Receive, stage, and transfer shipping containers to receipt storage and to unpacking.
*(Function is performed by the PDC Project **Shipping & Receiving System**)*

R.3.1.A The Shipping and Receiving System shall provide the capability for accommodating the arrival of three Safe-Secure Trailers or Safe-Guards Transporters (SST/SGTs), one at a time, and within eight hours perform receiving and staging for all three SST/SGTs.

Basis: Real time operational experience for unloading SST/SGTs. Frees up SST/SGT as soon as possible and allows unloading to be completed within one operational shift. PDC Project Program Requirements Document, G-PP-K-00001.

R.3.1.B The Shipping and Receiving System shall provide the capability for receiving CRTs and CPAs; pits, metal, and oxide in MD-2s or 9975s; and sample returns in Type A SafDrums shipping containers.

Basis: System must accommodate shipping containers for pits and non-pit material and sample returns received to be processed. PDC Project Program Requirements Document, G-PP-K-00001.

F.3.2 Unpack Received Materials (unpacking CPAs and CRTs)

Unpack pit materials received in containment vessels from their shipping containers and prepare received shipping containers for storage or processing.
*(Function is allocated to the **Unpacking and Packaging System**)*

R.3.2.A The Unpacking and Packaging System shall provide the capability to unpack pits in SIs from shipping containers on CRT/CPAs to allow for storage of material in SI/AL-R8.

Basis: Supports planned container configuration for storage and for transferring to processing location.

R.3.2.B The Unpacking and Packaging System shall provide the capability for unpacking materials received in containment vessels and Sealed Insert (SI) containers from their shipping containers and repacking into AL-R8 containers for storage and processing.

Basis: Material containers must be removed from their shipping containers for verification measurements. MD-2 shipping containers are unpacked to remove the SI containers. PDC Project Program Requirements Document, G-PP-K-00001.

R.3.2.C The Unpacking and Packaging System shall have the capability to decontaminate the CRT, shipping packages, and inner containers to $\leq$20 dpm/100 cm^2 alpha and $\leq$200 dpm/100 cm^2 beta/gamma.

Basis: 10 CFR 835, Occupational Radiation Protection.

F.3.3 Store Received Materials
Provide storage for received containers.
*(Function is allocated to the **Vault Storage System**)*

R.3.3.A The Vault Storage System shall be capable of storing received pits and Pu metal to accommodate at least [CLASSIFIED] of storage, as related to the classified production schedule and facility mission throughput. **HOLD**

Basis: See Classified Addendum to the PDCF FDD, Document No. WSRC-TR-2001-00525.
HOLD – confirm whether a new document will be developed.

R.3.3.B The storage area shall have a minimum of 6600 **HOLD** storage positions for received materials prior to processing.

Basis: R.0.E identifies total number of storage positions.
HOLD – Number of storage positions for received materials to be verified.

F.3.4 Store Products and Other Materials
Store KAMS inventory and store products and materials (i.e. samples) from plutonium pit and metal processing, in safe and secure containers, prior to shipment.
*(Function is allocated to the **Vault Storage System**)*

R.3.4.A The Vault Storage System shall provide a minimum of **TBD** total vault storage positions for KAMS inventory relocation and product, by-product, and sample materials prior to shipment from PDC to MFFF, F/H Analytical Laboratory or Disposition Location.

<u>*Basis*</u>: R.0.E identifies total number of storage positions. Supports required throughput and shipments from the PDC Facility.
TBD – Number of storage positions for product and other containers waiting to be shipped from facility to be verified.

R.3.4.B The HEU oxide byproduct (HEU Disposition Program destined material) storage area shall accommodate at least [CLASSIFIED] of storage as related to the processing of pits containing HEU, and based on the classified production schedule and facility mission throughput. **HOLD** - previous PDCF FDD had this requirement, does the PDC FDD need this requirement also?

<u>*Basis*</u>: See Classified Addendum to the FDD, Document No. WSRC-TR-2001-00525. **HOLD**
HOLD – confirm whether a new document will be developed.

R.3.4.C The other by-products storage area shall accommodate at least [CLASSIFIED] of storage as related to the production schedule and the facility mission throughput. **HOLD** - previous PDCF FDD had this requirement, does the PDC FDD need this requirement also?

<u>*Basis*</u>: See Classified Addendum to the FDD, Document No. WSRC-TR-2001-00525. **HOLD**
HOLD – confirm whether a new document will be developed.

R.3.4.D The storage area shall meet IAEA storage requirements, including segregation from the non-IAEA material.

<u>*Basis:*</u> Materials designated under IAEA control from KAMS will be relocated to an acceptable safe, secure storage area and segregated from non-IAEA material. Only 9975 drums containing Pu oxide in 3013 compliant containers are under IAEA control. IAEA Design Information Questionnaire, K/NSP-185, Rev. 7, October 2007 and MC&A Implementation Plan (MIP), OBU-NMM-03-00010, Rev. 3, January 2009 **HOLD**.
HOLD – Both documents to be revised.

F.3.5 Package Products and Samples for Shipment (packing CPAs and CRTs)

Package products and samples for shipment from PDC.
*(Function is allocated to the **Unpacking and Packaging System**)*

R.3.5.A The Unpacking and Packaging System shall be capable of preparing and staging empty shipping containers in Cargo Restraint Transports (CRTs) and Cargo Pallet Assemblies (CPAs) for packaging and shipment of product from the PDC.

Basis: Shipping configuration that allows efficient movement of multiple shipping containers.

R.3.5.B The Unpacking and Packaging System shall be capable of staging and packaging type A Croft SafDrums for shipment.

Basis: Shipping containers required to safely ship samples to F/H Analytical Laboratory.

F.3.6 Ship Product and Other Materials

Ship packaged product, by-product, and samples to an onsite or offsite facility for disposition.
*(Function is performed by the PDC Project **Shipping & Receiving System**)*

R.3.6.A The Shipping and Receiving System shall be capable of shipping the quantity of HEU oxide associated with the pit types listed in the Classified Addendum to the FDD. **HOLD**

Basis: Necessary to support facility throughput. See Classified Addendum to the FDD, Document No. WSRC-TR-2001-00525, and the Shipping Analysis Study, NNP-PDC-2004-00018.
HOLD - confirm whether a new document will be developed.

R.3.6.B The Shipping and Receiving System shall provide the capability for efficient loading of three SST/SGTs, one at a time, within eight hours total.

Basis: Real time operational experience for loading SST/SGTs and allows loading to be completed within one operational shift. PDC Project Program Requirements Document, G-PP-K-00001.

R.3.6.C The Shipping and Receiving System shall provide the capability of shipping the following samples from PDC:

- Pu oxide
- HEU oxide
- Beryllium filters
- Beryllium swipes
- Alpha swipes
- Uranium decontamination samples

Basis: Samples analysis will be performed at MFFF and F/H Analytical Laboratory.

F.4 Provide Infrastructure

Provide an Operations and Engineering Center, provide modular space for project and operations personnel, equipment assembly, and test areas. (Phase TBD)

F.5 Disposition non-pit Pu not suitable for MOX fuel (Placeholder function) (Phase TBD based on disposition path selected)

F.9 Perform NDA

Perform NDA to support product feed, facility processing, material receipt, storage, and shipping from PDC to other facilities.
(Function is allocated to the ***NDA System*** *and external interfaces, K-Area Interim Surveillance (KIS) and 910-B Water Seal Shuffler)* (Phases 1A, 1B, and 2)

R.9.A The NDA System shall provide the capability to perform verification/material control and accountability measurements to meet DOE M470.4-6 and M470.4-1. **HOLD**

Basis: Required to allow receipt and removal from the storage and process locations and to maintain material control and accountability. Accountability measurements (weight, gamma isotopic, calorimetry, neutron multiplicity, X-ray, shuffler).
HOLD – determine requirements.

R.9.B The NDA System shall complete material confirmation on shipping receipts within the time frame specified in DOE M470.4-6.

Basis: DOE M470.4-6.

R.9.C The NDA System shall have the capability to measure holdup in locations defined by the MC&A Strategy. **HOLD**

Basis: Holdup monitoring provides material control and accountability and safety attributes necessary to meet mission objectives.
HOLD – MC&A Strategy to be written.

R.9.D The NDA System shall have the capability to measure waste.

Basis: DOEM 470.4-6.

R.9.E The Storage NDA shall be IAEA compatible.

Basis: IAEA will continue to utilize selected KAMS NDA equipment. A neutron multiplicity counter (NMC) (Canberra Industries) is used for verification measurements on drums of plutonium. A gamma isotopic counter (GIC) (Canberra Industries) is used in conjunction with the NMC to provide isotopic data on drums of plutonium. A scale for weighing drums is also provided. IAEA Design Information Questionnaire, K/NSP-

185, Rev. 7, October 2007 and MC&A Implementation Plan (MIP), OBU-NMM-03-00010, Rev. 3, January 2009 **HOLD**.
HOLD – Both documents to be revised.

F.10 Provide Balance of Plant Support (Phases 1A, 1B, and 2)

F.10.1 Supply Heating, Ventilation, and Air Conditioning
Provide conditioned supply and exhaust air to support operations and personnel.

F.10.1.1 Provide Confinement Ventilation to the Process Areas
Provide confinement ventilation and ventilation for process areas in the process building during normal and upset conditions.
*(Function is allocated to the **Confinement Ventilation System**)*

F.10.1.2 Provide Non-Confinement HVAC to the Fan House and Support Areas
Supply conditioned air to the Fan House and support areas during all normal modes of operation.
*(Function is allocated to the **Non-Confinement HVAC for Fan House and Support Areas System**)*

F.10.1.3 Produce Chilled Water
Produce Chilled Water for the various HVAC systems during all normal modes of operation.
*(Function is allocated to the **Chilled Water System** (non-process))*

F.10.2 Supply Electrical Power
Supply electrical power to PDC systems during all modes of facility operation.

F.10.2.1 Supply Normal Power
Supply normal electrical power to PDC systems during normal facility operation.
*(Function is allocated to the **Electrical Power and Distribution System – Normal Power**)*

F.10.2.2 Supply Emergency Power
Supply emergency electrical power to Safety Class (SC) PDC systems/loads during loss of normal power.
*(Function is allocated to the **Electrical Power and Distribution System – Emergency Power**)*

F.10.2.3 Supply Standby Power
Supply standby electrical power to selected Safety Significant (SS) and other PDC systems during loss of normal power.
*(Function is allocated to the **Electrical Power and Distribution System – Standby Power**)*

F.10.2.4 Supply Conditioned/Uninterruptible Power

Supply conditioned/uninterruptible electrical power to Safety Significant (SS) and other specified critical PDC loads during normal as well as loss of normal power until standby power is supplied.
*(Function is allocated to the **Electrical Power and Distribution System – Uninterruptible Power Supply (UPS)**)*

F.10.3 Manage Waste

Manage transuranic, mixed transuranic, mixed low level, hazardous, low level, high activity liquid **HOLD**, low activity liquid and non-hazardous solid wastes to support process operations.
HOLD – Waste Management Strategy to confirm that high activity liquid waste will be managed
*(Function is allocated to the **Waste Management System**)*

F.10.4 Handle and Move Material

Handle and move material to support PDC operations.

F.10.4.1 Transport Material between Gloveboxes

Handle and transfer process materials, equipment, and supplies between gloveboxes during all modes of operation.
*(Function is allocated to the **Internal Transport System**)*

F.10.4.2 Provide Material Handling outside of Gloveboxes

Handle and transfer material outside gloveboxes to support PDC operations.
*(Function is allocated to the **Material Handling System**)*

F.10.5 Protect Facility Personnel from In-Process Radioactive and Hazardous Materials

Prevent or minimize personnel exposure to ionizing radiation, radioactive materials and/or hazardous materials during operations, maintenance, standby and anticipated upset conditions.
*(Function is allocated to the **Glovebox System**)*

F.10.6 Provide Safety and Health Monitoring

Monitor PDC Facility conditions: radiological and non-radiological, and provide notification of conditions for the safety and health of PDC personnel.
*(Function is allocated to the **Health & Safety Monitoring System**)*

F.10.7 Provide Criticality Control of Process

Monitor and maintain inventory control of SNM to ensure sub-critical glovebox operations.
*(Function is allocated to the **Criticality Control System**)*

F.10.8 Provide Robotic Manipulators and Grippers

Provide remote and repetitive material container and equipment component handling to support process operations.
(Function is allocated to the ***Robotic Manipulators and Grippers System****)*

F.10.9 Protect Facility and Personnel from Fire

Protect PDC Facilities and the inhabitants/personnel from fire by the provision of fire detection, suppression, notification, and life safety operations.
(Function is allocated to the ***Fire Protection System****)*

F.10.10 Provide Building Structures and PDC Site Infrastructure

Provide building structures that house and provide protection, security and support to process, process support and process support service systems, equipment, and personnel. Provide PDC site infrastructure to include mass earthwork, parking, access roads, fencing, site utilities, fire water containment, and storm water drainage.
(Function is allocated to the ***Structures & Building System****)*

F.10.11 Integrate Plant Monitoring and Control

Integrate the control and monitoring of PDC operations during all plant modes of operations and manage process data to support PDC operations.
(Function is allocated to the ***Process Control System****)*

F.10.12 Control Data and Account for Nuclear Material

Control data and account for nuclear material in use and in storage.
(Function is allocated to the ***MC&A System****)*

F.10.13 Provide Physical Security to Protect SNM and Classified Matter

Provide physical security to protect SNM and classified matter in use, in storage, and during transfers.
(Function is allocated to the ***Physical Security System****)*

F.10.14 Supply Inert and Process Gases

Supply inert and process gases to support processing operations and safety confinement systems.

F.10.14.1 Supply Argon and Helium Gas

Supply argon and helium gas to be distributed to the user systems.
(Function is allocated to the ***Argon and Helium Supply System****)*

F.10.14.2 Supply Nitrogen

Supply liquid and gaseous nitrogen to the user systems.
(Function is allocated to the ***Nitrogen Supply System****)*

F.10.14.3 Supply Purified Inert Gas Streams

Purify the spent inert gas to meet the specified impurity levels for oxygen

and water, remove heat, and remove hazardous and radioactive particulate.
*(Function is allocated to the **Inert Gas Purification System**)*

F.10.14.4 Supply Process Gases
Supply the gases and gas mixtures required by process and support operations (Argon/Hydrogen, Oxidizing Gas, P10 Gas, CO2)
*(Function is allocated to the **Process Gases Supply System**)*

F.10.15 Provide Water
Provide water to the PDC Facility as required to support processes and personnel.

F.10.15.1 Supply Facility Potable Water
Supply potable water to the building structures.
*(Function is allocated to the **Fire and Potable Water System**)*

F.10.15.2 Supply Fire Water
Provide fire water supply to hydrants and interface with the fire protection system.
*(Function is allocated to the **Fire and Potable Water System**)*

F.10.15.3 Supply Utility Cooling Water
Supply utility cooling water for process support operations.
*(Function is allocated to the **Cooling Water System**)*

F.10.15.4 Supply Utility and Process Chilled Water
Supply utility chilled water for heat rejection from operations where there is no potential for contamination and process chilled water for heat rejection from operations where there is potential for contamination.
*(Function is allocated to the **Process Chilled Water System**)*

F.10.15.5 Supply Limited Volume Cooling Water (LVCW)
Supply chilled deionized water for heat rejection from operations in gloveboxes where there is a potential for criticality.
*(Function is allocated to the **Limited Volume Cooling Water System**)*

F.10.16 Provide Air Service
Provide air (Plant Air, Instrument Air, and Breathing Air) to PDC process operations and for personnel protection.
*(Function is allocated to the **Plant, Instrument and Breathing Air System**)*

F.10.17 Provide Communications
Provide communications between process operators and control room, as well as between PDC and external systems.
*(Function is allocated to the **Communications System**)*

F.10.18 Provide Sanitary Sewer

Provide sanitary sewer to PDC structures.
(Function is allocated to the ***Sanitary Sewer System****)*

F.10.19 Provide Process Sewer

Provide for pathway for equipment condensate and floor drain effluents to KAC outfall.
(Function is allocated to the ***Process Sewer System****)*

Facility Hazard Categorization

The facility nuclear hazard category as defined by DOE-STD-1027 is a Hazard Category 2 (HC-2) nuclear facility. The basis for the Hazard Category designation is provided in the Safety Design Strategy (Y-AES-K-00002, Appendix G) and the KAC DSA (WSRC-SA-2002-00005) and is preliminary until the Conceptual Safety Design Report (CSDR) for the Pit Disassembly and Conversion Project in the K-Area Complex is approved. Chemical hazards in PDC will be addressed in the CSDR.

Facility Functional Classification

Functional Classification is a graded classification system used to guide the design, operation, procurement, and maintenance requirements for Structures, Systems, and Components (SSCs) installed in a nuclear facility. SSCs identified to provide a safety function were classified as safety class (SC) or safety significant (SS) per the Safety Design Strategy (Y-AES-K-00002, Appendix G) and are preliminary until the CSDR is approved. The CSDR is a report based on the PDC Consolidated Hazards Analysis Process (CHAP) that will be issued to address safety functions for the PDC Facility. Safety functions that require administrative controls will be protected with facility Technical Safety Requirements (TSRs).

FUNCTIONAL ALLOCATION AND CLASSIFICATION TABLE

Table 1-1 contains a summary of the functions presented in this section, lists the preliminary functional classification of each function, and identifies the facility/system that performs each function.

For F.9 and balance of plant function F.10, functional classification and performance category may change during the project phases; Table 1-1 is expanded to identify project phases for F.9 and F.10. NPH criteria definitions can be found in DOE-STD-1189-2008.

Table 1-1 - Functional Allocation and Classification

Function Number	Function Title	Facility/System (Primary System)	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), Seismic Design Criteria (SDC) and Limit State (LS) **	Remarks (Basis FC & NPH)
F.0	Prepare Surplus Pu-Bearing Material for Disposition	PDC Project	N/A	N/A	
F.1	Convert Surplus Non-pit Pu-Bearing Material to Pu Oxide *Phase 1A*	Stabilization and Packaging sub-project	N/A	N/A	
F.1.1	Unpack Shipping Container and Open 3013 and non-3013 Containers	Stabilization and Packaging System and external interface, K-Area Interim Surveillance (KIS)	SS	**TBD**	
F.1.2	Oxidize Non-pit Pu Metal	Stabilization and Packaging System	SS	**TBD**	
F.1.3	Stabilize and Package Non-Pit Pu Oxide	Stabilization and Packaging System	SS	**TBD**	
F.1.4	Package in Shipping Container	external interface K-Area Interim Surveillance (KIS)	SS	**TBD**	

Table 1-1 - Functional Allocation and Classification

Function Number	Function Title	Facility/System (Primary System)	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), Seismic Design Criteria (SDC) and Limit State (LS) **	Remarks (Basis FC & NPH)
F.2	Convert Surplus Pit and Non-pit Pu-Bearing Material to Pu Oxide *Phase 2*	Pit Processing sub-project	N/A	N/A	
F.2.1	Unpack Pits, Disassemble Pits, and Open 3013 Containers	Pit Disassembly System(2)	SS	**TBD**	
F.2.2	Chemically Separate Plutonium	Plutonium Separation System (27)	SS	**TBD**	
F.2.3	Oxidize Plutonium Metal	Plutonium Conversion System (4)	SS	**TBD**	
F.2.4	Blend and Sanitize Plutonium Oxide	Oxide Product Handling System (5)	SS	**TBD**	
F.2.5	Process Uranium Metal	Uranium Processing & Staging System (6)	SS	**TBD**	
F.2.6	Package Pu Oxides and Other By-Products	Product Canning System (7)	SS	**TBD**	
F.2.7	Package 3013s into 9975s	Unpacking and Packaging System (11)	SS	**TBD**	
F.2.8	Sanitize Non-SNM	Sanitization System (8)	SS	**TBD**	

Table 1-1 - Functional Allocation and Classification

Function Number	Function Title	Facility/System (Primary System)	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), Seismic Design Criteria (SDC) and Limit State (LS) **	Remarks (Basis FC & NPH)
F.3.0	Provide Receiving, Storage, and Shipping *Phase 1B*	Material Storage sub-project	N/A	**TBD**	
F.3.1	Receive Incoming Materials	Shipping & Receiving System (1)	SC	**TBD**	
F.3.2	Unpack Received Materials (unpacking CPAs and CRTs)	Unpacking and Packaging System (11)	SS	**TBD**	
F.3.3	Store Received Materials	Vault Storage System (10)	SC	**TBD**	
F.3.4	Store Products and Other Materials	Vault Storage System (10)	SC	**TBD**	
F.3.5	Package Products and Samples for Shipment Packing CPAs and CRTs	Unpacking and Packaging System (11)	SS	**TBD**	
F.3.6	Ship Product and Other Materials	Shipping & Receiving System (1)	SC	**TBD**	
F.4	Provide Infrastructure	Operations and Engineering Center System (42)	GS	**TBD**	
F.5	Disposition non-pit Pu not suitable for MOX fuel	Placeholder Function			

Table 1-1 - Functional Allocation and Classification

Function Number	Function Title	Facility/System	Phase 1A		Phase 1B		Phase 2		Remarks (Basis FC & NPH)
			Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	
F.9	Perform NDA	NDA System (9)	SS	**TBD**	SS	**TBD**	SS	**TBD**	
F.10	Provide Balance of Plant Support	PDC	N/A	N/A	N/A	N/A	N/A	N/A	
F.10.1	Supply Heating, Ventilation, and Air Conditioning		N/A	N/A	N/A	N/A	N/A	N/A	
F.10.1.1	Provide Confinement Ventilation to the Process Areas	Confinement Ventilation System (28)	SS	**TBD**	N/A	**TBD**	SC	**TBD**	
F.10.1.2	Provide Non-Confinement HVAC to the Fan House and Support Areas	Non-Confinement HVAC for Fan House and Support Areas System (41)	GS	**TBD**	GS	**TBD**	GS	**TBD**	
F.10.1.3	Produce Chilled Water	Chilled Water System (non-process) (33)	GS	**TBD**	GS	**TBD**	GS	**TBD**	

Table 1-1 - Functional Allocation and Classification									
Function Number	**Function Title**	**Facility/System**	**Phase 1A**		**Phase 1B**		**Phase 2**		**Remarks (Basis FC & NPH)**
			Highest System Functional Classification (FC) *	**NPH Criteria - Performance Category (PC), SDC and LS ****	**Highest System Functional Classification (FC) ***	**NPH Criteria - Performance Category (PC), SDC and LS ****	**Highest System Functional Classification (FC) ***	**NPH Criteria - Performance Category (PC), SDC and LS ****	
F.10.2	Supply Electrical Power		N/A	N/A	N/A	N/A	N/A	N/A	
F.10.2.1	Supply Normal Power	Electrical Power and Distribution System – Normal Power (29)	GS	**TBD**	GS	**TBD**	GS	**TBD**	
F.10.2.2	Supply Emergency Power	Electrical Power and Distribution System – Emergency Power (44)	N/A	N/A	N/A	N/A	SC	**TBD**	
F.10.2.3	Supply Standby Power	Electrical Power and Distribution System – Standby Power (45)	SS	**TBD**	SS	**TBD**	SS	**TBD**	
F.10.2.4	Supply Conditioned/ Uninterruptible Power	Electrical Power and Distribution System – Uninterruptible Power Supply (UPS) (46)	SS	**TBD**	SS	**TBD**	SS	**TBD**	

Table 1-1 - Functional Allocation and Classification

Function Number	Function Title	Facility/System	Phase 1A		Phase 1B		Phase 2		Remarks (Basis FC & NPH)
			Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	
F.10.3	Manage Waste	Waste Management System (25)	SS	**TBD**	SS	**TBD**	SS	**TBD**	
F.10.4	Handle and Move Material		N/A	N/A	N/A	N/A	N/A	N/A	
F.10.4.1	Transport Material between Gloveboxes	Internal Transport System (20)	N/A	N/A	N/A	N/A	SS	**TBD**	
F.10.4.2	Provide Material Handling outside of Gloveboxes	Material Handling System (21)	SS	**TBD**	SS	**TBD**	SS	**TBD**	
F.10.5	Protect Facility Personnel from In-Process Radioactive and Hazardous Materials	Glovebox System (22)	SS	**TBD**	N/A	N/A	SS	**TBD**	
F.10.6	Provide Safety and Health Monitoring	Health & Safety Monitoring System (34)	SS	**TBD**	SS	**TBD**	SS	**TBD**	
F.10.7	Provide Criticality Control of Process	Criticality Control System (26)	SS	**TBD**	SS	**TBD**	SS	**TBD**	

Table 1-1 - Functional Allocation and Classification

Function Number	Function Title	Facility/System	Phase 1A		Phase 1B		Phase 2		Remarks (Basis FC & NPH)
			Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	
F.10.8	Provide Robotic Manipulators and Grippers	Robotic Manipulators and Grippers System (43)	SS	**TBD**	N/A	N/A	SS	**TBD**	
F.10.9	Protect Facility and Personnel from Fire	Fire Protection System (35)	SC	**TBD**	SC	**TBD**	SS	**TBD**	
F.10.10	Provide Building Structures and PDC Site Infrastructure	Structures & Building System (37)	SC	**TBD**	SC	**TBD**	SC	**TBD**	
F.10.11	Integrate Plant Monitoring and Control	Process Control System (23)	GS	**TBD**	GS	**TBD**	GS	**TBD**	
F.10.12	Control Data and Account for Nuclear Material	MC&A System (30)	N/A	N/A	GS	**TBD**	GS	**TBD**	
F.10.13	Provide Physical Security to Protect SNM and Classified Matter	Physical Security System (36)	GS	**TBD**	GS	**TBD**	GS	**TBD**	

Table 1-1 - Functional Allocation and Classification

Function Number	Function Title	Facility/System	Phase 1A		Phase 1B		Phase 2		Remarks (Basis FC & NPH)
			Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	Highest System Functional Classification (FC) *	NPH Criteria - Performance Category (PC), SDC and LS **	
F.10.14	Supply Inert and Process Gases		N/A	N/A	N/A	N/A	N/A	N/A	
F.10.14.1	Supply Argon and Helium Gas	Argon and Helium Supply System (12)	GS	**TBD**	N/A	N/A	GS	**TBD**	
F.10.14.2	Supply Nitrogen	Nitrogen Supply System (13)	N/A	N/A	GS	**TBD**	GS	**TBD**	
F.10.14.3	Supply Purified Inert Gas Streams	Inert Gas Purification System (40)	SS	**TBD**	N/A	N/A	SS	**TBD**	
F.10.14.4	Supply Process Gases	Process Gases Supply System (14)	GS	**TBD**	N/A	N/A	GS	**TBD**	
F.10.15	Provide Water		N/A	N/A	N/A	N/A	N/A	N/A	
F.10.15.1	Supply Facility Potable Water	Fire and Potable Water System (31)	GS	**TBD**	GS	**TBD**	GS	**TBD**	
F.10.15.2	Supply Fire Water	Fire and Potable Water System (31)	SS	**TBD**	SS	**TBD**	SS	**TBD**	
F.10.15.3	Supply Utility Cooling Water	Cooling Water System (18)	GS	**TBD**	GS	**TBD**	GS	**TBD**	
F.10.15.4	Supply Utility and Process Chilled Water	Process Chilled Water System (17)	GS	**TBD**	N/A	N/A	GS	**TBD**	

Table 1-1 - Functional Allocation and Classification									
Function Number	**Function Title**	**Facility/System**	**Phase 1A**		**Phase 1B**		**Phase 2**		**Remarks (Basis FC & NPH)**
			Highest System Functional Classification (FC) *	**NPH Criteria - Performance Category (PC), SDC and LS ****	**Highest System Functional Classification (FC) ***	**NPH Criteria - Performance Category (PC), SDC and LS ****	**Highest System Functional Classification (FC) ***	**NPH Criteria - Performance Category (PC), SDC and LS ****	
F.10.15.5	Supply Limited Volume Cooling Water (LVCW)	Limited Volume Cooling Water System (16)	SS	**TBD**	N/A	N/A	SS	**TBD**	
F.10.16	Provide Air Service	Plant, Instrument and Breathing Air System (32)	SS	**TBD**	GS	**TBD**	GS	**TBD**	
F.10.17	Provide Communications	Communications System (39)	GS	**TBD**	GS	**TBD**	GS	**TBD**	
F.10.18	Provide Sanitary Sewer	Sanitary Sewer System (47)	GS	**TBD**	GS	**TBD**	GS	**TBD**	
F.10.19	Provide Process Sewer	Process Sewer System (48)	GS	**TBD**	GS	**TBD**	GS	**TBD**	

*** HOLD**: The assigned Functional Classifications are per the Safety Design Strategy (Y-AES-K-00002, Appendix G). The NPH criteria are per the PDCF FDD (G-FDD-F-00004, Rev. 9) and PuP FDD (G-FDD-K-00003, Rev. 0). The Functional Classification and NPH criteria are preliminary until the CSDR for the PDC Project in the K-Area Complex is approved.

****TBD**: NPH requirements to be determined.

Facility Safeguards and Security

Design of safeguards and security functions and features for the Pit Disassembly and Conversion Project is based on the following assumptions:

- PDC will store, process and handle up to Category I quantities of (Attractiveness Level B) special nuclear materials,
- Classified information will be stored and handled in PDC,
- 3013 Storage Containers will be received without Facility Modification (KAMS already receives),
- Central Alarm Station relocation for existing functions will not be required. New CAS for new alarms will be installed in KAC, **HOLD**
- Expansion or Improvement of the Protected Area Entry Control Facility is not required,
- PDC will utilize the Argus security system when PDC starts up.
- Tie in to the existing Plantwide Alternate Alarm Center (PAAC) for Secondary Alarm Station (SAS) functionality **HOLD**

HOLD – Newly initiated Security Design Integration Team (SecDIT) will resolve the issue of having to staff and operate two CAS facilities in K Area. The likely solution will be to transfer all existing CAS functions to the new CAS after it is operational. The SecDIT will also tackle the issue of the PAAC not being able to accept alarms from an Argus based CAS. Either a new Argus workstation will be added to the PAAC or a new SAS will be added to K Area.

Controls will be established to detect, assess, deter, and (in certain cases) prevent unauthorized access to security areas, nuclear materials, classified matter and information systems as described in the Safeguards and Security Requirements Identification Document – KAC Pit Disassembly and Conversion Project. **HOLD**
HOLD – Safeguards and Security Requirements Identification Document to be written.

Note: Below sections will be expanded to identify SRS manuals in addition to DOE Orders and Manuals.

<u>Physical Security</u>

Because the PDC Facility will contain Category I SNM, the facility must be located in a Protected Area as defined by a minimum-two-complimentary-sensor Perimeter Intrusion Detection and Assessment System (PIDAS). Entry Control Facilities will be required at the PIDAS and at the Material Access Area (MAA) boundaries. Monitoring of intrusion detection alarms and personnel access control for the PDC Facility will be accomplished by integrating monitoring into an existing CAS at the selected site. **HOLD** A formal Vulnerability Assessment Report (VAR) and Safeguards and Security Management Report (SSMR) will be required. DOE validation by a completed facility walkthrough and DOE-HQ approval of the PDC Site Safeguards and Security Plan (SSSP) will precede facility startup. As a minimum, physical security for PDC will be in accordance with DOE O-470.1, Safeguards and Security Program and DOE Manual 470.4-2 Change 1.

HOLD - Newly initiated Security Design Integration Team (SecDIT) will resolve the issue of having to staff and operate two CAS facilities in K Area. The likely solution will be to transfer all existing CAS functions to the new CAS after it is operational.

Information Security

Installation of classified systems and networks must comply with red/black and CDIN practices as described in DOE Manual 205.1-3, "Telecommunications Security Manual" and DOE Manual 470.4-4A, "Information Security." An evaluation of the classification of the signals from PDC instrumentation identifies specific red/black instrumentation for the PDC process, as referenced in SRNS-E1300-2010-00005, “Pit Disassembly and Conversion (PDC), Red/Black and Classification Evaluation of Process Modules (U)”, March 24, 2010. A Protected Transmission Security Officer (PTSO) must be formally appointed to serve as the focal representative to Technical Security for the planning, construction, and maintenance life cycle of the classified network. The PTSO must submit a Protected Transmission System plan and obtain approval of the DOE-SR Telecommunications Security Oversight Manager prior to any construction. **HOLD**
HOLD – The responsibility for approval of S&S activities will be transferred from DOE-EM to NNSA at some time in the future.

A classified data collection system is planned for use with PDC NDA equipment in Phase 2. Phase 1A will use existing NDA equipment and manual input into the classified system. The Safeguards and Security Requirements Identification Document (SRI) will list the computer security requirements for the classified automated information systems and other information security requirements within the expanded MAA boundary. The infrastructure for protecting PDC information must comply with the requirements in DOE Manual 205.1-4, National Security System Manual.

Material Control and Accountability

Design of nuclear material measurement systems and inventory control methods for the PDC must be compatible with the Comprehensive Nuclear Materials Management System (CNMMS). Confirmatory measurements of SNM received, inventory verification, and other nuclear material measurements for MC&A purposes shall conform to DOE Manual 474.4-6, Manual for Control and Accountability of Nuclear Material. The conceptual strategy for control and accountability of nuclear material is described in the Preliminary Safeguards Strategy for PDC Project in KAC. **HOLD**
HOLD – Preliminary Safeguards Strategy to be written.

2.0 FACILITY DESIGN REQUIREMENTS

Section 2.0 provides design requirements including constraints and criteria imposed on the facility by authoritative sources such as; federal and state regulations; DOE Orders; national consensus codes and standards; and other requirements based on design and/or operations experience. PDC Facility design, construction, commissioning, and operation shall conform to national codes and standards specified herein. A listing of the codes, standards, and guidance documents to be applied to the PDC Facility are categorized and listed in this section with more complete reference information listed in Appendix A. As specified in DOE Order 252.1, Technical Standards Program, Section 4, Requirements, and as mandated by Public Law 104.113, it is the policy of DOE to rely on the use of, and adherence to, non-governmental Standards when such standards are adequate and appropriate for the intended application. Adherence to appropriate non-governmental standards in the design, construction, testing, modification, operation, decommissioning, decontamination, and remediation of DOE's facilities and activities is necessary for successful implementation of the Department's policies. Standards proven through years of experience and accepted by professional and technical societies shall be used wherever applicable. The SRS Engineering Standards Manual mandates a set of minimum consensus codes and standards to apply to SRS Facilities. Additional requirements are applied as specified below as deemed appropriate by the Design Authority and/or Technical Agency.

Both the FDD and SDD(s) identify the requirements that shall be imposed on the design of the facility and system. A design requirement is identified in the FDD if: 1) the requirement covers multiple systems or 2) if the criterion is considered facility level. Otherwise, the criterion shall be identified in the SDD(s).

Design requirements are applicable to all phases, unless where noted.

2.1 ES&H Design Requirements

2.1.1 Safety Class Requirements

The PDC Systems, Structures and Components for identified safety functions shall be in accordance with the Safety Class Codes and Standards listed in Table 2.1.1-1:

Table 2.1.1-1 - Applicable Safety Class Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.1.1	WSRC-TM-95-1, Standard 01101	Use of Listed Equipment & Components for Safety Class Applications	January 21, 2000		

Table 2.1.1-1 - Applicable Safety Class Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.1.2	WSRC-TM-95-1, Standard 01060	Structural Design Criteria	August 11, 2009		
R.2.1.1.3	WSRC-TM-95-1, Standard 01061	Engineering Standard Qualification of Systems, Equipment, and Components for Natural Phenomena Hazards	August 11, 2009		
R.2.1.1.4	IEEE 379	Standard Application of the Single-Failure Criterion to Nuclear Power Generating Station Safety Systems (ANSI/IEEE)	September 21, 2000 Reaffirmed 2008		
R.2.1.1.5	IEEE 384	Standard Criteria for Independence of Class 1E Equipment and Circuits	September 26, 2008		
R.2.1.1.6	IEEE 323	Standard for Qualifying Class 1E Equipment for Nuclear Power Generating Stations	September 11, 2003 Reaffirmed September 25, 2008		
R.2.1.1.7	IEEE 336	Guide for Installation, Inspection, and Testing for Class 1E Power, Instrumentation, and Control Equipment at Nuclear Facilities	September 22, 2005		
R.2.1.1.8	IEEE 338	Standard Criteria for the Periodic Surveillance Testing of Nuclear Power Generating Station Safety Systems	December 6, 2006		

Table 2.1.1-1 - Applicable Safety Class Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.1.9	IEEE 603	Standard Criteria for Safety Systems for Nuclear Power Generating Stations	September 11, 2009		
R.2.1.1.10	IEEE 334	Qualifying Continuous Duty Class 1E Motors for Nuclear Power Generating Plants	September 15, 2006		
R.2.1.1.11	IEEE 493	Recommended Practice for the Design of Reliable Industrial and Commercial Power Systems	February 7, 2007		
R.2.1.1.12	IEEE 577	Standard Requirements for Reliability Analysis in the Design and Operation of Safety Systems for Nuclear Facilities	May 12, 2004		
R.2.1.1.13	DOE Guide 420.1-1	Non-Reactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide	March 28, 2000		
R.2.1.1.14	DOE Guide 420.1-2	Guide for the Mitigation of Natural Phenomenon Hazards for DOE Nuclear Facilities and Non-Nuclear Facilities	March 28, 2000		
R.2.1.1.15	DOE Guide 420.1-3	Implementation Guide for DOE Fire Protection and Emergency Services Programs for Use with DOE Order 420.1B, Facility Safety	September 27, 2007		

Table 2.1.1-1 - Applicable Safety Class Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.1.16	IEEE 308	Standard Criteria for Class 1E Power Systems for Nuclear Power Generation Stations	December 6, 2001 Reaffirmed March 21, 2007		
R.2.1.1.17	ASME AG-1	Code on Nuclear Air and Gas Treatment	September 30, 2009		HVAC Equipment and Nuclear Air Treatment Systems Equipment
R.2.1.1.18	IEEE 7-4.3.2	IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations.	September 11, 2003		
R.2.1.1.19	DOE-STD-1189-2008	Integration of Safety Into the Design Process	March 2008		
R.2.1.1.20	IEEE 741	Criteria for the Protection of Class 1E Power Systems and Equipment for Nuclear Power Generating Stations	September 27, 2007		

R.2.1.1.21 PDC shall comply with SRS Manual 11Q, Facility Safety Document Manual.

Basis: SRS 11Q complies with SRNS-RP-2008-00086-018-M&O, SRNS Standard/Requirements Identification Document, Functional Area 18, Nuclear and Process Safety.

R.2.1.1.22 Safety class systems shall provide diversity compliant with IEEE 379. **HOLD**

Basis: Diversity requirement per IEEE 379.
HOLD – Diversity and Defense in Depth (D3) Analysis to be completed to determine the need for diversity for safety class systems, using a method such as established in NUREG/CR-6303 and ensuring that this need is balanced against maintenance, spare parts, more complicated procedures, costs, and training issues that would impact reliability. NUREG/CR-7007 may be used to provide an acceptable means for achieving adequate diversity for this system.

R.2.1.1.23 PDC shall comply with DOE Order 420.1B, Facility Safety

Basis: DOE Order 420.1B provides requirements related to design of nuclear facilities.

R.2.1.1.24 PDC shall comply with IEEE N320, Performance Specifications for Reactor Emergency Radiological Monitoring Instrumentation.

Basis: IEEE N320 applies to SC SSCs.

2.1.2 Nuclear Criticality Safety

The PDC Systems, Structures and Components shall be in accordance with the Nuclear Criticality Safety Codes and Standards listed in Table 2.1.2-1:

Table 2.1.2-1 - Applicable Nuclear Criticality Safety Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.2.1	ANS 8.1	Nuclear Criticality Safety in Operations with Fissionable Materials Outside Reactors	January 1, 1998, Reaffirmed May 16, 2007		
R.2.1.2.2	ANS 8.10	Criteria for Nuclear Criticality Safety Controls in Operations with Shielding and Confinement	September 14, 1983, Reaffirmed April 1, 2005		
R.2.1.2.3	ANS 8.15	Nuclear Criticality Control of Special Actinide Elements	January 1, 1981, Reaffirmed July 15, 2005		
R.2.1.2.4	ANS 8.3	Criticality Accident Alarm System	January 1, 1997, Reaffirmed 2003		Nuclear Criticality Monitoring
R.2.1.2.5	ANS 8.7	Nuclear Criticality Safety in the Storage of Fissile Materials	January 1,1998, Reaffirmed September 12, 2007		

Table 2.1.2-1 - Applicable Nuclear Criticality Safety Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.2.6	WSRC-TM-95-1, Standard 13096	Field Installation of Nuclear Incident Monitors	March 15, 2010		
R.2.1.2.7	ANS 8.21	Use of Fixed Neutron Absorbers in Nuclear Facilities Outside Reactors	January 1,1995, Reaffirmed July 23, 2001		
R.2.1.2.8	ANS 8.22	Nuclear Criticality Safety Based on Limiting and Controlling Moderators	August 22,1997 Reaffirmed December 8, 2006		
R.2.1.2.9	ANS 8.19	Administrative Practices for Nuclear Criticality Safety	January 1, 2005		

R.2.1.2.10 The volume of cooling water that might leak into a glovebox shall be restricted to be no more than permitted by the Nuclear Criticality Safety Evaluation (NCSE) **TBD**.
Applicability: Phase 1A and Phase 2
Basis: Ensures that configuration of any water leakage cannot cause an unplanned nuclear criticality event
TBD - NCSE will be developed during preliminary design phase.

R.2.1.2.11 PDC shall comply with SRS Manual SCD-3, Nuclear Criticality Safety Manual.

Basis: SRS SCD-3 complies with SRNS-RP-2008-00086-018-M&O, SRNS Standard/Requirements Identification Document, Functional Area 18, Nuclear and Process Safety.

2.1.3 Safety Significant Requirements

The PDC Systems, Structures and Components for identified safety functions shall be in accordance with the Safety Significant Codes and Standards listed in Table 2.1.3-1:

Table 2.1.3-1 – Applicable Safety Significant Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.3.1	IEEE 833	Recommended Practice for the Protection of Electric Equipment in Nuclear Power Generating Stations from Water Hazards	January 1, 2005		

2.1.4 Environmental Protection

The PDC Systems, Structures and Components shall be in accordance with the Environmental Protection Codes and Standards listed in Table 2.1.4-1:

Table 2.1.4-1 - Applicable Environmental Protection Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.4.1	10 CFR 1022	Compliance with Floodplain/Wetlands Environmental Review Requirements	January 1, 2008		
R.2.1.4.2	DOE Order 450.1A	Environmental Protection Program	June 4, 2008		
R.2.1.4.3	40 CFR 50	National Primary and Secondary Ambient Air Quality Standards	July 1, 2008		
R.2.1.4.4	40 CFR 82	Protection of Stratospheric Ozone	July 1, 2007		

Table 2.1.4-1 - Applicable Environmental Protection Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.4.5	40 CFR 60	Standards of Performance for New Stationary Sources	July 1, 2007		
R.2.1.4.6	40 CFR 61	National Emission Standards for Hazardous Air Pollutants (NESHAP)	July 1, 2008		
R.2.1.4.7	DOE Order 231.1A Change 1	Environmental Safety and Health Reporting	June 3, 2004		
R.2.1.4.8	DOE/EH-0173T	Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance	February 11, 2005		
R.2.1.4.9	40 CFR 141	National Primary Drinking Water Regulations	July 1, 2007		
R.2.1.4.10	40 CFR 142	National Primary Drinking Water Regulations Implementation	July 1, 2007		
R.2.1.4.11	40 CFR 143	National Secondary Drinking Water Regulations	July 1, 2007		
R.2.1.4.12	40 CFR 110	Discharge of Oil	July 1, 2008		
R.2.1.4.13	40 CFR 112	Oil Pollution Prevention	July 1, 2008		
R.2.1.4.14	SC R.61-62	South Carolina Air Pollution Control Regulations and Standards	September 28, 2007		
R.2.1.4.15	SC R.61-58	South Carolina Primary Drinking Water Regulations	September 28, 2007		
R.2.1.4.16	40 CFR 61.32	Beryllium	July 1, 2006		
R.2.1.4.17	40 CFR 61.92	Radionuclides	July 1, 2006		

Table 2.1.4-1 - Applicable Environmental Protection Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.4.18	SCR1000000	NPDES General Permit for Storm Water Discharges from Large and Small Construction Activities	September 1, 2006		
R.2.1.4.19	R.61-9	NPDES Regulations (S.C.)	May 23, 2008		
R.2.1.4.20	DOE Order 5400.5, Change 2	Radiation Protection of the Public and the Environment	January 7, 1993		
R.2.1.4.21	40 CFR 63	National Emission Standards for Hazardous Air Pollutants for Source Categories	January 18, 2008		

R.2.1.4.22 The chilled water systems shall use a type of refrigerant that is within **TBD** environmental permits when accidentally leaked into the environment.

Basis: Permit in compliance with state and federal regulations. Applies LEED guidance principles in DOE Order 430.2B.
TBD – PDC environmental permit to be developed and approved.

R.2.1.4.23 Effluents from all systems shall be verified to ensure that all **TBD** environmental permit requirements are met.

Basis: Ensures compliance with permit and state and federal regulations.
TBD – PDC environmental permit to be developed and approved.

R.2.1.4.24 PDC shall have features to enable effluent monitoring, environmental surveillance, meteorological monitoring, radiological monitoring, and groundwater monitoring.

Basis: DOE Order 450.1A.

R.2.1.4.25 PDC shall be in accordance with SRS Manual 3Q, Environmental Compliance Manual.

Basis: SRS 3Q complies with SRNS-RP-2008-00086-020-M&O, SRNS Standard/Requirements Identification Document, Functional Area 20, Environmental Protection.

R.2.1.4.26 Per IEEE N42.18, systems where the concentration of radionuclides changes significantly between the sample point and detector, as in off-line particulate monitoring, shall be designed with the capability for testing using a radioactive material or known tracer to determine the loss in the sample lines.

Basis: IEEE N42.18, Specification and Performance of Onsite Instrumentation for Continuously Monitoring Radioactivity in Effluents, provides guidance and requirements for effluent monitoring instrumentation applicable to PDC.

R.2.1.4.27 Radiological concentrations shall be monitored at the point of facility discharge.

Basis: To achieve radiation potential ALARA and demonstrate compliance with environmental permits as well as to limit release of airborne radionuclides/hazardous chemicals to the environment.

R.2.1.4.28 PDC shall comply with DOE-SR Letter OSQA-09-0107, "Implementation of DOE-STD-1189, *Integration of Safety into the Design Process*, for Environmental Activities".

Basis: Letter contains requirements related to PDC design.

2.1.5 Waste Management

The PDC Systems, Structures and Components shall be in accordance with the Waste Management Codes and Standards listed in Table 2.1.5-1:

Table 2.1.5-1 - Applicable Waste Management Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.5.1	DOE Order 435.1, Change 1	Radioactive Waste Management	August 28, 2001		
R.2.1.5.2	10 CFR 962	By Product Material	January 1, 2008		
R.2.1.5.3	40 CFR 260	Hazardous Waste Management System: General	July 1, 2008		

Table 2.1.5-1 - Applicable Waste Management Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.5.4	40 CFR 266	Standards for Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities	July 1, 2008		
R.2.1.5.5	40 CFR 262	Standards Applicable to Generators of Hazardous Waste	July 1, 2008		
R.2.1.5.6	40 CFR 270	The Hazardous Waste Permit Program	July 1, 2008		
R.2.1.5.7	SC R.61-79	Regulation for Hazardous Waste Management Systems	September 28, 2007		
R.2.1.5.8	SC 61-107	South Carolina Solid Waste Management Regulations	September 28, 2007		

R.2.1.5.9 PDC shall be in accordance with SRS Manual 19Q, Transportation Safety Manual.

Basis: SRS 19Q complies with SRNS-RP-2008-00086-013-M&O, SRNS Standard/Requirements Identification Document, Functional Area 13, Packaging and Transportation.

R.2.1.5.10 PDC waste management shall be in accordance with SRS Manual 1S, Waste Acceptance Criteria Manual.

Basis: SRS 1S complies with SRNS-RP-2008-00086-016-M&O, SRNS Standard/Requirements Identification Document, Functional Area 16, Waste Management.

2.1.6 Radiological Protection

The PDC Systems, Structures and Components shall be in accordance with the Radiological Protection Codes and Standards listed in Table 2.1.6-1:

Table 2.1.6-1 - Applicable Radiological Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.6.1	SRS Standard 01064	Radiological Design Requirements	June 22, 2009		
R.2.1.6.2	DOE-STD-1128-2008	Guide of Good Practices for Occupational Radiological Protection in Plutonium Facilities	December 2008		
R.2.1.6.3	ASTM C637	Standard Specification for Aggregates for Radiation-Shielding Concrete	December 15, 2009		
R.2.1.6.4	DOE-STD-1098-08	Radiological Control	October 2008 Change Notice 1, May 2009		

R.2.1.6.5 PDC shall be in accordance with SRS Manual 5Q, Radiological Control Manual.

Basis: SRS 5Q implements requirements in 10 CFR 835, Occupational Radiation Protection, and DOE Order 420.1B, Facility Safety.

R.2.1.6.6 The radiation monitor power supply type and quality shall be based on the safety classification of the monitoring system or device.

Basis: DOE-HDBK-1132, Part I, Section 1.3.3

2.1.7 Industrial Hygiene and Occupational Safety

The PDC Systems, Structures and Components shall be in accordance with the Industrial Hygiene and Occupational Safety Codes and Standards listed in Table 2.1.7-1:

Table 2.1.7-1 - Applicable Industrial Safety and Hygiene Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.7.1	10 CFR 850	Chronic Beryllium Disease Prevention Program	January 1, 2008		
R.2.1.7.2	IEEE C95.1	Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3kHz to 300 GHz	October 3, 2005		
R.2.1.7.3	IEEE C95.2	Radio-Frequency Energy and Current-Flow Symbols	June 9, 2005		

R.2.1.7.4 PDC shall be in accordance with SRS Manual 4Q, Industrial Hygiene Manual.

Basis: SRS 4Q complies with SRNS-RP-2008-00086-019-M&O, SRNS Standard/Requirements Identification Document, Functional Area 19, Occupational Safety and Health.

R.2.1.7.5 PDC shall be in accordance with SRS Manual 8Q, Employee Safety Manual.

Basis: SRS 8Q complies with SRNS-RP-2008-00086-019-M&O, SRNS Standard/Requirements Identification Document, Functional Area 19, Occupational Safety and Health.

R.2.1.7.6 Gaseous agents shall not adversely react with exposed nuclear materials in the glovebox.

Basis: Prevents unanticipated reaction between chemicals and ensures safety of personnel.

R.2.1.7.7 Worker exposure to uranium shall not exceed the published occupational permissible exposure limit (PEL) of 0.05 mg/m^3 for soluble compounds or 0.25 mg/m^3 for insoluble compounds.

Basis: The American Conference of Government Industrial Hygiene (ACGIH) threshold limit values (TLVs) and OSHA PELs establish the occupational workers limit for exposure to hazardous chemical compounds. The more restrictive of OSHA PEL's or the 2005 ACGIH TLV's will be used.

R.2.1.7.8 The sound levels in corridors and/or rooms shall be in accordance with OSHA 29 CFR 1910.95, Occupational Noise Exposure and exposure regulation limits.

Basis: Industry Standards for worker noise levels.

R.2.1.7.9 Any hoods and local exhaust systems used in controlling the emission of non-radiological particles, gases, vapors, mists, and/or fumes in the breathing zone of employees shall comply with SRS Manual 4Q, and Industrial Hygiene, Section IH-401.

Basis: Engineering controls are the first line of defense for worker protection from hazards in the workplace. Ventilation is one of the primary engineering controls used to protect personnel from potential chemical exposures. SRS Manual 4Q contains the requirements and required design document for hoods and local exhaust systems.

R.2.1.7.10 HVAC air intakes shall be located a minimum of 25 feet away from any air exhaust opening and from any areas where diesel or vehicle exhaust may be present.

Basis: ASHRAE 62.1.

R.2.1.7.11 Worker exposure to beryllium shall not exceed 0.2 micrograms per cubic meter.

Basis: 10 CFR 850.

2.1.8 Safeguards and Security

The PDC Systems, Structures and Components shall be in accordance with the Safeguards and Security Codes and Standards listed in Table 2.1.8-1:

Table 2.1.8-1 - Applicable Safeguards and Security Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.1.8.1	DOE Manual 470.4-2A	Physical Protection Program Manual	July 23, 2009		
R.2.1.8.2	DOE Order 470.4A	Safeguards and Security Program	May 25, 2007		
R.2.1.8.3	DOE Manual 470.4-4A	Information Security	January 16, 2009		
R.2.1.8.4	DOE Order 205.1A	DOE Cyber Security Management Program	December 4, 2006		
R.2.1.8.5	DOE Manual 470.4-6, Change 1	Nuclear Materials Control and Accountability	August 14, 2006		
R.2.1.8.6	DOE Order 470.3B	Graded Security Protection Policy	August 12, 2008		
R.2.1.8.7	DOE Manual 470.4-1, Chg 1	Safeguards and Security Program Planning Management	March 7, 2006		
R.2.1.8.8	DOE Manual 205.1-5 Chg 2	Cyber Security Process Requirements Manual	December 22, 2009		
R.2.1.8.9	DOE Manual 205.1-3	Telecommunications Security Manual	April 17, 2006		
R.2.1.8.10	DOE Manual 205.1-4	National Security System Manual	March 8, 2007		
R.2.1.8.11	DOE Manual 205.1-7 Chg 2	Security Controls for Unclassified Information Systems Manual	December 22, 2009		
R.2.1.8.12	NAPs **HOLD**	NNSA Policies			

HOLD – The responsibility for approval of S&S activities will be transferred from DOE-EM to NNSA in the future. NNSA also has S&S requirements in their NAPS. There are approximately 10 NAPs.

R.2.1.8.13 PDC shall be in accordance with SRS Manual 7Q, Security Manual.

Basis: SRS Manual 7Q defines requirements for implementing safeguards and security policies and procedures.

R.2.1.8.14 PDC shall be in accordance with SRS Manual 10Q, Computer Security Manual.

Basis: SRS Manual 10Q defines general compliance requirements applicable to all users in the protection of computing resources commensurate with the risk and magnitude of harm that could result from the loss, misuse, disclosure, or unauthorized modification of information.

R.2.1.8.15 PDC shall be in accordance with SRS Manual 14Q, Material Control and Accountability Manual.

Basis: SRS Manual 14Q applies to facilities with a designated Material Balance Area.

R.2.1.8.16 PDC shall meet the Safeguards and Security Requirements Identification Document – KAC PDC Project. **HOLD**
HOLD – Safeguards and Security Requirements Identification Document to be written.

Basis: The Safeguards and Security Requirements Document contains the applicable PDC requirements based on Vulnerability Analysis Report (VAR) results. The SRI complies with DOE Manual 470.4-2A.

R.2.1.8.17 Facility interior and exterior alarm systems reporting to the Central Alarm Station (CAS) shall be compatible with the ARGUS electronic security system.

Basis: Compatibility and interface with existing systems is required.

R.2.1.8.18 PDC shall meet the red/black requirements documented in SRNS-E1300-2010-00005, "PDC Red/Black and Classification of Process Modules (U)", March 24, 2010.

Basis: SRNS-E1300-2010-00005 documents red/black requirements for the PDC Facility.

2.2 Process and Configuration Design Requirements

2.2.1 Materials of Construction

The PDC Systems, Structures and Components shall be in accordance with the Materials of Construction Codes and Standards listed in Table 2.2.1-1:

Table 2.2.1-1 - Applicable Materials of Construction Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.2.1.1	NFPA 251	Standard Method of Tests of Fire Endurance of Building Construction and Materials	January 1, 2006		
R.2.2.1.2	WSRC-TM-95-1, Standard 05951	Corrosion Evaluation: Stainless Steels and Other Corrosion Resistant Alloys	March 28, 2007		
R.2.2.1.3	WSRC-TM-95-1, Standard 05952	Required Practices to Minimize Chloride Induced Stress Corrosion Cracking of Austenitic Stainless Steel	May 26, 2009		

R.2.2.1.4 Materials used in radiological areas shall be capable of withstanding the total absorbed dose expected to be received over the lifetime of the system, or be easily replaceable.

Basis: The use of Teflon or organic material is discouraged in areas where the total absorbed dose would require periodic replacement to maintain a confinement boundary. Limitations on the use of polymeric materials exposed to ionizing radiation are to be considered due to possible degradation. Radiation degradation includes detrimental changes in hardness, elongation, tensile strength, impact resistance, and discoloration. Most polymeric materials are suitable for cumulative radiation exposures of less than 1×10^4 rads in air. Most thermoplastics (with the exception of Teflon™, polytetrafluoroethylene (PTFE), and a few others) are suitable up to 1×10^6 rads and may be usable up to 1×10^7 rads. Thermosetting polymers, such as epoxies and phenolics, and aromatic thermoplastics, such as polystyrene, polyketones, and polyimides, exhibit resistance to levels up to 1×10^9 rads in air. Numerous reference materials provide data on threshold radiation damage of polymeric materials.

R.2.2.1.5 Teflon, if used, shall be in compliance with the expectations of NNSA as specified in NNSA memorandum from E.H. Beckner, "The Use of Teflon Components in NNSA Nuclear Facilities", 5/20/04.

Basis: NNSA provides specific expectations regarding the use of Teflon and other polymer based materials in the NNSA memorandum to the DOE Nuclear Complex Facilities.

2.2.2 Operating Environment

R.2.2.2.1 PDC shall accommodate the regional climatology and local meteorology of the SRS as described in the SRS Climatology Report WSRC-IM-99-034. **HOLD**

Basis: It is necessary that PDC be designed to meet regional conditions. This will help ensure the reliability of the facility.
HOLD - SRS Climatology Report to be validated.

R.2.2.2.2 The heat disposal system into the SRS atmosphere shall be designed to operate under environmental conditions that consider year-round climatology for the atmospheric conditions that exist at SRS: Maximum Dry Bulb Air Temperature = 97ºF and Maximum Wet Bulb Air Temperature = 80ºF.

Basis: WSRC-IM-99-034, SRS Climatological Report. **HOLD**
HOLD - Climatology Report to be validated.

R.2.2.2.3 Outside air winter design temperature shall be 21.3 °F Dry Bulb (DB)

Basis: ASHRAE Handbook, Fundamentals, for Augusta, GA @ 99.6% annual cumulative frequency of occurrence.

R.2.2.2.4 Outside air summer design temperature shall be 96.8 °F DB and 76.1 °F Wet Bulb (WB).

Basis: ASHRAE Handbook, Fundamentals for Augusta, GA @ 0.4% annual cumulative frequency of occurrence.

R.2.2.2.5 All ventilation equipment and controls shall either be rated for exterior use or be provided with a weatherproof enclosure or building.

Basis: Protection from weather effects such as precipitation, heat, and cold, for the service life of these systems and maintainability. 2004-2 guidance requires that the ventilation system withstand credible natural phenomena such as flooding and precipitation as required by the accident analysis.

2.2.3 Process Operating Conditions

R.2.2.3.1 PDC shall operate 24 hours per day, 7 days per week totaling 365 days per year.

Basis: This is based on throughput requirements to dispose material in 15 years. Facility will have scheduled outages to perform maintenance and for MC&A which have been incorporated into planning.

R.2.2.3.2 Exposed equipment shall be protected from inclement weather.

Basis: Prevent premature deterioration of equipment and ensure operation during the life cycle of the facility / system.

2.2.4 Configuration and Essential Features

The PDC Systems, Structures and Components shall be in accordance with the Configuration and Essential Features Codes and Standards listed in Table 2.2.4-1:

Table 2.2.4-1 - Applicable Configuration and Essential Features Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.2.4.1	DOE-STD-1066-99	Fire Protection Design Criteria	July 1999		
R.2.2.4.2	NFPA 101	Life Safety Code	October 27, 2009		
R.2.2.4.3	DOE Order 430.2B	Departmental Energy, Renewable Energy, and Transportation Management	February 27, 2008		
R.2.2.4.4	Executive Order 13423 **HOLD**	Strengthening Federal Environmental, Energy, and Transportation Management	January 24, 2007 Reviewed on March 24, 2010		
R.2.2.4.5	Executive Order 13514 **HOLD**	Federal Leadership in Environmental, Energy, and Economic Performance	October 5, 2009		

HOLD – Executive Orders 13423 and 13514 appear to be guidance and goals rather than requirements.

R.2.2.4.6 The PDC areas and its associated support facilities shall be segmented by fire rated construction to assure that the Maximum Possible Fire Loss (MPFL) will not exceed $50,000,000.

Basis: Fire Hazards Analysis **TBD**. The cost for modifying the Final Storage Room and this equipment has not been determined. However the MPFL is assumed to exceed the monetary value of $3 million requiring automatic fire extinguishing systems, and not exceeding the $50 million for redundant fire protection systems. The cost of the modifications and possible program interruption or delays will necessitate complete automatic suppression throughout the project area.
TBD – Fire Hazards Analysis to be written.

R.2.2.4.7 PDC shall be capable of handling the following containers in Tables 2.2.4-2 through 2.2.4-5.

Table 2.2.4-2 3013 Configurations that will be received

Type	Configuration	Comments
Outer Can	BNFL Outer Can	Used for all 3013s
Inner Can	BNFL Inner Can	Used for RFETS
	SRS Short Inner Can (Bagless Transfer Can)	For Metal Shipment (2 per 3013)
	SRS Tall Inner Can	For Oxide Shipment
	Aries (LANL) Inner Can	Similar to BNFL Inner Can
	LLNL Inner Can	Similar to BNFL Inner Can
	Hanford “Bagless” Inner Can	For Oxide & Metal Shipments (like SRS Tall Can)
	PDCF Inner Can	**HOLD**
Convenience Can	Rocky Flats Convenience Can	For Metal Shipment (RFETS)
	BNFL Oxide Convenience Can	For Oxide Shipment (RFETS)
	SRS Short Convenience Can	For Metal Shipment (optional)
	SRS Tall Oxide Convenience Can	For Oxide Shipment
	LANL Convenience Can	For Metal or Oxide Shipment
	LLNL Convenience Can	For Metal or Oxide Shipment
	Hanford Convenience Can	For Metal or Oxide Shipment
	COGEMA Convenience Can	**HOLD**

Table 2.2.4-3 Characteristics 3013 Convenience Cans that will be received

Container Designation	RFETS (Metal)	BNFL (Oxide)	SRS Short	SRS Tall (Oxide)	LANL*	LLNL*	Hanford
OD	10.44 cm	11.20 cm	10.03 cm	11.16 cm	10.29 cm	10.795 cm	10.85 cm
Side Wall Thickness	0.056 cm	0.10 cm	0.076 cm	0.107 cm	0.0254 cm	0.0254 cm	0.152 cm
Internal Height	13.09 cm	20.65 cm	9.83 cm	18.00 cm	22.06 cm	17.755 cm	18.40 cm
Top Lid Thickness	0.40 cm	0.3 cm	N/A	0.688 cm	0.0254 cm	0.0254 cm	0.302 cm
Bottom Thickness	0.11 cm	0.1 cm	0.076 cm	0.107 cm	0.0254 cm	0.0254 cm	0.635 cm
Drawings	M-PV-F-0015	M-PV-F-0016 M-PV-F-0018	M-FFD-F-00083 M-FFD-F-00098	R-R1-F-0098	90Y-219959	LLNL-94-1 **	DMW-1911

* LLNL and LANL Convenience Cans also may be the BNFL type per N-NCS-F-00087

** Drawing / sketch indicated per N-NCS-F-00087

Table 2.2.4-4 Characteristics of 3013 Inner Cans that will be received

Container Designation	BNFL (RFETS)	SRS Short	SRS Tall + Hanford	LANL (ARIES)
OD	11.70 cm	11.68 cm	11.68 cm	11.63 cm
Side Wall Thickness	0.15 cm	0.152 cm	0.152 cm	0.10 cm
Internal Height	22.0 cm	10.06 cm	21.18 cm	22.66 cm
Top Lid Thickness	0.09 cm	0.305 cm	0.305 cm	0.10 cm
Bottom Thickness	0.2 cm	0.635 cm	0.635 cm	0.10 cm
Drawings	M-PV-F-0016 M-PV-F-0018	R-R1-F-0039 R-R1-F-0038 R-R1-F-0059	R-R3-F-0030 R-R4-F-0107 R-R4-F-0119	90Y-219875

Table 2.2.4-5 Characteristics of 3013 Outer Cans that will be received

3013 Outer Container	
OD	12.50 cm
Side Wall Thickness	0.3225 cm
Internal Height	23.5 cm
Top Lid Thickness	1.0 cm
Bottom Thickness	0.9 cm
Drawing	M-PV-F-0017

Table 2.2.4-6 Characteristics of Process Generated Containers

Container Type	OD	Side Wall Thickness	Height	Top Lid Thickness	Bottom Thickness	Weight (Loaded)	Drawing
3013 Convenience Can	4.395 in.	0.042 in.	7.4 in.	0.063 in.	0.08 in. max	~ 6 kg	R-RI-F-0098 w/ filter lid
non-3013 Convenience Can	3.75 in.	**TBD**	3.0625 in.	**TBD**	**TBD**	~ 6 kg	All Can Seamless (2 Stacked) 20 oz. slip lid
non-3013 Outer Can	4.25 in.	Dimension not important	7 in.	Dimension not important w/filter	Dimension not important	~ 6 kg	
3013 Inner Can	11.68 cm	0.152 cm **HOLD**	21.18 cm **HOLD**	0.305 cm **HOLD**	0.635 cm **HOLD**	18.0 lb. (8.2 kg) **HOLD**	Hanford can design w/SRS lid
3013 Outer Can	4.92 in. (125 mm)	(3.225 mm)	10.0 in. (254 mm)	(10 mm)	(9 mm)	27.7 lb. (12.6 kg)	M-PV-F-0017
Type B Sample Vial	1.00 in.	0.314 in.	1.625 in.	0.125 in.	0.126 in.	111 gm empty (8.25 cc capacity)	R-R4-F-0063
Type C Sample Vial	2.00 in	0.500 in	3.08 in	0.200 in	0.247 in	**TBD** (74.5 cc capacity)	M-MH-G-00617
Outer Sample Can	4.25 in.	Dimension not important	7 in.	Dimension not important w/filter	Dimension not important	~ 2 kg	**TBD**

Table 2.2.4-7 Characteristics of 9975 Shipping Containers

Container Type	OD	Side Wall Thickness	Height	Top Lid Thickness	Bottom Thickness	Weight	Drawing
Outer 9975 (35 gallon drum)	18.35 in.	0.048 in.	35.5 in.	0.048 in.	0.048 in.	404 lb max.loaded	SRS SARP WSRC-SA-2002-00008
9975 Secondary Confinement Vessel (SCV)	6.625 in.	0.280 in.	23.5 in.	1.38 in.	0.280 in.	55 lb. empty	SRS SARP WSRC-SA-2002-00008
9975 Primary Confinement Vessel (PCV)	5.563 in.	0.258 in.	18.12 in. total usable Internal Ht.	1.38 in.	0.258 in.	34 lb. empty	SRS SARP WSRC-SA-2002-00008

Table 2.2.4-8 Characteristics of Croft SafDrum Containers

Container Type	ID	Side Wall Thickness	Height	Top Lid Thickness	Bottom Thickness	Weight	Drawing
Type A Croft SafDrum Outer Container (30 Gallon SST Drum)	18.00 in.	0.0478 in.	26.50 in.	0.25 in.	0.25 in.	248 lb Maximum Gross	**TBD**
SafDrum Inner Containment Vessel (7.5 gallon vessel)	11.00 in. (13.80 OD with flange)	0.125 in.	18.50 in.	0.25 in.	0.25 in.	**TBD**	**TBD**

<u>Basis</u>: Various Pu handling containers will be utilized in the PDC; containers must be uniform in configuration to allow interface with other process system equipment, material handling equipment and MC&A equipment. Tables are based on SRNS-E9000-2008-00006, Interoffice Memo. from Design Authority R.J.Bayer, to Project Engineering Manager T.G.Ballweg, dated October 21, 2008.

HOLD - Dimensions on tables to be validated.

TBD - Values to be determined and validated as design progresses.

R.2.2.4.8 PDC shall be capable of handling the incoming 3013 configurations specified in Interface Control Document G-ESR-K-00011, Section 5.3, Table 5-4. **HOLD**

Basis: ICD identifies various 3013 can configurations packaged by DOE sites over the years to different revisions of DOE-STD-3013. PDC will receive these containers and must be capable of handling and opening them.
HOLD - G-ESR-K-00011 will be revised to include materials PDC must prepare for MFFF disposition.

R.2.2.4.9 Open atmosphere heat disposal systems shall be capable of operating with treated coolant.

Basis: Control of cooling water chemistry reduces maintenance and increases reliability. Coolant treating is to prevent biological growth.

R.2.2.4.10 Open atmosphere heat disposal systems shall be capable of receiving makeup water.

Basis: Makeup water is needed due to evaporation.

R.2.2.4.11 Open atmosphere heat disposal systems shall be capable of blow down to control water chemistry balance.

Basis: Control of cooling water chemistry reduces maintenance and increases reliability.

R.2.2.4.12 PDC shall provide for the relocation and isolation of the Plutonium Production Reactor Agreement (PPRA) inspections from facility operations.

Basis: PDC Program Requirements Document, G-PP-K-00001.

R.2.2.4.13 Process Room Operator Interface Workstations on the process side of gloveboxes shall be placed in an At-the-Controls Area per Manual 2S Procedure 5.3 "Control Area Activities".

Basis: Distractions are minimized.

R.2.2.4.14 A method of audio communication shall be established between all At-the-Controls areas throughout the facility (including process rooms and the control room).

Basis: Communications between operations personnel is essential to facility operations.

R.2.2.4.15 Control rooms shall be arranged in compliance with SRS Manual 2S, Conduct of Operations.

Basis: SRS Manual 2S has been developed and adopted for use as a site-wide control of operations.

R.2.2.4.16 PDC shall comply with DOE Order 460.1C, Packaging and Transportation Safety.

Basis: DOE Order 460.1C establishes safety requirements for proper packaging and transportation of DOE offsite shipments and onsite transfers of radioactive and other hazardous materials for modal transportation.

2.3 Engineering Disciplinary Design Requirements

2.3.1 Civil and Sitework

The PDC Systems, Structures and Components shall be in accordance with the Civil and Sitework Codes and Standards listed in Table 2.3.1-1:

Table 2.3.1-1 - Applicable Civil and Sitework Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.1.1	WSRC-TM-95-1, Standard 01110	Civil Site Design Criteria	November 8, 2005		
R.2.3.1.2	ASCE 77	Design and Construction of Urban Stormwater Management Systems	January 1, 1992		
R.2.3.1.3	AWWA Standards	American Water Works Association Standards	June 24, 2007		Piping and Valves
R.2.3.1.4	41 CFR 101-19.003-6	Public Buildings	July 1, 2007		
R.2.3.1.5	ASTM D1193	Standard Specification for Reagent Water	March 1, 2006		
R.2.3.1.6	IPC	International Plumbing Code	January 1, 2009		

2.3.2 Structural and Natural Phenomena

The PDC Systems, Structures and Components shall be in accordance with the Structural and Natural Phenomena Codes and Standards listed in Table 2.3.2-1:

Table 2.3.2-1 - Applicable Structural and Natural Phenomena Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.2.1	ASME STS-1	Steel Stacks	October 13, 2006		
R.2.3.2.2	IBC	International Building Code	January 1, 2009		Fire Protection System, Architectural and Structural Components
R.2.3.2.3	AWS D1.6	Structural Welding Code - Stainless Steel	January 1, 2007		
R.2.3.2.4	AWS D1.1	Structural Welding Code - Steel	January 1, 2008		
R.2.3.2.5	ASCE 4	Seismic Analysis of Safety-Related Nuclear Structures and Commentary	January 1, 2000		
R.2.3.2.6	ASCE 7	Minimum Design Loads for Buildings and Other Structures	May 3, 2007		
R.2.3.2.7	ACI 318	Building Code Requirements for Structural Concrete and Commentary	August 28, 2009		
R.2.3.2.8	ACI 349	Code Requirements for Nuclear Safety Related Concrete Structures	September 1, 2007		
R.2.3.2.9	AISC N690L	Specification for the Design, Fabrication, and Erection of Steel Safety-Related Structures for Nuclear Facilities - Supplement 2	December 17, 2003 Supplement 2: October 6, 2004		
R.2.3.2.10	AISC 325	Steel Construction Manual	January 1, 2005		
R.2.3.2.11	ACI SP-66	ACI Detailing Manual	January 1, 2004		
R.2.3.2.12	ACI 305R	Hot Weather Concreting	January 1, 1999		

Table 2.3.2-1 - Applicable Structural and Natural Phenomena Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.2.13	ACI 306R	Cold Weather Concreting	January 1, 1988 (Reapproved 2002)		
R.2.3.2.14	WSRC-TM-95-1, Standard 03010	Coring, Chipping, and Drilling in Concrete	December 19, 2005		
R.2.3.2.15	ACI 301	Standard Specification for Structural Concrete	January 1, 2005 w/ errata August 26, 2008		
R.2.3.2.16	ASTM A615	Standard Specification for Deformed and Plant Billet-Steel Bars for Concrete Reinforcement	November 15, 2009		
R.2.3.2.17	WSRC-TM-95-1, Standard 01065	Strong Motion Seismic Monitoring Instrumentation for SRS	March 27, 2006		
R.2.3.2.18	WSRC-TM-95-58, Guide 09900-G	Architectural Field Painting	November 18, 2003		
R.2.3.2.19	WSRC-TM-95-58, Guide 01100-G	Design Criteria for Structures, Systems, and Components	June 11, 2007		
R.2.3.2.20	WSRC-TM-95-58, Guide 03251-G	Concrete Anchors	July 30, 2007		
R.2.3.2.21	WSRC-TM-95-58, Guide 03252-G	Installation and Testing of Concrete Anchors	September 10, 2007		
R.2.3.2.22	AWS D1.2	Structural Welding Code for Aluminum	January 1, 2008		Robotics Manipulators and Grippers System structural components
R.2.3.2.23	unassigned				

R.2.3.2.24 SSCs whose failure could impact the function of higher performance category SSCs shall be supported and anchored for Natural Phenomena Hazards (NPH) loads associated with the higher PC SSC.

Basis: The requirement is intended to assure that the failure of the structural support for an SSC with a lower performance category will not cause an SSC with a higher performance category to fail to perform its intended function. Alternately, the higher performance classification target may be shown by appropriate analysis or testing to be capable of safely withstanding the resulting impact from the failure of the threatening SSC.

R.2.3.2.25 PDC shall be designed for a 15-year operation period and a 20-year design life. **HOLD**

Basis: The specified operation period is based on process throughput capability to prepare Pu at a processing rate as described in R.0.C with a contingency of an additional five years added for lifecycle flexibility and operational overlap.
HOLD - Design life and operational period to be validated during conceptual design and future design evolution.

R.2.3.2.26 Intentionally sealed structures shall account for the effects of tornado generated atmospheric pressure change.

Basis: To ensure confinement (under internal negative pressure).

R.2.3.2.27 Systems, Structures, and Components shall be in accordance with their performance category and seismic design category as defined in the Conceptual Safety Design Report (CSDR) **HOLD** for the PDC Project in the K-Area Complex.

Basis: The CSDR defines the performance categories and seismic design categories for PDC.
HOLD - CSDR to be written. For Conceptual Design, Y-AES-K-00002, Appendix G will be used.

R.2.3.2.28 PDC shall develop in-structure response spectra in accordance with ASCE 4 for the PC-3 level earthquake for the qualification for PC-3 equipment.

Basis: ASCE 4

R.2.3.2.29 All new construction, including facility modifications, shall conform to the International Building Code (IBC).

Basis: Accounts for all applicable local code requirements, especially those ensuring safety against natural phenomena hazards.

R.2.3.2.30 PDC shall provide barriers from floor to hard ceiling between operations and maintenance sides of gloveboxes.

Basis: To provide control of contamination.

R.2.3.2.31 SSCs whose failure could affect the integrity or function of a higher performance category SSC shall be designed in accordance with the requirements for seismic II/I design for overhead commodities.

Basis: Safety class systems must be protected from failure due to interaction with non-safety systems.

R.2.3.2.32 PDC shall comply NNSA CTA Memorandum “Guidance and Expectations for DOE-STD-1189-2008, *Integration of Safety into the Design Process*, Natural Phenomena Hazard Design Basis Criteria for Chemical Hazard Safety Structures, Systems, and Components”

Basis: Memo includes requirements related to PDC design.

2.3.3 Architectural

The PDC Systems, Structures and Components shall be in accordance with the Architectural Codes and Standards listed in Table 2.3.3-1:

Table 2.3.3-1 - Applicable Architectural Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.3.1	NRCA Roofing Manual	NRCA Roofing and Waterproofing Manual	January 1, 2001	Bituminous Membrane Waterproofing / Membrane Roofing	
R.2.3.3.2	ASTM C1193	Standard Guide for Use of Joint Sealants	January 1, 2009		
R.2.3.3.3	NRCA	Handbook of Accepted Roofing Knowledge	January 1983 Revised January 1985	Roof Insulation	

Table 2.3.3-1 - Applicable Architectural Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.3.4	SMACNA 1793	Architectural Sheet Metal Manual	November 1, 2006	Sheet Metal Flashing and Trim	
R.2.3.3.5	ASTM C920	Standard Specification for Elastomeric Joint Sealants	July 15, 2008		
R.2.3.3.6	NFPA 80	Standard for Fire Doors and Other Opening Protectives	January 1, 2010	Fire-rated steel doors, frames, and window installation	Fire Walls, Fire Barrier Walls, Fire Doors
R.2.3.3.7	SDI A250.8	Recommended Specifications for Standard Steel Doors and Frames	January 1, 2003		
R.2.3.3.8	WSRC-TM-95-1, Standard 07270	Installation and Inspection of Penetration Seals	November 7, 2005		
R.2.3.3.9	AAMA SFM-1	Aluminum Store Front and Entrance Manual	August 2002	Aluminum Entrances	
R.2.3.3.10	AAMA Manuals	AAMA Metal Curtain Wall, Window, Store Front and Entrance - Guide Specification Manuals			
R.2.3.3.11	GANA Glazing Manual	GANA Glazing Manual	November 1, 2008		
R.2.3.3.12	GANA Sealant Manual	GANA Sealant Manual	2008		
R.2.3.3.13	NFPA 252	Standard Methods of Fire Tests of Door Assemblies	January 1, 2008		
R.2.3.3.14	ANSI Z97.1	Safety Glazing Materials Used in Buildings - Safety Performance Specifications and Methods of Test	January 1, 2004	Safety Glass	

Table 2.3.3-1 - Applicable Architectural Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.3.15	ANSI A156 Series	Door Hardware	January 1, 2006	Door Hardware	
R.2.3.3.16	ASTM E330	Standard Test Method for Structural Performance of Exterior Windows, Doors, and Curtain Walls by Uniform Static Air Pressure Difference	November 10, 2002	Measurement of Dead, Live, and Wind Loads on Overhead Coiling Doors	
R.2.3.3.17	ANSI A115 Series	Installation Guides and Preparation for Installation of Doors	January 1, 1994	Preparation of Door Frames for installation of Bolts, Closures, Latches, Locks, and Strikes	
R.2.3.3.18	ASTM C840	Standard Specification for Application and Finishing of Gypsum Board	May 1, 2008		
R.2.3.3.19	TCA Handbook for Ceramic Tile Installation	TCA Handbook for Ceramic Tile Installation	March 2009		
R.2.3.3.20	ASTM E580	Standard Practice for Installation of Ceiling Suspension Systems for Acoustical Tile and Lay-in Panels in Areas Subject to Earthquake Ground Motions	August 15, 2009	Suspended Acoustic Ceilings	

Table 2.3.3-1 - Applicable Architectural Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.3.21	ASTM C635	Standard Specification for the Manufacture, Performance, and Testing of Metal Suspension Systems for Acoustical Tile and Lay-In Panel Ceilings	October 1, 2007	Suspended Acoustic Ceilings	
R.2.3.3.22	ASTM C636	Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustical Tile and Lay-In Panels	April 1, 2008	Suspended Acoustic Ceilings	
R.2.3.3.23	NFPA 257	Standard on Fire Test for Window and Glass Block Assemblies	January 1, 2007		
R.2.3.3.24	ASTM D4258	Standard Practice for Surface Cleaning Concrete for Coating	September 1, 2005	Design of Concrete Surfaces requiring Coatings to Enhance Decontamination	
R.2.3.3.25	MBMA Metal Building Systems Manual	MBMA Metal Building Systems Manual	2006		

R.2.3.3.26 Airlocks or vestibules shall be provided at personnel and equipment access ways through walls functioning as contamination confinement barriers.

Basis: Use of airlocks and vestibules will enhance the control of airflow and reduce the potential for the spread of contamination. Per SRS Engineering Standard 15889.

R.2.3.3.27 Walls and partitions in PDC shall maintain specified atmospheric pressure differentials between the building interior and outdoors, the entranceways (airlocks) and the building corridors, as well as the specified pressure differentials between corridors and process rooms.

Basis: The flow of air in the building must be from areas of lower potential for contamination to areas with higher potential for contamination. The architectural design in conjunction with the HVAC system must ensure appropriate airflow.

R.2.3.3.28 Provisions for ingress/egress (including elevated walkways, platforms, and storage areas) shall comply with NFPA 101, *Safety to Life from Fire in Buildings and Structures*, and 41 CFR 101, *Uniform Federal Accessibility Standards*.

Basis: This requirement ensures that adequate, safe means of ingress/and egress are provided. Per NFPA 101 and 41 CFR 101.

R.2.3.3.29 All penetrations through fire walls shall be sealed to meet the same fire rating as the wall.

Basis: Prevents spread of fire and facilitates segregation of fire zones within the facility. Per NFPA 101.

R.2.3.3.30 All doors, windows, dampers etc shall meet or exceed the fire rating of walls.

Basis: Prevents spread of fire and facilitates segregation of fire zones within the facility. Per NFPA 101.

R.2.3.3.31 PDC buildings requiring access by the public and consideration for employment of physically handicapped persons shall be designed in accordance with the Uniform Federal Accessibility Standards in 41 CFR 101-19.6, Accommodations for the Physically Handicapped.

Basis: 41 CFR 101-19.003-6, Public Building, provides regulations applicable to the design of buildings to make them accessible to the public and employees that are physically handicapped.

2.3.4 Mechanical

The PDC Systems, Structures and Components shall be in accordance with the Mechanical Codes and Standards listed in Table 2.3.4-1:

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.1	ASME Boiler and Pressure Vessel Code	Boiler and Pressure Vessel Code, Section VIII	2007		
R.2.3.4.2	AWWA D100	Welded Carbon Steel Tanks for Water Storage	June 12, 2005 w/errata through December 1, 2007		
R.2.3.4.3	API STD 620	Design and Construction of Large, Welded, Low-Pressure Storage Tanks	February 1, 2008		Storage Tanks; Process Tanks for Flammable Liquids
R.2.3.4.4	API STD 2000	Venting Atmospheric and Low Pressure Storage Tanks Non-Refrigerated and Refrigerated	November 1, 2009		
R.2.3.4.5	ASME B31.3	Process Piping	December 31, 2008		Piping
R.2.3.4.6	NFPA 30	Flammable and Combustible Liquids Code	January 1, 2008 (errata through March 13, 2008)		Liquid Run-Off Control; Process Tanks for Flammable Liquids
R.2.3.4.7	ASME B73.1	Specification for Horizontal End Suction Centrifugal Pumps for Chemical Process	January 1, 2001 (Reaffirmed 2007)		Chemical Process Pumps

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.8	ASME B73.2	Specification for Vertical In-Line Centrifugal Pumps for Chemical Process	January 1, 2003 (Reaffirmed 2008)		Chemical Process Pumps
R.2.3.4.9	API STD 674	Positive Displacement Pumps - Reciprocating	June 1, 1995		Chemical Process Pumps
R.2.3.4.10	API STD 675	Positive Displacement Pumps - Controlled Volume	January 1, 1994, Reaffirmed 2000		Chemical Process Pumps
R.2.3.4.11	TEMA	Standards of the Tubular Exchanger Manufacturers Association	January 1, 2007		
R.2.3.4.12	ASME B30.2	Overhead and Gantry Cranes (Top Running Bridge, Single or Multiple Girder, Top Running Trolley Hoist)	January 1, 2005		Cranes
R.2.3.4.13	ASME B30.11	Monorails and Underhung Cranes - Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings	January 1, 2004		
R.2.3.4.14	CMAA 70	Specifications for Top Running Bridge and Gantry Type Multiple Girder Electric Overhead Traveling Cranes	January 1, 2004		Cranes

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.15	CMAA 74	Specification for Top Running and Under Running Single Girder Electric Overhead Traveling Cranes Utilizing Under Running Trolley Hoists	January 1, 2004		Cranes
R.2.3.4.16	API STD 617	Axial and Centrifugal Compressors and Expander-Compressors for Petroleum, Chemical and Gas Industry Services	July 1, 2002 Reaffirmed January 2009		
R.2.3.4.17	API STD 618	Reciprocating Compressors for Petroleum, Chemical, and Gas Industry Services	December 1, 2007		
R.2.3.4.18	API STD 619	Rotary Type Positive Displacement Compressors for Petroleum, Chemical, and Gas Industry Services	December 1, 2004		
R.2.3.4.19	ANS 59.51	Fuel Oil Systems for Safety-Related Emergency Diesel Generators	January 1, 1997 (Reaffirmed October 4, 2007)		
R.2.3.4.20	ASHRAE Handbook - Fundamentals	ASHRAE Handbook - Fundamentals	2009		
R.2.3.4.21	DOE-HDBK-1169-2003	Nuclear Air Cleaning Handbook	November 2003		

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.22	AGS G001-2007	American Glovebox Society Guideline for Gloveboxes	February 2007		Gloveboxes
R.2.3.4.23	10 CFR 435	Energy Conservation Voluntary Performance Standards for New Buildings; Mandatory for Federal Buildings	January 1, 2006		
R.2.3.4.24	ASTM F683	Standard Practice for Selection and Application of Thermal Insulation for Piping and Machinery	May 1, 2008		
R.2.3.4.25	ASTM C450	Standard Practice for Fabrication of Thermal Insulating Fitting Covers for NPS Piping, and Vessel Lagging	May 1, 2008		
R.2.3.4.26	WSRC-TM-95-1, Standard 15061	Pressure Equipment Protection Requirements	August 10, 2009		
R.2.3.4.27	MSS-SP-58	Manufacturers Standardization Society - Pipe Hangers and Supports - Materials, Design and Manufacture	November 1, 2009		
R.2.3.4.28	WSRC-TM-95-1, Standard 15060	ASME B31.3 Additional Requirements for SRS Piping Systems	December 9, 2008		

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.29	API STD 650	Welded Steel Tanks for Oil Storage	June 1, 2007 (incorporating Add.1 November 2008, Add.2 November 2009)		Process Tanks for Flammable Liquids; Petroleum Storage Tanks
R.2.3.4.30	ASME B30.17	Overhead and Gantry Cranes - Top Running Bridge, Single Girder, Underhung Hoist	January 1, 2006		
R.2.3.4.31	ASME B30.16	Overhead Hoists (Underhung) Safety Standard for Cableways, Cranes, Derricks, Hoists, Hooks, Jacks, and Slings	July 13, 2007		
R.2.3.4.32	ASME HST-1	Performance Standard for Electrical Chain Hoists	November 8, 1999 Reaffirmed 2004		
R.2.3.4.33	ANSI/ITSDF B56.1	Safety Standard for Low and High Lift Trucks	January 1, 2005 (Revised w/errata December 7, 2005)	Type E Electric Trucks	
R.2.3.4.34	UL 583	UL Standard for Safety of Electric Battery Powered Industrial Trucks	June 26, 1996 w/revisions through and including August 31, 2007	Type E Lift Trucks	

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.35	WSRC-IM-95-58, Guide 16745-G	Environmental and Installation Considerations for Computer Type Equipment	July 16, 2003		
R.2.3.4.36	NFPA 801	Standard for Fire Protection for Facilities Handling Radioactive Materials	January 1, 2008		Gloveboxes; Liquid Run-Off Control; Fire Alarm & Detection; Hot Cells; Hoods; Dampers
R.2.3.4.37	NFPA 13	Installation of Sprinkler Systems	January 1, 2010		Automatic Sprinkler Systems; Water Supplies; Cable Installations
R.2.3.4.38	NFPA 24	Standard for Installation of Private Fire Service Mains and Their Appurtenances	January 1, 2010		Water Supplies; Water Distribution and Fire Hose
R.2.3.4.39	NFPA 10	Standard for Portable Fire Extinguishers	January 1, 2010		Fire Extinguishers
R.2.3.4.40	NFPA 15	Standard for Water Spray Fixed Systems for Fire Protection	January 1, 2007		Automatic Sprinkler Systems
R.2.3.4.41	NFPA 2001	Standard on Clean Agent Fire Extinguishing Systems	January 1, 2008		Gaseous Fire Suppression Systems
R.2.3.4.42	NFPA 72	National Fire Alarm Code	January 1, 2010		Automatic Sprinkler Systems; Water Mist Systems; Fire Pumps; Chemical Fire Suppression; Fire Alarm & Detection

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.43	NFPA 90A	Standard for Installation of Air Conditioning and Ventilating Systems	January 1, 2009		Fire Alarm & Detection; Ventilation Systems; Fire Walls; Fire Barrier Walls; Fire Doors; Gloveboxes; Hot Cells; Hoods; Air Flow & Controls; Dampers
R.2.3.4.44	NFPA 90B	Standard for the Installation of Warm Air Heating and Air Conditioning Systems	January 1, 2009		Ventilation Systems; Air Flow & Controls
R.2.3.4.45	NFPA 54	National Fuel Gas Code	January 1, 2009		
R.2.3.4.46	NFPA 69	Standard on Explosion Prevention Systems	January 1, 2008		Explosives; Gloveboxes; Hot Cells; Hoods
R.2.3.4.47	NFPA 220	Standard on Types of Building Construction	January 1, 2009		Permanent Structures; Fire Walls; Fire Barrier Walls; Fire Doors
R.2.3.4.48	NFPA 80A	Recommended Practice for Protection of Buildings from Exterior Fire Exposures	January 1, 2007		Fire Exposure Protection; Fire Walls; Fire Barrier Walls; Fire Doors
R.2.3.4.49	NFPA 505	Fire Safety Standard for Powered Industrial Trucks, Including Type Designations, Areas of Use, Conversions, Maintenance, and Operation	January 1, 2006		

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.50	DOE-STD-1090	Hoisting And Rigging (Formerly Hoisting and Rigging Manual)	December 2007		
R.2.3.4.51	NFPA 37	Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	January 1, 2010		Electrical Systems
R.2.3.4.52	WSRC-TM-95-1, Standard 01120	SRS Fire Protection Design Criteria	October 19, 2007		
R.2.3.4.53	ASME A17.1	Safety Code for Elevators and Escalators Includes Requirements for Elevators, Escalators, Dumbwaiters, Moving Walks, Material Lifts, and Dumbwaiters With Automatic Transfer Devices	January 1, 2007		
R.2.3.4.54	ASME A17.3	Safety Code for Existing Elevators and Escalators	January 1, 2008		
R.2.3.4.55	NFPA 214	Standard on Water Cooling Towers	January 1, 2005		Cooling Towers
R.2.3.4.56	WSRC-TM-95-1, Standard 11595	Breathing Air Distribution System	January 26, 2009		
R.2.3.4.57	NFPA 25	Standard for the Inspection, Testing, and Maintenance of Water-Based Fire Protection Systems	January 1, 2008		Automatic Sprinkler Systems; Fire Pumps; Water Distribution and Fire Hose

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.58	NFPA 22	Standard for Water Tanks for Private Fire Protection	January 1, 2008		Water Supplies
R.2.3.4.59	NFPA 86	Standard for Ovens and Furnaces	January 1, 2007		
R.2.3.4.60	AGS-G006-2005	Standard Operating Procedure for the Design and Fabrication of Nuclear Gloveboxes	2005		
R.2.3.4.61	UL 555	UL Standard for Safety Fire Dampers	July 12, 2006		Dampers
R.2.3.4.62	UL 142	Steel Aboveground Tanks for Flammable and Combustible Liquids	October 2, 2009		Process Tanks for Flammable Liquids
R.2.3.4.63	API 610	Centrifugal Pumps for Petroleum, Petrochemical, and Natural Gas Industries	October 1, 2004		Fuel Oil Services Pumps
R.2.3.4.64	API 613	Special Purpose Gear Units for Petroleum, Chemical, and Gas Industry Services	December 5, 2005		
R.2.3.4.65	ASHRAE Handbook	ASHRAE Handbook – HVAC Applications	2007		
R.2.3.4.66	ASHRAE Handbook	ASHRAE Handbook – HVAC Systems and Equipment	2008		

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.67	ASHRAE Handbook	ASHRAE Handbook – Refrigeration Systems and Applications	2006		
R.2.3.4.68	ASHRAE GRP 158	Cooling and Heating Load Calculation Manual	1979		
R.2.3.4.69	ARI 550/590	Water Chilling Packages Using the Vapor Compression Cycle	January 1, 2003		
R.2.3.4.70	ASHRAE 15	Safety Standard for Refrigeration Systems	January 1, 2007		
R.2.3.4.71	ASHRAE 24	Methods of Testing for Rating Liquid Coolers	June 20, 2009		
R.2.3.4.72	ASHRAE 55	Thermal Environmental Conditions for Human Occupancy	January 24, 2009		
R.2.3.4.73	ASHRAE 90.1	Energy Standard for Buildings Except Low-Rise Residential Buildings	October 3, 2009		
R.2.3.4.74	SMACNA 1966	HVAC Duct Construction Standards – Metal and Flexible	January 1, 2005		
R.2.3.4.75	AMCA 201	Fans and Systems	January 1, 2002		
R.2.3.4.76	AMCA 210	Laboratory Methods of Testing Fans for Rating	January 1, 2007		
R.2.3.4.77	ASME B31.5	Refrigeration Piping and Heat Transfer Components	January 1, 2006		Refrigeration Piping

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.78	WSRC-TM-95-1, Standard 15889	Confinement Ventilation Systems Design Criteria	April 28, 2005		
R.2.3.4.79	NFPA 221	Standard for High Challenge Fire Walls, Fire Walls, and Fire Barrier Walls	January 1, 2009		Fire Walls; Fire Barrier Walls; Fire Doors
R.2.3.4.80	WSRC-TM-95-1, Standard 15888	HEPA Filter Requirements	November 2, 2009		
R.2.3.4.81	ASHRAE 90365	Heating, Ventilation, and Air Conditioning Design Guide for DOE Nuclear Facilities	January 1, 1993		
R.2.3.4.82	AABC Volume A	National Standards for Total System Balance	2002		
R.2.3.4.83	DOE-STD-3025-2007	DOE Standard Quality Assurance Inspection and Testing for HEPA Filters	February 2007		
R.2.3.4.84	API 673	Centrifugal Fans for Petroleum, Chemical, and Gas Industry Service	January 1, 2002		
R.2.3.4.85	AHRI 410	Standard for Forced-Circulation Air-Cooling and Air-Heating Coils	January 1, 2001		Coils
R.2.3.4.86	ASHRAE 62.1	Ventilation for Acceptable Indoor Air Quality	September 9, 2009		
R.2.3.4.87	SMACNA 1520	Round Industrial Duct Construction Standards	September 1, 2009		

Table 2.3.4-1 - Applicable Mechanical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.4.88	SMACNA 1922	Rectangular Industrial Duct Construction Standards	August 1, 2004		
R.2.3.4.89	ACGIH 2090	Industrial Ventilation – a Manual of Recommended Practice	January 1, 2001		
R.2.3.4.90	AHRI 430	Central Station Air-Handling Units	January 1, 1999		HVAC Air Handling Units
R.2.3.4.91	UL 555S	Standard for Safety – Smoke Dampers	January 25, 2010		Dampers
R.2.3.4.92	RIA R15.06	Industrial Robots and Robot Systems – Safety Requirements	January 1, 1999		
R.2.3.4.93	DOE-STD-3020-2005	Specification for HEPA Filters Used by DOE Contractors	December 2005		
R.2.3.4.94	WSRC-IM-95-98, Guide No. 15250-G	Mechanical Insulation	May 27, 2004		

R.2.3.4.95 PDC shall be in accordance with SRS Manual 2Q, Fire Protection Manual.

Basis: SRS 2Q complies with SRNS-RP-2008-00086-012-M&O, SRNS Standard/Requirements Identification Document, Functional Area 12, Fire Protection.

R.2.3.4.96 The chilled water systems shall include provisions to pull samples of water from each closed loop water system for water properties quality analysis.

Basis: Closed loop cooling water to process systems must be sampled to detect contamination (indicating leak) and to maintain water chemistry to maximize service life of the system.

R.2.3.4.97 Connections to domestic water shall comply with SBCCI 5 "Standard Plumbing Code."

Basis: Prevents backflow/cross connection to domestic water, standard for connection of domestic water to process related equipment.

R.2.3.4.98 All chilled water and cooling system piping shall be per ASME B31.3.

Basis: Site specification for chilled water and cooling system piping.

R.2.3.4.99 All chilled water and cooling system piping shall be per WSRC-TM-95-1, SRS Engineering Standard 15060.

Basis: Site specification for chilled water and cooling system piping.

R.2.3.4.100 All chilled water and cooling system piping shall be per P-Spec. PS101C unless approved otherwise.

Basis: Site specification for chilled water and cooling system piping.

R.2.3.4.101 Exterior insulation on piping and equipment shall be provided with weather protecting aluminum jackets in accordance with WSRC-IM-95-98, Guide 15250-G.

Basis: SRS Guidance provides design details for proper installation of exterior insulation and weather protection of piping and equipment.

R.2.3.4.102 Closed-loop cooling systems shall be used for transporting heat between heat-generating and heat-receiving exchange units, with makeup and drain capacities provided for startup and maintenance activities.

Basis: Prevents spread of contamination in case of coil breach.

R.2.3.4.103 Backflow prevention from the potentially contaminated process chilled water to any interfacing fluid systems shall be provided (i.e., to the makeup water supply system).

Basis: Prevents spread of contamination into clean systems.

R.2.3.4.104 The chilled water systems shall have freeze protection to operate during winter atmospheric conditions of -3 ºF, assuming minimum heat loads.

Basis: Maintains operability in freezing temperature conditions.

R.2.3.4.105 Fire detection in gloveboxes shall be thermal detectors (probe or ribbon type).

Basis: Standard method for glovebox fire detection at SRS. Thermal detectors specified provide for ease of testing and replacement.

R.2.3.4.106 Gaseous and liquid piping systems shall include physical design features to prevent damage from pressure transients from water and air hammer.

Basis: The DOE complex has experienced several incidents where pressure transients (steam and water) have caused damage to DOE facilities. Administrative and procedural controls may supplement physical design features.

R.2.3.4.107 Components (piping, storage tanks, and instrumentation) susceptible to freezing shall be provided with freeze protection.

Basis: Freeze protection is required for property protection, worker safety, and to minimize process downtime (RAMI). Basis for selection of atmospheric temperature is the extreme temperatures recorded at the SRS for the period of 1961-1986, as reported in "A Climatological Description of the Savannah River Site," WSRC-RP-89-313.

R.2.3.4.108 Piping systems and applicable equipment shall allow for component isolation, draining, and line breaks.

Basis: These design features will increase the efficiency of performing maintenance activities on piping systems and related equipment, as well as increase the efficiency of waste handling activities.

R.2.3.4.109 Pressurized gas supply lines to gloveboxes and process vessels/equipment shall prevent over pressurization of the process enclosure and process vessels/equipment.

Basis: It is normal SRS practice to operate vessels at a slight negative pressure with respect to the process enclosures. This needs to be ensured to prevent the migration of contamination back into the line when the system is depressurized. The use of positive pressure process vessels shall be evaluated and approved by the Design Authority on a case-by-case basis, as exception only.

R.2.3.4.110 New ductwork for all potentially contaminated HVAC exhaust systems shall be welded construction with flanged transverse joints.

Basis: Reduces potential for contaminated air leakage and reduces the potential for build up of contaminated materials in corners and low airflow areas in the duct.

R.2.3.4.111 New ductwork shall be fabricated from Type 304-L stainless steel sheet metal and pipe.

Basis: Reduces potential for contaminated air leakage and reduces the potential for build up of contaminated materials in corners and low airflow areas in the duct.

R.2.3.4.112 Outdoor air to the non-process areas of PDC shall be filtered with moderate efficiency filters to Minimum Efficiency Reporting Values (MERV) of 7.

Basis: To provide acceptable indoor air quality per American Society of Heating, Refrigeration and Air Conditioning Engineers, Inc. ASHRAE 62.1, ASHRAE Handbooks.

R.2.3.4.113 During a fire event, exhaust air fans shall be maintained in operation as necessary to maintain differential pressures to atmosphere.

Applicability: Phase 2
Basis: Supports safe egress from process areas and supports the building without jeopardizing life safety concerns as well as maintaining the building differential pressures.

R.2.3.4.114 During a fire event, stairwells shall be pressurized with respect to adjacent areas.

Basis: Supports safe egress from process areas and supports the building without jeopardizing life safety concerns as well as maintaining the building differential pressures.

R.2.3.4.115 During a fire event, administrative area air handling units shall be shut down.

Basis: Supports safe egress from process areas and supports the building without jeopardizing life safety concerns as well as maintaining the building differential pressures.

R.2.3.4.116 PDC shall preclude interconnections among storm water systems, process water systems, gas systems, the sanitary waste system and radioactive or other hazardous material handling systems.

Basis: Prevention of back flow and cross contamination of systems. WSRC Manual 3Q, Environmental Compliance Manual.

R.2.3.4.117 PDC shall comply with NNSA CTA Memorandum, “Interim Guidance for the Design and Operation of Wet Pipe Sprinkler Systems and Supporting Water Supplies”.

Basis: Memo contains requirements related to PDC design.

2.3.5 Electrical

The PDC Systems, Structures and Components shall be in accordance with the Electrical Codes and Standards listed in Table 2.3.5-1:

Table 2.3.5-1 - Applicable Electrical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.5.1	DOE-STD-3003-2000	Backup Power Sources for DOE Facilities	January 2000		
R.2.3.5.2	NFPA 70	National Electrical Code	January 1, 2008		Pathways and Spaces; Commercial Building Wiring; Monitoring; Fire Protection Systems; Electrical Systems
R.2.3.5.3	IEEE C2	National Electrical Safety Code	January 1, 2007 Errata through May 14, 2007		Electrical Systems
R.2.3.5.4	NFPA 780	Lightning Protection Code	January 1, 2008		Grounding & Lightning Protection
R.2.3.5.5	IEEE 141	Recommended Practice for Electric Power Distribution for Industrial Plants	December 2, 1993 w/errata through June 9, 1998 (Reaffirmed 1999)		Electrical Systems
R.2.3.5.6	IEEE 142	Recommended Practice for Grounding of Industrial and Commercial Power Systems, IEEE Green Book	June 7, 2007		Grounding & Lightning Protection

Table 2.3.5-1 - Applicable Electrical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.5.7	IEEE 242	Recommended Practice for Protection and Coordination of Industrial and Commercial Power Systems	June 14, 2001, with errata dated January 24, 2003		Electrical Systems
R.2.3.5.8	WSRC-TM-95-1, Standard 16050	Electrical Design Criteria	August 15, 2005		
R.2.3.5.9	IEEE 1100	Recommended Practice for Powering and Grounding Electronic Equipment, IEEE Emerald Book	December 9, 2005		Grounding & Lightning Protection
R.2.3.5.10	NEMA C84.1	Electrical Power Systems and Equipment-Voltage Ratings (60 Hertz)	January 1, 2006		Electrical Systems
R.2.3.5.11	IESNA HB-9	Lighting Handbook, Reference and Application	January 1, 2000 w/errata through April 11, 2005		Electrical Systems
R.2.3.5.12	WSRC-IM-95-58, Guide 16980-G	Assessment of Listed/Non-Listed Electrical Equipment for Use at SRS	January 6, 2005		
R.2.3.5.13	NEMA MG 1	Motors and Generators	January 1, 2006		
R.2.3.5.14	IEEE 515	Recommended Practice for the Testing, Design, Installation, and Maintenance of Electrical Resistance Heat Tracing for Industrial Applications	February 9, 2004		

Table 2.3.5-1 - Applicable Electrical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.5.15	TIA/EIA 4720000-A	Generic Specifications for Fiber Optic Cable	November 1, 2003		
R.2.3.5.16	IEEE 739	Recommended Practice for Energy Management in Industrial and Commercial Facilities	January 1, 1995		Electrical Systems
R.2.3.5.17	NEMA ICS 1	Industrial Control and Systems General Requirements	January 1, 2000 (Reaffirmed 2008)		Electrical Systems
R.2.3.5.18	IEEE C37.96	Guide for AC Motor Protection	March 30, 2000 (Reaffirmed December 5, 2006)		Electrical Systems
R.2.3.5.19	IEEE C37.90	Standard for Relays and Relay Systems Associated with Electrical Power Apparatus	September 22, 2005		Electrical Systems
R.2.3.5.20	NEMA 250	Enclosures for Electrical Equipment (1000 volts maximum)	January 1, 2008		
R.2.3.5.21	IEEE 841	Standard for Petroleum and Chemical Industry – Premium-Efficiency, Severe-Duty Totally Enclosed Fan-Cooled (TEFC) Squirrel Cage Induction Motors - Up To and Including 370 kW (500 hp)	March 19, 2009		
R.2.3.5.22	IEEE C62.41	IEEE Recommended Practice on Surge Voltages in Low Voltage AC Power Circuits	January 1, 1991 (Reaffirmed 1995)		

Table 2.3.5-1 - Applicable Electrical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.5.23	IEEE 628	Standard Criteria for the Design, Installation, and Qualification of Raceway Systems for Class 1E Nuclear Power Generating Stations	January 5, 2001 Reaffirmed December 5, 2006		
R.2.3.5.24	IEEE 383	Type Test of Class 1E Electric Cables, Field Splices, and Connections for Nuclear Power Generating Stations	December 12, 2003 Reaffirmed December 10, 2008		
R.2.3.5.25	IEEE 835	Standard Power Cable Ampacity Tables	September 22, 1994 Reaffirmed June 7, 2006		
R.2.3.5.26	WSRC-IM-95-58, Guide 16600-G	Application of IEEE 384-1992 for SRS Non-Reactor Facilities, Safety Systems	January 6, 2005		
R.2.3.5.27	WSRC-IM-95-58, Guide 16601-G	Application of IEEE 308-2001 for SRS Non-Reactor Facilities, Safety Systems	January 6, 2005		
R.2.3.5.28	NEMA PB1	Panelboards	January 1, 2006		
R.2.3.5.29	NEMA ICS 6	Enclosure for Industrial Controls and Systems	January 1, 1993 (Reaffirmed 2006)		Electrical Systems
R.2.3.5.30	UL 67	Panelboards	March 18, 2009		
R.2.3.5.31	UL 489	Molded-Case Circuit Breakers, Molded-Case Switches and Circuit-Breaker Enclosures	September 1, 2009		
R.2.3.5.32	UL 6	Electrical Rigid Metal Conduit	November 30, 2007		

Table 2.3.5-1 - Applicable Electrical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.5.33	NEMA C80.1	Electrical Rigid Steel Conduit	August 18, 2005		
R.2.3.5.34	NFPA 75	Standard for the Protection of Information Technology Equipment	January 1, 2009		Electronic Computer / Data Processing Systems
R.2.3.5.35	IEEE 1050	Guide for Instrumentation and Control Equipment Grounding in Generating Stations	September 24, 2004		Grounding and Lightning Protection
R.2.3.5.36	NRC Regulatory Guide 1.180	Guidelines for Evaluating Electromagnetic and Radio-Frequency Interference in Safety-Related Instrumentation and Control Systems	October 2003		
R.2.3.5.37	NACE RP0169	Control of External Corrosion on Underground or Submerged Metallic Piping Systems	July 1, 2002		
R.2.3.5.38	NACE RP0285	Corrosion Control of Underground Storage Tank Systems by Cathodic Protection	January 1, 2002		
R.2.3.5.39	NACE RP0286	Electrical Insulation of Cathodically Protected Pipelines	July 1, 2007		
R.2.3.5.40	UL 508	Standard for Safety Industrial Control Equipment	January 28, 1999		Electrical Systems
R.2.3.5.41	NFPA 110	Standard for Emergency and Standby Power Systems	January 1, 2010		Electrical Systems

Table 2.3.5-1 - Applicable Electrical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.5.42	UL 1746	Standard for Safety External Corrosion Protection Systems for Steel Underground Storage Tanks	January 17, 2007		
R.2.3.5.43	IEEE 446	Recommended Practice for Emergency and Standby Power Systems for Industrial and Commercial Applications	December 12, 1995		Electrical Systems
R.2.3.5.44	IEEE 484	Recommended Practice for Installation Design and Installation of Vented Lead-Acid Batteries for Stationary Applications	September 12, 2002 (Reaffirmed December 10, 2008)		Electrical Systems
R.2.3.5.45	IEEE 485	Recommended Practice for Sizing Lead-Acid Batteries for Stationary Applications	March 20, 1997 (Reaffirmed September 11, 2003)		Electrical Systems
R.2.3.5.46	IEEE 980	Guide for Containment and Control of Oil Spills in Substations	September 22, 1994 (Reaffirmed March 17, 2001)		
R.2.3.5.47	IEEE C37.95	Guide for Protective Relaying of Utility-Consumer Interconnections	December 11, 2002 (Reaffirmed December 5, 2007)		Electrical Systems
R.2.3.5.48	NFPA 111	Molded Case Circuit Breakers and Molded Case Switches	January 1, 2010		Electrical Systems

Table 2.3.5-1 - Applicable Electrical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.5.49	NFPA 79	Electrical Standard for Industrial Machinery	January 1, 2007 (w/ errata through April 13, 2009)		Lasers, Robotic Manipulators and Grippers System
R.2.3.5.50	SEMI F47	Specification for Semiconductor Processing Equipment Voltage Sag Immunity	July 1, 2006		
R.2.3.5.51	IEEE 344	Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations	December 8, 2004 (Reaffirmed September 11, 2009)		
R.2.3.5.52	IEEE 519	Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems	June 18, 1992 (errata June 15, 2004)		
R.2.3.5.53	IEEE 765	Standard for Preferred Power Supply (PPS) for Nuclear Power Generating Stations (NPGS)	June 8, 2006		
R.2.3.5.54	WSRC-IM-95-58, Guide 16051-G	Installation of Electrical Raceway Systems and Cable Trays	October 31, 2007		
R.2.3.5.55	WSRC-IM-95-58, Guide 16052-G	Installation of Electrical Wires, Cables and Terminations	August 15, 2005		
R.2.3.5.56	WSRC-IM-95-58, Guide 16053-G	Installation of Electrical Equipment	February 12, 2004		

Table 2.3.5-1 - Applicable Electrical Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.5.57	WSRC-IM-95-58, Guide 16054-G	Installation of Electrical Heat Tracing and Freeze Protection	October 31, 2007		
R.2.3.5.58	WSRC-IM-95-58, Guide 16055-G	Installation of Lighting and Communication Systems	October 31, 2007		
R.2.3.5.59	WSRC-IM-95-58, Guide 16056-G	Installation of Grounding Systems	October 31, 2007		
R.2.3.5.60	WSRC-IM-95-58, Guide 16057-G	Installation of Cathodic Protection Systems	September 21, 2004		
R.2.3.5.61	WSRC-IM-95-58, Guide 16256-G	Diesel Generator Systems	November 5, 2003		

R.2.3.5.62 Conductors and cables shall be in accordance with Insulated Cable Engineers Association (ICEA) and National Electrical Manufacturers Association (NEMA) standards.

Basis: Industrial standards for conductor and cable design used at SRS.

R.2.3.5.63 All commercial electrical materials and equipment shall be tested and listed by Underwriter's Laboratories (UL) or approved by Factory Mutual Engineering and Research (FM). In lieu of UL or FM certification, testing and certification by a similar nationally recognized testing laboratory is permitted or by methods identified in WSRC Manual, WSRC-IM-95-58, Guide 16980, Assessment of Listed/Non-Listed Electrical Equipment for Use at SRS.

Basis: Listed equipment or qualification of equipment is required for system and facility reliability and safety.

R.2.3.5.64 Equipment operated in a non-air atmosphere shall be designed to take into account for the differences in physical properties of the atmosphere from air. Properties to be considered shall include all properties that are relevant to the performance of the equipment, e.g.

dielectric strength, thermal conductivity, heat capacity, flammability, etc.

Basis: In order to prevent electrical component failures for equipment operation within these different atmospheres.

R.2.3.5.65 All existing electrical loads located in the KAC Primary Building shall be transitioned from a corner grounded delta system to a wye grounded system.

Basis: To avoid maintenance confusion by having multiple grounding and wiring types within the same building.

R.2.3.5.66 PDC-provided new outside KAC facilities power distribution shall be configured 480 Vac, 3-Phase, 4-wire (WYE connected).

Basis: To maintain consistency with KAC power distribution conventions and to help reduce harmonics in the power system.

R.2.3.5.67 Before returning to normal power mode, all source voltages, frequencies, and phase angles of the generator power shall be synchronized with the electrical system power source.

Basis: Industrial standard practice and to prevent equipment damage.

R.2.3.5.68 The electrical system shall maintain a physical separation/isolation between safety and non-safety loads.

Basis: Failure of GS equipment must not impact equipment of a higher functional classification.

R.2.3.5.69 Electrical cabling routed within areas without fire detection/suppression shall be installed in enclosed metallic raceway or equivalent.

Basis: Facility combustible loading program. **TBD**
TBD – Facility combustible loading program to be completed.

R.2.3.5.70 Operating and operating status conditions and alarms shall be provided for electrical SS and SC systems in the main KAC control room.

Basis: DOE Guide 420.1-1.

R.2.3.5.71 Specific sub-systems/components of the electrical system shall be designed to be in accordance with Electrical Systems Application section of SRS Engineering Standards Manual, Attachment 1, "National Codes and Standards for Engineering/Design Tasks Matrix.

Basis: WSRC-TM-95-1, Attachment 1.

R.2.3.5.72 Cable ampacity shall be derived from FDD R.2.3.5.2 and R.2.3.5.25.

Basis: See FDD R.2.3.5.2 and FDD R.2.3.5.25.

R.2.3.5.73 Individual circuit breakers on panel boards shall be capable of accepting a lock-out device.

Basis: Manual 8Q, Procedure 32. "Hazardous Energy Control (Lockout/Tagout)."

R.2.3.5.74 All diesel fuel tanks shall be accessible for periodic surveillances.

Basis: These include checking fuel level and sampling for moisture, particulates, and biologicals.

R.2.3.5.75 Diesel tanks shall accommodate periodic sampling via a bottom drain.

Basis: The bottom drain is used to obtain the sample, which is located at the bottom of the tank.

R.2.3.5.76 An automatic timer/recorder shall be provided to determine the time between loss of normal power and assumption of the load by the diesel generator.

Basis: Provides a means for meeting emergency power and standby power requirements **HOLD**.
HOLD – Emergency power and standby power SDDs to be written.

R.2.3.5.77 Load banks with automatic interlock (to allow emergency generator to supply power to the facility during testing) shall be used for periodic load testing of diesels.

Basis: Prevents using the existing load for the facility during testing and allows for the generator to automatically switch back to supplying the emergency loads in the facility if called for while testing is underway.

R.2.3.5.78 An Automatic Transfer Switch (ATS) shall be provided with a manual bypass.

Basis: Provides for maintenance of the ATS.

R.2.3.5.79 Power reliability to the safety class fan loads, which is a combination of the utility system reliability and the safety class generators, shall satisfy the requirements of **TBD** RAMI analysis.

Basis: PDC RAMI Analysis.
TBD - RAMI Analysis for the PDC Facility has yet to be completed.

R.2.3.5.80 Power reliability to the safety class fan loads, which is a combination of the utility system reliability and the safety class generators, shall satisfy the requirements of IEEE 577.

Basis: IEEE 577.

R.2.3.5.81 Power reliability to the SS loads, if any, shall satisfy the requirements of **TBD** RAMI analysis.

Basis: PDC RAMI Analysis.
TBD - RAMI Analysis for the PDC Facility has yet to be completed.

R.2.3.5.82 Power reliability to the SS loads, if any, shall satisfy the requirements of IEEE 577.

Basis: IEEE 577.

R.2.3.5.83 If variable frequency drives (VFDs) are used, filters on incoming and outgoing cables, supplemental cabinet cooling, short cable lengths to loads, maintenance and spare parts shall be provided.

Basis: Based on SRS site experience in using VFDs. "Short cable lengths" dependent on individual VFD manufacturer.

R.2.3.5.84 A junction box and breaker shall be added at each of the generator locations (standby and emergency).

Basis: Required for the addition of a portable generator.

R.2.3.5.85 Generators (standby and emergency) shall be sized with a minimum 30% loading.

Basis: To prevent wet stacking and reliable operation during a design basis event.

R.2.3.5.86 The electrical systems shall meet the requirements of ANSI C37 series Circuit Breakers, Switchgear, Relays, Substations, and Fuses.

Basis: The ANSI C37 series provides requirements for electrical protection of the 115/230 kVAC distribution buses for the PDC high-voltage distribution system.

R.2.3.5.87 Low-voltage equipment ratings, including circuit breakers, shall be selected such that the rated symmetrical interrupting current capacity is greater than the calculated fault current.

Basis: NFPA 70, Section 110.9 Interrupting Rating, provides the basis for interrupting ratings. All electrical components shall be specified to withstand the largest fault available for its intended application.

R.2.3.5.88 The lighting in all At-the-Controls Areas throughout the facility (including the Control Room) shall be consistent and at office-lighting levels.

Basis: The design of process graphics is influenced by the ambient lighting; the same graphic may be viewed at different At-the-Controls areas, so the lighting needs to be consistent.

2.3.6 Control

The PDC Systems, Structures and Components shall be in accordance with the Control Codes and Standards listed in Table 2.3.6-1:

Table 2.3.6-1 - Applicable Control Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.6.1	WSRC-TM-95-1, Standard 01709	Color Conventions for Process Displays	March 30, 2010		
R.2.3.6.2	WSRC-IM-95-58, Guide 01703-G **HOLD**	Design Guidance for Instrumented Systems that are Used in Safety Significant and Hazardous Processes	August 21, 2007		
R.2.3.6.3	ISA 18.2	Management of Alarm Systems for the Process Industries	June 23, 2009		
R.2.3.6.4	WSRC-IM-95-58, Engineering Guide 16744-G	Computer/Control and Data Processing Equipment Power – Grounding Practices	July 16, 2003		

HOLD – Impact of hardware fault tolerance invoked in this guide to be looked at.

R.2.3.6.5 Data, electronic/electrical and communications security isolation shall be provided in accordance with DOE Order 205.1A, Department of Energy Cyber Security Management.

Basis: Security and isolation features need to be incorporated into the data, electronic/electrical and communication designs to ensure protection of sensitive data.

R.2.3.6.6 Data, electronic/electrical and communications security isolation shall be provided in accordance with DOE Manual 205.1-4, National Security System Manual.

Basis: Security and isolation features need to be incorporated into the data, electronic/electrical and communication designs to ensure protection of sensitive data.

R.2.3.6.7 Operator interface workstations in process rooms shall be located at a distance from gloveboxes to minimize operator exposure per the Dose Study.

Basis: Operator interface workstation will be placed to keep exposure ALARA.

R.2.3.6.8 The Crane Control Room shall serve as the Central Control Room for PDC.
Applicability: Phase 1A, Phase 1B

Basis: Minimize the impacts of Phase 1 operations while construction/startup is preparing the Central Control Room for Phase 2.

R.2.3.6.9 The existing Central Control Room on the +15' of KAC shall serve as the Central Control Room for PDC.
Applicability: Phase 2

R.2.3.6.10 The monitoring of facility and equipment status and operations turnover shall be provided by electronic/graphic display of plant status and equipment line-up.

Basis: Use of electronic/graphic display will ensure efficient plant operation and process support.

R.2.3.6.11 Local manual controls shall be provided on all HVAC equipment.

Basis: For maintenance and operation in the event of a remote operator interface malfunction. Tritium Lessons Learned.

R.2.3.6.12 Process systems shall have operational margins for process conditions to ensure that design conditions shall not be exceeded during normal operations or any condition that may result from normal operations (including operational occurrences and/or transients).

Basis: To maximize process control system availability, such systems should not be unnecessarily shut down because of operational occurrences and/or transients not exceeding design or accident thresholds.

R.2.3.6.13 Local manual controls shall be provided on all SC equipment.

Basis: For maintenance and operation in the event of a remote operator interface malfunction.

R.2.3.6.14 Operator Interface Workstations shall have the proper placement in the Main Control Room and on the process and maintenance side of each glovebox in the process rooms.

Basis: Process operation will occur both from the control room and process side of the gloveboxes. Proper placement will ensure that the operator can look at the workstation and confirm operations in the glovebox, and will help the operators execute the 2 man rule. Maintenance side gloveboxes are available to help during maintenance activities.

R.2.3.6.15 Devices or subsystems with local and remote control capability shall be designed with a means of disabling remote control by higher level control systems when local and remote control is being utilized.

Basis: Human Factors.

R.2.3.6.16 PDC shall use the numbering system for all input/output and local field instruments as specified in SRS Manual E7, Procedure 1.30.

Basis: Providing unique identifiers for instrumentation is required to support operations and maintenance.

R.2.3.6.17 The control system cabinets shall be equipped with instrumentation that can monitor cabinet temperatures

Basis: Control system components have acceptable Operating conditions. Cabinet temperature indications and alarms provide Operations with the ability to monitor and act on abnormal conditions prior to PCS component failures.

R.2.3.6.18 Control feedback shall be provided to the operator for every commanded action that is not clearly visible from all associated At-the-Controls areas.

Basis: Human Factors principles require that the operator understand the state of the process.

R.2.3.6.19 All audible alarm/alert indications used must be distinct and able to be discerned over background noise in all At-the-Controls areas.

Basis: Understanding alarms/alert annunciation is essential to facility operations.

R.2.3.6.20 If an abnormal process condition requires correction within 10 minutes, an automated action shall be created to address the abnormality (instead of relying solely on operator response).

Basis: To increase the reliability of safety system responses, safety systems shall not require operator action for initiation.

R.2.3.6.21 Operator interfaces shall be developed within the relevant guidelines of NUREG-0700, Rev. 2.

Basis: Human factors.

R.2.3.6.22 Software interlocks shall be kept at the lowest control level (i.e. the controller associated with the sensor that detects the interlock condition should take the action).

Basis: The implementation of software interlocks at the closest physical point to the sensing and actuation location increases the reliability and reduces the response time of the control system. Network communication pathways between controllers should not be relied on to ensure an interlocking action occurs.

R.2.3.6.23 Software interlocks shall be designed with the capability to allow bypassing as necessary to perform maintenance and calibration activities.

Basis: The implementation of software interlocks should not prevent maintenance activities.

R.2.3.6.24 All process operations, utility operations, process and utility support operations, monitoring, control and data handling for these operations shall be provided with Digital Automation Systems.

Basis: The use of automated systems should be maximized to provide a higher degree of reliability for process control. The Digital automation system includes hardware/ system software and communications interfaces. The Digital automation systems will be configured separately to support both Classified and Unclassified operations.

R.2.3.6.25 All Digital Automation Systems shall be integrated to the Classified or Unclassified network.

Basis: Good engineering practice. These Classified and Unclassified networks will serve as the host networks and shall be based on the Distributed Control System technology.

2.3.7 Instrumentation

The PDC Systems, Structures and Components shall be in accordance with the Instrumentation Codes and Standards listed in Table 2.3.7-1:

Table 2.3.7-1 - Applicable Instrumentation Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.3.7.1	ISA 67.04.01	Setpoints for Nuclear Safety-Related Instrumentation	May 16, 2006		Setpoints & Scaling
R.2.3.7.2	WSRC-TM-95-1, Standard 15980	Mechanical Installation of Safety Class and Safety Significant Instrumentation	June 2, 2009		
R.2.3.7.3	WSRC-TM-95-1, Standard 01703	Application of ISA 84.00.01-Part 1 for SRS Non-Reactor Facilities	July 21, 2008		

R.2.3.7.4 Chilled water systems shall provide the capability to monitor supply temperature, return temperature, flowrate, and pressure for each separate section of cooling water supply and return.

Basis: Essential to monitor system performance and equipment conditions. “Separate section” refers to individual components off the main header.

R.2.3.7.5 The chilled water systems shall monitor and alarm chiller refrigerant leaks.

Basis: Facilitate operability and notify operations of leaks in the system.

R.2.3.7.6 The fire alarm remote annunciator in the KAC control room (currently planned to monitor K-Area Interim Surveillance GS and SS panels) shall be used for remotely monitoring certain alarm conditions (alarms, supervisory signals, and troubles) for the project equipment (PDC Fire Detection, PDC Fire Suppression Activation).

Basis: The control room will be manned during active processing but not at all times while material is present. Alarms are continuously monitored in the KAC CCR.

R.2.3.7.7 Instrumentation shall monitor process variables over their defined ranges for normal operation, anticipated operational occurrences, and accident conditions with the appropriate level of accuracy and repeatability to ensure adequate safety.

Basis: Instrumentation that is designed to envelope the expected operating range of a process variable enables operations to readily detect instrument failure and provides operations a view of process conditions during all operating modes.

R.2.3.7.8 Instrumentation located inside a glovebox shall allow for remote calibration.

Basis: Access to instrumentation is required to meet availability and safety requirements.

R.2.3.7.9 Instrumentation located inside a glovebox shall provide for remote indication.

Basis: Access to instrumentation is required to meet availability and safety requirements.

R.2.3.7.10 Instrumentation shall be compatible with the process material or fluid at its installed location.

Basis: Instrumentation that is in contact with process material or fluid must be compatible with these conditions to prevent failure of the instrumentation or possible erroneous readings.

R.2.3.7.11 Instrumentation shall be compatible environmental ratings which envelope the design conditions expected at their installed locations for the operating modes, which they are required to support.

Basis: Instrumentation must be functional during designed operating conditions.

R.2.3.7.12 Except for NIMs, the use of bells for audible alarms shall not be used.

Basis: Bells are prohibited to ensure that NIM alarms cannot be mistaken for other types of alarms.

R.2.3.7.13 Instrumentation/controls and valves shall go to a safe state on loss of power or motive force (fail-safe design).

Basis: To ensure public and worker safety.

R.2.3.7.14 Redundant thermocouples or redundant thermal detectors shall be provided where these instruments are direct immersion type or welded to a device.

Basis: Redundant instrumentation provides a ready replacement without penetration into a process for worker safety and system availability.

R.2.3.7.15 Modular construction of instrumentation shall be provided to permit quick replacement of failed components.

Basis: To minimize radiation exposure to maintenance personnel.

R.2.3.7.16 Differential pressure shall be indicated across all HEPA filtering elements and normal filters, except for room exhaust register filters.

Basis: Indication of filter loading permits early warning to change the filter.

R.2.3.7.17 Loss of differential pressure or its instrumentation for the primary confinement systems shall immediately alarm in the KAC central control room and locally in affected process areas.

Basis: This alerts operations to take appropriate action upon off-normal operation of the primary confinement systems or failure of ventilation instrumentation.

R.2.3.7.18 A pressure-dampening device shall be provided on the pressure controller impulse line between the controller and the atmosphere.

Basis: Dampens pressure fluctuations caused by wind velocity across the sample location.

2.4 Testing and Maintenance Design Requirements

2.4.1 Testability

R.2.4.1.1 SSCs shall be arranged so that they can be inspected and tested as appropriate before being placed in service, at regular intervals while in service to be determined by system level requirements, and be located at a distance from all stationary structures so that access is afforded for operation, inspection, and testing of equipment.

Basis: DOE Order 420.1B, Facility Safety, specifies that facilities shall be designed to facilitate inspections, testing, maintenance, and repair and replacement of safety SSCs as part of an overall reliability, availability, and maintainability program.

R.2.4.1.2 A separate software development, analysis, and testing control system with identical software and functionally identical hardware to the on-line system shall be provided.

Basis: A development control system will permit testing to demonstrate the capability of the software to produce valid results for test cases encompassing the range of permitted usage defined by the program documentation. Such activities will ensure that the software adequately and correctly performs intended functions and does not perform any unintended function that either by itself or in combination with other functions can degrade the system. The hardware, identical to the PDC process control system hardware, in the development system provides the added benefit of additional spare parts for the process control system.

R.2.4.1.3 The development system identified in FDD R.2.4.1.3 shall be isolated from the process system.

Basis: The development system will be used for software development, testing, verification, and demonstrations in an off-line capacity prior to software being installed into the facility.

R.2.4.1.4 The development system identified in FDD R.2.4.1.3 shall be equipped with I/O racks.

Basis: I/O racks will be used to test and/or troubleshoot control system hardware prior to field installation.

2.4.2 Maintenance

R.2.4.2.1 All SSCs for which a life expectancy of 20 **HOLD** years (PDC design life) cannot reasonably be assured shall be designed and installed to facilitate replacement.

Basis: The requirement for a nominal PDC Facility lifetime is 20 **HOLD** years. As specified in DOE Order 430.1B, Real Property Asset Management, Section 6, Requirements, the physical asset acquisition process shall ensure an integrated, systematic approach toward consideration of maintainability, operability, life-cycle costs, and configuration integrity in designs and acquisitions. The requirement to design for replacement of SSCs not meeting the minimum lifetime requirement ensures a systematic approach considering life-cycle costs, Conduct of Operations, and conduct of maintenance. Additionally, DOE Order 420.1B, Facility Safety, specifies that

facilities shall be designed to facilitate inspections, testing, maintenance, and repair and replacement of safety SSCs as part of an overall reliability, availability, and maintainability program. The objective is for the facility to be maintained in a safe state, including during these operations, and in keeping with the ALARA principle for occupational radiation exposure.
HOLD - Life Expectancy to be validated.

R.2.4.2.2 Utility connections to all enclosures (gloveboxes and hoods) shall have capabilities for isolation from outside the enclosure.

Basis: Isolation is necessary to facilitate safe, cost effective maintenance.

R.2.4.2.3 Where in-place handling is not practical, PDC shall include maintenance or inspection facilities and carrier systems (e.g.; lift trucks, dollies, etc) to transport components to and from the repair areas.

Basis: PDC must provide a method of removing/re-installing the components and transporting them to and from the maintenance shops or facility dock.

R.2.4.2.4 PDC shall have the capabilities to support 'hot' (gloveboxes with radioactive materials) and 'cold' maintenance.

Basis: 'Hot' is defined as anywhere where radioactive species can exist and result in airborne, surface or other contamination. 'Cold' is where personnel do not have to concern themselves with contamination.

R.2.4.2.5 Provisions shall allow the capability for the repair and replacement of major processing system components/equipment such as furnaces, etc.

Basis: Major processing system components/equipment may require replacement or repair at some time during the facility life cycle. The facility must be designed to allow replacement and repair.

R.2.4.2.6 Provisions shall allow for the repair and replacement of material handling equipment.

Basis: Material handling equipment is inherently susceptible to wear or damage during operation. It must be designed for ease of replacement and repair so as not to adversely affect the facility availability.

R.2.4.2.7 PDC shall be capable of monitoring and/or trending essential equipment performance (e.g., vibration data on pumps/fans/agitators).

Basis: By providing the capability of monitoring/trending critical equipment performance preventive maintenance is allowed prior to the failure of equipment.

R.2.4.2.8 Single point power source isolation for instruments and equipment shall be provided.

Basis: By providing single point power source isolation, a single component may be isolated with a minimum impact to facility operation.

R.2.4.2.9 Equipment isolation points shall be capable of accepting a lock to isolate hazardous energy.

Basis: 29 CFR 1910, Occupational Safety and Health Standards, requires acceptance of a lock. Requirement is also consistent with the SRS Lockout/Tagout procedures, SRS Manual 8Q, Safety Manual, Procedure 32, Hazardous Energy Control.

R.2.4.2.10 Chilled water systems shall allow any one chiller unit or circulating pump to be maintained (i.e., being out of service) with the rest of the systems operating normally.

Basis: Redundancy to ensure continued operations during maintenance activities.

R.2.4.2.11 Gaseous fire suppression bottles shall be on a quick disconnect to each glovebox for ease of operation.

Basis: A single system to a single supply would mean the entire operation would be impaired if there is a need to isolate the gas. Individual glovebox systems would only isolate that particular system, and would minimize facility piping.

R.2.4.2.12 PDC systems shall be designed so that they interface with the existing KAC automated maintenance system.

Basis: Necessary for cost effective maintenance and operations.

2.4.3 Surveillance and In-Service Inspection

The PDC Systems, Structures and Components shall be in accordance with the Surveillance and In-Service Inspection Codes and Standards listed in Table 2.4.3-1:

Table 2.4.3-1 - Applicable Surveillance and In-Service Inspection Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.4.3.1	UL 586	UL Standard for Safety High-Efficiency, Particulate, Air Filter Units	August 14, 2009		Ventilation Systems

R.2.4.3.2 All pressure vessels located outside of glovebox or hood enclosures shall have 3 feet clear access all around for inspection.

Basis: Pressure vessels (except vacuum vessels) require periodic testing to ensure structural integrity of the vessel. This testing requires 360 degree access to the vessel. To ensure that testing can be accomplished a 3 foot clearance, in all directions, is necessary to allow complete and accurate testing.

R.2.4.3.3 Systems shall be tested at the component, system, and integrated system level.

Basis: Three level testing is necessary during startup and normal operational surveillances and monitoring.

R.2.4.3.4 PDC shall provide for non-destructive, in-service inspections of safety-related and mission-related equipment.

Basis: Non-destructive, in-service inspections provide a means of identifying items which may require maintenance or replacement in the near future and allows the scheduling of replacement or maintenance during facility planned outages, thus reducing the frequency of unplanned downtime.

R.2.4.3.5 Exhaust and supply ducts shall have the capability to measure airflow (welded couplings on exhaust duct for test ports for pitot tube probes).

Basis: To facilitate startup testing and balancing of the HVAC System.

R.2.4.3.6 Duct security barriers as specified in the PDC SRI shall be accessible for inspection **HOLD**.

Basis: Safeguards and Security Requirements Identification Document – Pit Disassembly and Conversion Project specifies requirements for barriers in ductwork and necessity of inspection access.
HOLD – SRI to be written.

2.5 Programmatic Design Requirements

2.5.1 Reliability, Availability and Maintainability

R.2.5.1.1 PDC shall meet the requirements of the Reliability, Availability, Maintainability, and Inspectability (RAMI) analysis. **HOLD**

<u>Basis</u>: Requirements resulting from the RAMI analysis will be factored into design input and design output documents to assure the facility meets required production rates and process requirements.
HOLD – RAMI Analysis to be completed.

2.5.2 Quality Assurance

The PDC Systems, Structures and Components shall be in accordance with the Quality Assurance Codes and Standards listed in Table 2.5.2-1:

Table 2.5.2-1 - Applicable Quality Assurance Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.5.2.1	ASME NQA-1	Quality Assurance Requirements for Nuclear Facility Applications	March 14, 2008 (Addenda A, August 14, 2009)		

R.2.5.2.2 PDC shall comply with the requirements established in SRS 1Q, Quality Assurance Manual and Engineering Manuals that implement these requirements.

<u>Basis</u>: SRS 1Q complies with SRNS-RP-2008-00086-002, SRNS Standard/Requirements Identification Document, Functional Area 02, Quality Assurance.

R.2.5.2.3 Software shall meet the Requirements for Software Specification document **HOLD**.

<u>Basis</u>: E7, Section 5.0
HOLD – Document to be developed

2.5.3 Human Factors

The PDC Systems, Structures and Components shall be in accordance with the Human Factors Codes and Standards listed in Table 2.5.3-1:

Table 2.5.3-1 - Applicable Human Factors Codes and Standards

Req't. Number	Code/Std. Number	Code/Std. Title	Code/Std. Date/Rev.	Applicable Section(s)	SSC(s)
R.2.5.3.1	DOE-HDBK-1140-2001	Human Factors/Ergonomics Handbook for the Design for Ease of Maintenance	February 2001		

R.2.5.3.2 All design shall take place per the Human Factors Engineering Plan (Rev. 1).

Basis: E7, Procedure 2.18.

R.2.5.3.3 Any field instrument indication or control that requires reading or manipulation shall be visible to the operator while standing on the floor or on an accessible fixed platform.

Basis: Human Factors Principles require that an operator can clearly see indications and easily reach controls.

2.5.4 Emergency Management

R.2.5.4.1 The PDC features and information necessary to support effective site emergency response actions shall be included in the design and coordinated with the existing emergency planning of the facility site.

Basis: SRS Manual 6Q, SRS Emergency Plan/Emergency Management Program Procedures Manual and SCD-7, SRS Emergency Plan.

R.2.5.4.2 PDC shall comply with DOE Order 151.1C, Comprehensive Emergency Management System, November 2005, and the Emergency Management Guides (EMGs), issued as supplements to the Order.

Basis: DOE Order 151.1C

2.5.5 Training and Qualification

R.2.5.5.1 A separate training system with identical software and functionally identical hardware to the on-line system shall be provided.

Basis: For simulation and training personnel.

2.5.6 Management Systems

There are no specific requirements applicable to this category.

3.0 FACILITY EXTERNAL INTERFACE DESCRIPTIONS

External Interfaces are those interfaces between systems installed by the PDC Project in KAC with systems that are not owned by the PDC Project in KAC. This section identifies and describes those external interfaces. These interfaces include existing KAC-owned systems, on-site and off-site facilities.

The PDC Project will be executed in phases with capabilities operational at differing times. This FDD section identifies and describes the external interfaces that are required for Phase 1A, 1B and 2. Figures 3.1-1, 3.1-2, and 3.1-3 are the External Interface Diagrams for Phase 1A, Phase 1B and Phase 2, respectively. These figures identify the functional and physical external interfaces. The arrows denote the direction of the flow of information and/or physical material between the interfaces.

External interfaces will change during each project phase. The Interface Control Documents (ICDs) will define the specific external interface requirements during each phase between the PDC Project in KAC and interface Owner. For example, when the Phase 1A becomes operational, those external interfaces will either be included as part of KAC systems or if external to KAC, will be controlled via Memorandum of Understanding (MOUs) or service agreements between KAC-Operations.

The PDC Project will have multiple ICDs based on the ownership of the interface. An interface owner may be responsible for multiple interfaces. These ICDs are identified in Figures 3.1-1 through 3.1-3.

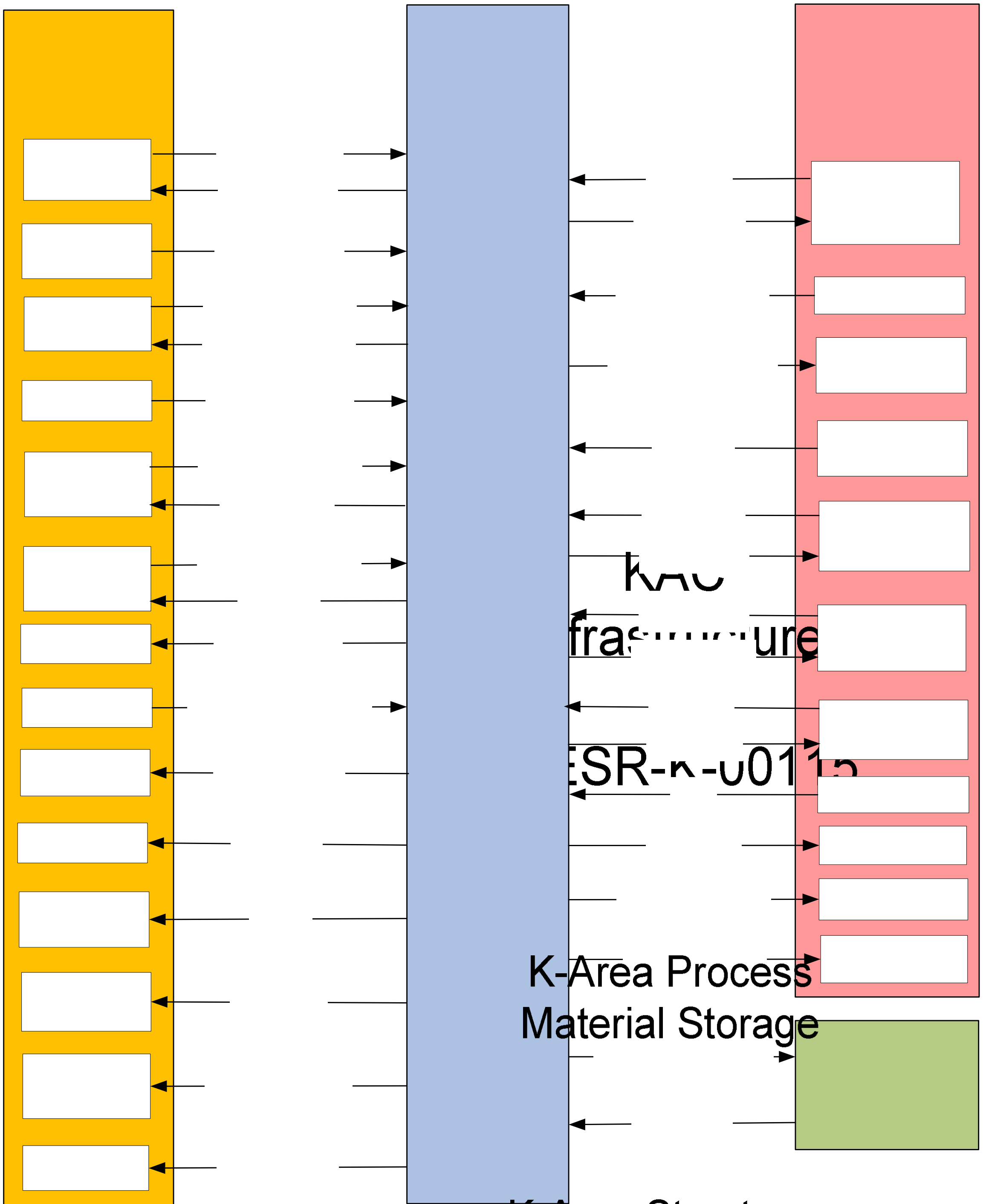

Figure 3.1-1 External Interface Diagram for Phase 1A

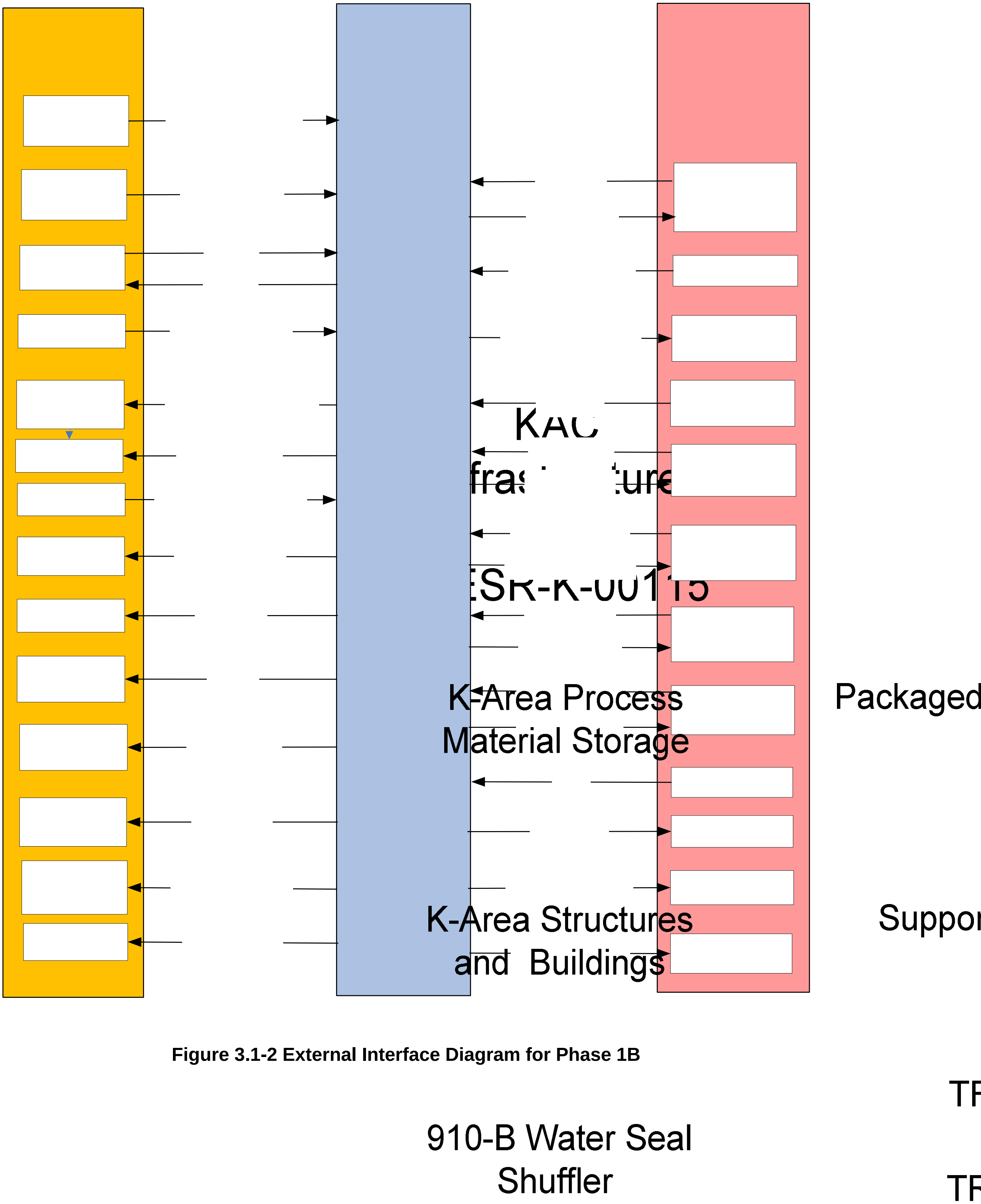

Figure 3.1-2 External Interface Diagram for Phase 1B

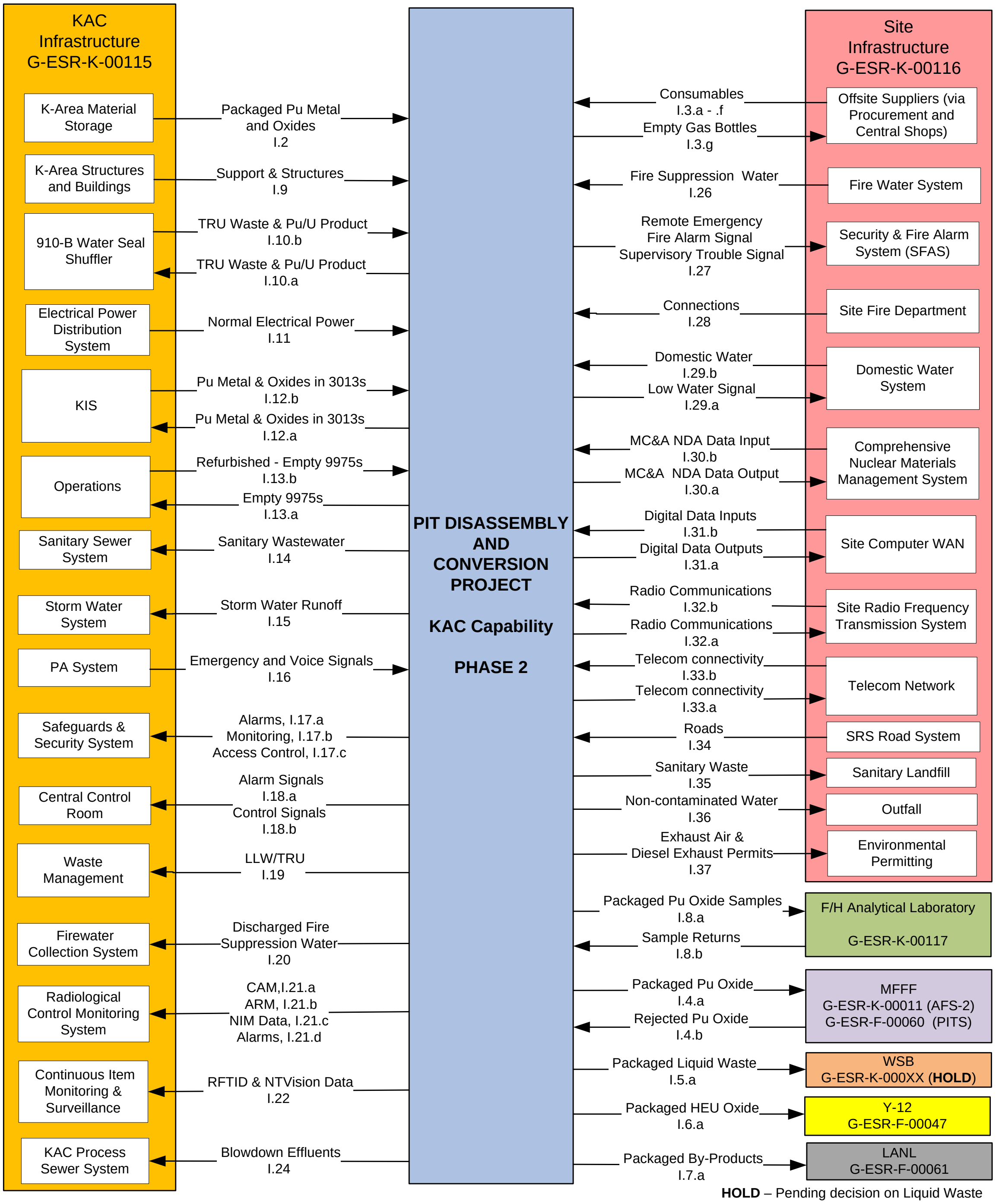

Figure 3.1-3 External Interface Diagram for Phase 2

3.1 Facility External Interface Description

Tables 3.1-1 and 3.1-2 provide definitions and descriptions of PDC in KAC external interfaces. The applicability of the interface relative to the project phases is noted. Requirements related to these interfaces are specified in the ICDs.

Table 3.1-1 – External Interface Descriptions – PDC in KAC Inputs

Source	Interface Number and Description
Material Suppliers	
MFFF	I.4.b Pu oxide that does not meet MFFF specifications is rejected and returned to the PDC Facility by KAC Operations/Site Transport for further processing. Phase 2
F/H Analytical Laboratory	I.8.b Empty or sample returns in Type A Croft SafDrums are transported by KAC Operations/Site Transport from F/H Analytical Laboratory to the PDC in KAC via an on-site transport vehicle. Phase 1A Phase 2 (may expand interface due to additional samples and EU samples)
KAC Infrastructure	
KAC Process Material Storage	I.2.b Pu metal and oxide in 3013 containers packaged in 9975 shipping containers are transported using a manual drum cart. Phase 1A – from 910-B Vault Phase 1B – from Off-site suppliers Phase 2 – from 910-B and -40’ Material Storage

Source	Interface Number and Description
K-Area Structures and Buildings	I.9 KAC to provide building structures to house, protect, secure, and provide process support for all PDC Processes. Phase 1A – PDC will take ownership of specified areas of the KAC Facility for S&P Process installation Phase 1B - the areas of ownership by PDC will expand, modifications for storage will occur, and modifications will be made to shipping and receiving area. Phase 2 - additional support and operational structures will be added within KAC for PDC
910-B Water Seal Shuffler	I.10.b Waste in 55 gallon drums following theft diversion check is removed from the MAA by PDC Operations and transported to PDC waste management operations using a manual drum cart. Pu and EU material packaged in a can following U accountability/verification measurements is returned to PDC. Phase 1A - for Pu material and waste Phase 1B - available for checks if any material is brought into PDC. Phase 2 - for Pu and EU material and waste
KAC Electrical Power Distribution System	I.11 Normal electrical power is supplied to PDC equipment from the KAC Electrical Power Distribution System which is fed from the SRS Electrical Power Distribution System. In Phase 2, normal electrical power is supplied to the PDC equipment from 2 normal power feeders run from substation 151-1K. Phase 1A Phase 1B For Phase 2

Source	Interface Number and Description
K-Area Interim Surveillance (KIS)	I.12.b 3013 containers in 9975 following Digital Radiography/NDA in the K-Area Interim Surveillance are returned to the PDC by PDC Operations using a geometrically safe shielded transport cart. Phase 1A Phase 2 (may expand interface or leave unchanged from Phase 1A)
KAC Operations	I.13.b Certified/refurbished - empty 9975 shipping containers needed for packaging of processed Pu materials are transported by KAC Operations to PDC using a manual drum cart. Interface used for Phases 1A and 2, but requirements are different for each Phase. During Phase 2, Operations will supply materials in ALR-8's and 9975's to PDC for processing.
K-Area Public Address (PA) System	I.16 K-Area Central Control Room (or SRSOC via K-Area PA System) transmits emergency and voice signals to PDC Facility personnel via the PDC public address equipment. Interface used for all phases, but requirements are different for each Phase.

SRS Infrastructure	
Offsite Supplier (via SRS Procurement and Central Shops)	I.3 Consumables are drawn from supplies in Central Shops, as needed, to support PDC operations, and supplies are replenished via procurement orders from Suppliers. Consumables include: a. Empty material and sample containers: convenience cans, 3013 inner and outer cans, non-3013 outer cans, FFTF charge cans and Type B sample vials. b. Empty waste containers: B-25 containers, LLW bags, TRU Drums, B-12s, 5-gallon pails, 55-gallon drums, 10-gallon drums, Green-Is-Clean (GIC) bags, 5-gallon pail bags, TRU Waste drum bags. c. Fuel Oil for Diesels d. Compressed gas bottles or filling of tank in KAC (Ar, Ar/H, CO_2, N_2, He, He/O_2, $N_2H_2P_{10}$). e. Chemicals including water treatment for cooling towers, heat exchangers and chillers. f. Supplies (e.g., glovebox gloves, plastic sleeving, etc.) Will maintain this interface through all phases. Interface requirements will change.
SRS Electrical Power Distribution System	I.25 Normal electrical power is supplied to the PDC equipment from 2 normal power feeders run from substation 151-1K. Phase 2
SRS Fire Water System	I.26 Fire suppression water is supplied to the PDC Fire Protection System via several K-Area tie-ins. Interface used for all phases, but requirements are different for each Phase.
KAC Domestic Water System	I.29 Domestic water is supplied (1) to PDC for restrooms, breakrooms, water fountains and safety showers via K-Area tie-in, and (2) to PDC cooling towers and chilled water system as make-up water. Interface used for all phases, but requirements are different for each Phase.

SRS Comprehensive Nuclear Materials Management System (CNMMS)	I.30.b Summary MC&A NDA data is transmitted from the PDC MC&A System to the SRS CNMMS. Phase 1A will utilize the existing KIS interface. Phase 1B Phase 2
SRS Site Computer WAN	I.31.b SRS Site Computer WAN communicates with PDC digital data communications circuits and file servers. Interface used for all phases, but requirements are different for each Phase.
SRS Site Radio Frequency Transmission System	I.32.b SRS radio transmission system communicates with PDC security communications equipment. Phase 2.
SRS Telecom Network	I.33.b SRS Telecom Network communicates with PDC communications system telecom equipment. Interface used for all phases, but requirements are different for each Phase.
SRS Road System	I.34 SRS roads are used to safely transport packaged Pu material, samples and waste in shipping containers to MFFF, F/H Lab, WSB **(HOLD)** and SWM via on-site vehicles and off-site (Y-12, LANL) Interface used for all phases, but requirements are different for each Phase.

Table 3.1-2 – External Interface Descriptions – PDC in KAC Outputs

Destination	Interface Number and Description
Material Receivers	
Offsite Suppliers	I.3.g Empty compressed gas bottles are returned to the supplier via Central Shops. Interface used for all phases, but requirements are different for each Phase.
MFFF	I.4.a Pu oxide prepared to meet MFFF specifications in 3013 containers packaged in 9975 shipping containers is transported from the PDC to MFFF via KAMS (see interface I.2.b). KAC Operations transports containers between the PDC and KAMS within the KAC Primary Building using a manual drum cart. The Office of Secure Transportation (OST) or Wackenhut Services Incorporated (WSI) via a Safe-Guards Transporter (SGT) vehicle transports packages between KAMS and the MFFF. Interface used in Phase 2
WSB **(HOLD)**	I.5 Packaged liquid waste to meet WSB specifications is sent for disposition. (**HOLD** – pending decision of liquid waste) Interface used in Phase 2
Y-12	I.6 Packaged HEU oxide prepared to meet Y-12 HEU Disposition Program requirements is transported from PDC to Y-12. **TBD -** transportation responsibility. Interface used in Phase 2
LANL	I.7 Packaged By-Products prepared to By-Products ICD is transported from PDC to LANL. **TBD -** transportation responsibility. Interface used in Phase 2
F/H Analytical Laboratory	I.8.a Packaged samples in Type A Croft SafDrums are transported by KAC Operations/Site Transport from PDC to the F/H Analytical Laboratory via an on-site transport vehicle. The Type A Croft SafDrum may be temporarily staged in the KAC 910-A Room prior to shipment. Interface for Phases 1A and 2. However, in Phase 2 this interface expands to include HEU oxide, beryllium filters and swipes, alpha swipes, and samples from uranium decontamination samples.

KAC Infrastructure	
KAC Process Material Storage	I.2.a Pu oxide in 3013 containers packaged in 9975 shipping containers is transported from PDC to 910-B within the KAC Primary Building using a manual drum cart. KAMS/PDC stages these containers until shipped to MFFF for processing. Phase 1A - interface is 910-B Vault Phase 2 - Material Storage is owned by PDC.
910-B Water Seal Shuffler	I.10.a Waste listed below in a 55 gallon drum is transported by PDC Operations to the Shuffler for a theft diversion check using a manual drum cart. • All drummed TRU waste • Repackaged drummed LLW that did not pass the Entry Control Facility (ECF) Special Nuclear Material (SNM) metal detectors Packaged material or sample is transported by PDC Operations to the Shuffler for U accountability/verification measurements using a geometrically safe shielded transport cart. Interface used for all phases, but requirements are different for each Phase.
K-Area Interim Surveillance (KIS)	I.12.a 3013 containers filled with oxide for the MFFF/Y-12 are transported to the K-Area Interim Surveillance for Digital Radiography by PDC Operations using a geometrically safe shielded transport cart. Phase 1A Phase 2

KAC Operations	I.13.a Using a manual drum cart move materials between KAC and PDC. Move packaged samples to F/H Analytical Laboratory from the PDC. For material transports where trucks are needed, KAC Operations coordinates trucking with Site Transport. Phase 1A - empty 9975 shipping containers are transported by KAC Operations from PDC for refurbishment and certification Phase 1B - KAC Operations transports loaded 9975s to new storage on -40' elevation. Phase 2 - empty 9975 shipping containers are transported by KAC Operations from PDC for refurbishment and certification
KAC Sanitary Sewer System	I.14 Sanitary wastewater from the PDC Facility is discharged to the KAC Sanitary Sewer System for collection and treatment and then discharged into the NPDES Outfall K-18. Interface used for all phases, but requirements are different for each Phase.
KAC Storm Water System	I.15 Non-contaminated storm water runoff from PDC Support Facilities flows into the KAC Storm Water System and then flows into several K-area outfalls including Storm Water Outfall K-08 (vicinity of K-Assembly) and Storm Water Outfall K-01 (vicinity of Sand Filter Structure). Interface for Phase 1A and 2, but requirements are different for each Phase.
K-Area Safeguards and Security System	I.17.a Alarm data from PDC areas I.17.b Monitoring data from PDC areas is sent to KAC Safeguards and Security System (S&S). I.17.c PDC Facility personnel badging data is supplied to the Electronic Safeguards and Security System (E3S) administrator. I.17.d PDC Facility personnel badging data is supplied to the ARGUS administrator. Phase 1A - I.17.a, I.17.b, and I.17.c will be used Phase 1B - I.17.a, I.17.b, and I.17.c will be used For Phase 2, I.17.c will be replaced by I.17.d

KAC Central Control Room	I.18.a Alarm signals are transmitted to the KAC Central Control Room via the PDC Process Control System. I.18.b Control signals are transmitted to the KAC Central Control Room via the PDC Process Control System. Phase 1A – I.18.a and I.18.b will be used Phase 1B – I.18.a will be used Phase 2 – I.18.a and I.18.b will be used
KAC Waste Management	I.19 Wastes from PDC will consist of Transuranic, mixed transuranic, mixed low level, low level, and high activity/low activity liquid wastes in support of process operations. During Phase 1A, waste will consist of TRU solid waste from S&P processing. During Phase1B, waste will consist of TRU and LLW from shipping container receiving During Phase 2, waste will consist of TRU and LLW from Pit Processing including liquid waste from HEU processing
KAC Fire Protection System	I.20 Water discharged by the PDC Fire Protection System (I.26) is collected by the PDC fire suppression water collection system and then directed via drain lines to the KAC Fire Protection System. Water from PDC areas with low risk of containing Pu oxide is carried by drain lines to the KAC Elevation -40' Collection Sump. Water from PDC areas with high risk of containing Pu oxide is carried by drain lines to a clarifying tank where Pu oxide is separated out. The overflow water from this tank flows to the KAC -40 Elevation Collection Sump (**HOLD** - confirm strategy). Water in the sump is sampled and analyzed and then dispositioned based on the Pu contamination level. Uncontaminated water flows to the NPDES Outfall K-18, and contaminated water is trucked to the Effluent Treatment Project (ETP). Interface used for all phases, but requirements are different for each Phase. Note that although gaseous suppression is utilized (existing) in Phase 1A, it will be replaced with water suppression in Phase 2. See I.26 for Fire Water Supply Interface

KAC Radiological Control Monitoring System	I.21 Data from PDC CAMs, ARMs, and NIMs are transmitted to the radiological monitoring equipment in the KAC RCO office and in the K-Area Control Room. I.21.a. Continuous Air Monitors (CAMs) monitor locally for airborne contamination. I.21.b Area Radiation Monitors (ARMs) monitor locally for ionizing radiation I.21.c Nuclear Incident Monitors (NIMs) monitor specific locations for radiation associated with unstable/uncontrolled reactions I.21.d Alarms occur at the point of detection and are repeated in the RCO office(s) and the Control Room(s). I.21.e Tritium Air Monitors (TAMs) monitor for tritium. Interface used for all phases, but requirements are different for each Phase.
KAC Continuous Item Monitoring & Surveillance (CIMS)	I.22 Container data from active RFTID tag seal devices and NTVision data from cameras located at areas of interest are transmitted to the KAC CIMS. Interface used for all phases, but requirements are different for each Phase.
KAC Process Sewer System	I.24 Low-level blowdown and process effluents (e.g., water from chilled water system maintenance) from the PDC floor drains flow into the KAC Process Sewer System and then flow into the NPDES Outfall K-18. Interface used for all phases, but requirements are different for each Phase.
SRS Infrastructure	
SRS Security & Fire Alarm System (SFAS)	I.27. Remote emergency fire alarm signal and supervisory trouble signal are transmitted from the PDC to the SRS Security & Fire Alarm System (SFAS) in the SRS Operations Center (SRSOC) via two dedicated telephone lines. (Note: These signals will also be sent to PDC Remote Fire Protection Panel located in the KAC Central Control Room via hard wired connection). I.27.a Remote emergency fire alarm signal I.27.b Supervisory trouble signal Interface used for all phases, but requirements are different for each Phase.
Site Fire Department	I.28 PDC supplies fire hose connection points and fire lanes. Interface used for all phases, but requirements are different for each Phase.

SRS Domestic Water System	I.29.a Low water signal to initiate flow of make-up water is transmitted by the PDC Chilled Water System. Interface used for all phases, but requirements are different for each Phase.
SRS Comprehensive Nuclear Materials Management System (CNMMS).	I.30.a MC&A NDA data is transmitted from the PDC MC&A System to the CNMMS. Phase 1A will use existing KIS interfaces. Interface used for Phases 1B and 2, but requirements are different for each Phase.
SRS Site Computer WAN	I.31.a PDC digital data communications circuits and file servers communicate with the SRS Site Computer WAN. Interface used for all phases, but requirements are different for each Phase.
SRS Site Radio Frequency Transmission System	I.32.a PDC security communications equipment communicates with the SRS radio transmission system. Interface used for all phases, but requirements are different for each Phase.
SRS Telecom Network	I.33.a PDC communications system telecom equipment communicates with the SRS Telecom Network. Interface used for all phases, but requirements are different for each Phase.
Sanitary Landfill	I.35 Clean / sanitary / green-is-clean solid waste from the PDC is transported to the Sanitary Landfill. Phase 1A and 1B will use existing KAC interface. Phase 2

SRS Outfall	I.36 Non-contaminated storm water runoff from PDC Support Facilities collected by the KAC Storm Water System flows into several K-area outfalls including Storm Water Outfall K-08 (vicinity of K-Assembly) and Storm Water Outfall K-01 (vicinity of Sand Filter Structure. Low-level blowdown and process effluents from floor drains collected by the KAC Process Sewer System and sanitary waste treated by the KAC Sanitary Sewer System flow into the NPDES Outfall K-18. Interface used for all phases, but requirements are different for each Phase.
Environment	I.37 Exhaust air from the PDC flows through filter into the environment. Diesel exhausts air into the environment. Cooling tower exhausts water vapor into the environment. Interface used for all phases, but requirements are different for each Phase. Interface for Phase 1A – use of HEPA filters and stack Interface for Phase 2 – use of sand filter and stack

3.2 Facility External Interface Requirements

The External Interface requirements are contained in the following ICDs:

PCD External Interface Documents

ICD Title	Document Number
PDC Interfaces with K-Area Complex	G-ESR-K-00115 **TBD**
PDC Interfaces with SRS Infrastructure	G-ESR-K-00116 **TBD**
PDC Interfaces with F/H Analytical Laboratory	G-ESR-K-00117 **TBD**
PDC Interfaces with The Mixed Oxide Fuel Fabrication Facility (MFFF)	G-ESR-K-00011 (AFS-2) G-ESR-F-00060 (PIT)
PDC Interfaces with The Waste Solidification Building (WSB)	G-ESR-K-00XXX **TBD**
PDC Interfaces with Y-12	G-ESR-F-00047
PDC Interfaces with LANL	G-ESR-F-00061

TBD – documents under development

4.0 FACILITY DESIGN DESCRIPTION

4.1 Facility Overview Description

Section to be developed.

4.2 Detailed Facility Process Description

Section to be developed.

4.3 Facility Arrangement

Section to be developed.

4.4 System Summary Descriptions

Summary descriptions for the PDC Project systems in KAC are provided in this section. Table 4.4-1 provides a summary listing of systems.

Table 4.4-1 – Pit Disassembly and Conversion Systems

Systems Group/Title	FDD Subsection Number
Process Systems	**4.4.1**
Shipping & Receiving System (1)	4.4.1.1
Pit Disassembly System (2)	4.4.1.2
Stabilization and Packaging System (3)	4.4.1.3
Plutonium Conversion System (4)	4.4.1.4
Oxide Product Handling System (5)	4.4.1.5
Uranium Processing & Staging System (6)	4.4.1.6
Product Canning System (7)	4.4.1.7
Sanitization System (8)	4.4.1.8
NDA System (9)	4.4.1.9
Vault Storage System (10)	4.4.1.10
Unpacking and Packaging System (11)	4.4.1.11
Plutonium Separation System (27)	4.4.1.12
Balance of Plant Systems	**4.4.2**
Argon and Helium Supply System (12)	4.4.2.1
Nitrogen Supply System (13)	4.4.2.2
Process Gases Supply System (14)	4.4.2.3
Limited Volume Cooling Water System (16)	4.4.2.4
Process Chilled Water System (17)	4.4.2.5
Cooling Water System (18)	4.4.2.6
Internal Transport System (20)	4.4.2.7
Material Handling System (21)	4.4.2.8
Glovebox System (22)	4.4.2.9
Process Control System (23)	4.4.2.10
Waste Management System (25)	4.4.2.11

Systems Group/Title	FDD Subsection Number
Criticality Control System (26)	4.4.2.12
Confinement Ventilation System (28)	4.4.2.13
Electrical Power & Distribution System – Normal Power (29)	4.4.2.14
Material Control & Accountability System (30)	4.4.2.15
Fire and Potable Water System (31)	4.4.2.16
Plant, Instrument, and Breathing Air System (32)	4.4.2.17
Chilled Water System (33)	4.4.2.18
Health & Safety Monitoring System (34)	4.4.2.19
Fire Protection System (35)	4.4.2.20
Physical Security System (36)	4.4.2.21
Structures and Building System (37)	4.4.2.22
Communications System (39)	4.4.2.23
Inert Gas Purification System (40)	4.4.2.24
Non-Confinement HVAC for Fan House and Support Areas System (41)	4.4.2.25
Operations and Engineering Center System (42)	4.4.2.26
Robotic Manipulators and Grippers System (43)	4.4.2.27
Electrical Power & Distribution System – Emergency Power (44)	4.4.2.28
Electrical Power & Distribution System – Stand-by Power (45)	4.4.2.29
Electrical Power & Distribution System – Uninterruptible Power Supply (UPS) (46)	4.4.2.30
Sanitary Sewer System (47)	4.4.2.31
Process Sewer System (48)	4.4.2.32

4.4.1 Process Systems

This section describes the process systems in the Pit Disassembly and Conversion Project.

4.4.1.1 Shipping & Receiving System (1)

The Shipping & Receiving System receives pit and non-pit plutonium metal from across the DOE Nuclear Weapons Complex. The system receives Safe-Secure Trailer or Safe-Guards Transporter (SST/SGT) shipments and provides movement of material to and from unpacking. The Shipping & Receiving System also receives parts and supplies, including empty containers, and transports these supplies to process and support systems. This system additionally provides the standard commercially available equipment needed for unconfined material transfer within the PDC facility. Non-standard or specialized material associated with any unique specific systems, are covered within the specific system applicable to the material handling technology. Material received in PDC from onsite sources may arrive in a transport with equivalent security to an SST/SGT, rather than an SST/SGT.

4.4.1.2 Pit Disassembly System (2)

The Pit Disassembly System receives unpacked pits from Sealed Inserts (SI)s and 3013 cans containing clean Pu metal from the Unpacking & Packaging System. Also, 3013 cans of Pu oxide requiring rework due to off-spec product are received. The system bisects and disassembles all pits, then segregates pit components for further processing. The plutonium and plutonium-bonded hemishells are size-reduced to accommodate batch limitations in the downstream processing. Uranium feed is decontaminated to reduce the spread of plutonium contamination in the downstream Uranium Processing gloveboxes. The components/pieces are then loaded into material transfer containers and sent for further processing in the Plutonium Conversion, Plutonium Separation, Uranium Processing, or Sanitization systems as appropriate. For 3013 cans that contain clean Pu metal or failed Pu oxide, the outer welded can is opened and the inner can is removed. The cans of Pu metal and oxide are sent to the Plutonium Conversion System for further processing.

4.4.1.3 Stabilization and Packaging System (3)

The Stabilization and Packaging System prepares non-pit Pu to meet the MFFF specification KIS glovebox. The system will open 3013s, oxidize non-pit Pu metal, stabilize Pu oxide product, and package Pu oxide product in 3013s.

4.4.1.4 Plutonium Conversion System (4)

The Plutonium Conversion System converts plutonium metal from pits into plutonium oxide. The feed materials include plutonium ingots in crucibles, plutonium pit pieces, and failed plutonium oxide. The plutonium metal is oxidized in a Direct Metal Oxidation (DMO) furnace, calcined to meet 3013 storage requirements, and then placed in a milk bottle before being sent downstream for blending and final canning of the oxide product.

4.4.1.5 Oxide Product Handling System (5)

The Oxide Product Handling System lag stores, blends, samples, and cans the plutonium oxide product received in COGEMA convenience cans for transfer to the Product Canning System. The resulting plutonium oxide product is an unclassified, homogeneous, blended product that is not traceable to its source meeting specifications for MFFF, classification guidance, and 3013 requirement expectations.

4.4.1.6 Uranium Processing & Staging System (6)

The Uranium Processing & Staging System converts highly enriched uranium (HEU) metal to HEU oxide that will meet Y-12 plant acceptance criteria. HEU hemishells and components are received from the Pit Disassembly System where pieces that were contaminated with Pu are decontaminated, size reduced, and then processed in a DMO furnace for oxidation to HEU oxide power. The HEU oxide is loaded in convenience cans and then into secondary containers for the ES-3100. The system also samples and packages HEU oxide for chemical analysis.

4.4.1.7 Product Canning System (7)

The Product Canning System packages plutonium oxide product, other by-products, and MOX samples received in convenience cans from the Oxide Product Handling System into 3013 cans for shipment and long-term storage. The system will can the blended product within 3013 inner and outer welded containers.

4.4.1.8 Sanitization System (8)

The Sanitization System receives classified weapon parts containing no SNM from the pit disassembly and chemical separations operations. Classified characteristics (size, thickness, etc.) of the weapon parts are destroyed. The sanitized materials are packaged and discarded as waste.

4.4.1.9 NDA System (9)

The NDA System provides specialized equipment to certify contents of received containerized SNM feeds, and processed containerized SNM and other pit parts, to meet MC&A requirements. The NDA System also consists of specialized equipment (i.e. scales, instruments, gages, etc.) located where required within the various gloveboxes for monitoring material flow in and out of the process systems. The NDA System also provides equipment for waste assay.

4.4.1.10 Vault Storage System (10)

The Vault Storage System stores SNM after receipt in CRTs or 9975s, prior to unpacking; stores SNM after partial unpacking, prior to processing; and stores SNM and other byproducts after partial packaging, prior to shipping.

4.4.1.11 Unpacking and Packaging System (11)

The Unpacking and Packaging System unpacks shipping containers from CRTs, decontaminates shipping containers, and stages containerized metal for storage and empty containers for reuse. The system also performs all of the shipping container packaging needs for the facility, including preparing plutonium oxide and HEU oxide, off spec plutonium oxide, and other pit parts for shipment to other SRS facilities or to other DOE sites.

4.4.1.12 Plutonium Separation System (27)

The Plutonium Separation System extracts plutonium metal from pit pieces containing plutonium attached to another metal. The products include plutonium ingots, highly enriched uranium (HEU) pieces and non-Special Nuclear Material (SNM) pieces.

This system uses a hydride/dehydride process to safely separate the plutonium in pits from other pit pieces by use of a hydrogen recycle reaction.

The resulting plutonium ingots are staged for transfer to the Plutonium Conversion System where the plutonium metal is converted to oxide. The HEU pieces contaminated with Pu are sent to Uranium Processing for decontamination and oxidation.

The Non-SNM pieces are transferred to the Sanitization System for destruction of classified aspects (i.e., shape, dimensions etc.) of the piece.

4.4.2 Balance of Plant Systems

This section describes the Balance of Plant (BOP) systems for the Pit Disassembly and Conversion Project.

4.4.2.1 Argon and Helium Supply System (12)

The Argon and Helium Supply System supplies argon and helium gas to be distributed to the user systems.

4.4.2.2 Nitrogen Supply System (13)

The Nitrogen Supply System supplies liquid and gaseous nitrogen to the air systems instrumentation and to valves in selected process systems.

4.4.2.3 Process Gases Supply System (14)

The Process Gases Supply System is comprised of compressed bottled gas systems for argon/hydrogen, oxidizing gas, P10 gas, and argon gas.

4.4.2.4 Limited Volume Cooling Water System (16)

The Limited Volume Cooling Water System supplies chilled deionized water for heat rejection from operations in gloveboxes where there is a potential for criticality.

4.4.2.5 Process Chilled Water System (17)

The Process Chilled Water System primarily serves the process systems and the Limited Volume Cooling Water System. The system supplies utility chilled water for heat rejection from operations where there is no potential for contamination and process chilled water for heat rejection from operations where there is potential for contamination. It is the primary cooling water loop for process equipment located outside of gloveboxes. It is the secondary cooling water loop for the Limited Volume Cooling Water System.

4.4.2.6 Cooling Water System (18)

The Cooling Water System primarily supplies cooling water to HVAC System HVAC chillers.

4.4.2.7 Internal Transport System (20)

The Internal Transport System handles and transports process materials, consumables, and waste within an overhead conveyor enclosure from one process glovebox to another.

4.4.2.8 Material Handling System (21)

The Material Handling System handles and transfers material manually outside gloveboxes to support PDC operations.

4.4.2.9 Glovebox System (22)

The Glovebox System provides a primary confinement boundary and structure to protect personnel from ionizing radiation, radioactive materials, and hazardous materials during operations. Confinement of materials is accomplished by gloveboxes, airlocks, hoods, and radiological benches which are maintained at a negative pressure with respect to the surrounding process areas. The system also provides transfer of materials to and from gloveboxes via ports, double-door transfer systems, and double-door pass throughs. The system features a means to remove equipment for repair and/or replacement.

4.4.2.10 Process Control System (23)

The Process Control System provides facility-wide integrated process control and the worker protection functions needed to support all areas of the plant where automation, monitoring, remote analysis or assessments and other similar activities are being performed. The system provides alarm processing, display, annunciation, and printout capabilities.

The Process Control System also provides a centralized system for collecting and archiving process and facility data to be used in supervisory monitoring, process trending, engineering analysis, maintenance trouble shooting, report generation, and historical data recording. The material flow data is archived for the Shipping and Receiving System.

4.4.2.11 Waste Management System (25)

The Waste Management System collects, handles, packages, identifies and ships outside the K-Area Complex (KAC) solid wastes [low level (LLW), transuranic (TRU), mixed TRU, hazardous, and non-hazardous], and liquid waste [high activity (HAW), low activity (LAW), concentrated liquid, waste oil, and blow down and condensates] **HOLD**. No mixed low level wastes are expected from PDC operations.

The Waste Management System provides for the collection, final packaging and inventory identification of TRU waste from the process-related waste generated within KAC. Glovebox generated solid waste is collected, sorted, processed and packaged in the waste management gloveboxes. Other solid wastes are packaged at the point of generation and disposed of by the Waste Management System. Room wastes will be placed in final waste packaging (i.e., B-25 boxes) within the Waste Management Storage Area. Non-hazardous solid wastes, which include “green-is-clean” wastes and office/break room trash, are collected for transport to the Savannah River Site (SRS) solid waste facility for disposal.

Liquid wastes are collected in tanks, neutralized as necessary, and transferred to waste processing operations outside of KAC. **HOLD** – final disposition path to be determined

4.4.2.12 Criticality Control System (26)

This project will store and process fissile materials in sufficient quantities such that a criticality event will be credible. The Criticality Control System will monitor and maintain fissile mass control of SNM to ensure sub-critical operations.

4.4.2.13 Confinement Ventilation System (28)

The Confinement Ventilation System functions to provide confinement ventilation within the Pu processing areas that minimizes the spread of potentially radioactive airborne contaminants within the facility, maintains personnel exposure As Low As Reasonably Achievable (ALARA), and prevents the release of radioactive contaminants to the public and environment.

The exhaust primary function provides confinement by maintaining an airflow gradient that moves contaminants to areas of successively higher contamination potential, prior to filtering.

The Confinement Ventilation System secondary function provides proper environmental control for all temperature, humidity, or dust sensitive equipment protection and the health, safety, and comfort of the operating personnel.

The Confinement Ventilation System is a once through system with no recirculation. Outside air is conditioned in the air handlers or dehumidifiers to meet and maintain temperature and humidity requirements.

Initially this system will utilize HEPA filters to cleanse the air prior to exhausting it to the atmosphere in Phase 1A. In Phase 2, a sand filter will be installed and all exhaust air will be sent through it prior to release to the atmosphere.

4.4.2.14 Electrical Power & Distribution System – Normal Power (29)

The PDC Electrical Power and Distribution System – Normal Power will supply normal electrical power to all PDC systems during normal PDC operations.

4.4.2.15 Material Control & Accountability System (30)

The Material Control and Accountability System (MC&A) provides the control and accountability of nuclear material in the KAC consistent with domestic safeguards requirements. The MC&A System is both an administrative control system and a computerized data collection system. The administrative system incorporates rules and procedures for controlling access to nuclear material; handling, storing, transferring, measuring, and inventorying nuclear materials; monitoring nuclear material; and detecting and assessing anomalous conditions and unauthorized removal of nuclear material.

The classified computerized data collection system acquires all pertinent facility MC&A data, including item identification, location, nuclear material measured values, and transfers. The MC&A data collection system then transmits this data to the SRS Comprehensive Nuclear Materials Management System, which is the site system of record for MC&A data. Data transmitted from the PDC to the Comprehensive Nuclear Materials Management System is encrypted to protect classified information. The MC&A System uses "tools" that, for the most part, do not belong to the MC&A System, but are parts of PDC systems. These tools include identification readers, electronic scales, automated transfer systems, monitoring equipment, nondestructive assay (NDA) measurement equipment, and analytical laboratory measurement systems. The only "tool" that is owned directly by the MC&A System is a computerized data collection system, which acquires MC&A data from the tools in the PDC systems and sends it to the Comprehensive Nuclear Materials Management System.

The designs of the various PDC modules and processes incorporate measurement and tracking tools to facilitate accurate and timely nuclear material control and accountability. The MC&A System tracks nuclear material from the moment it enters the KAC until it is shipped out as either product or waste. The MC&A System also tracks material held up in equipment and devices, where feasible.

Nuclear material information is entered into the MC&A computerized data collection system either automatically or by hand using workstations or human-machine interfaces (HMI). The first entry into the MC&A data collection system occurs when material is first received into the KAC. The material is received and tracked as it is either put into temporary storage or enters a process module. In the process module it is processed, and exits the module either as feed for the next process, as product, as waste, or remains in the module as holdup. This continues until all product and waste material resulting from the received material is shipped out of the KAC and the facility is decommissioned.

4.4.2.16 Fire & Potable Water System (31)

The K-Area Domestic Water System supplies water to the system through separate dedicated lines to each system.

The fire water system provides fire water to all wet-pipe fire headers throughout PDC.

The potable water system supplies water for personnel use throughout PDC building structures.

The Fire and Potable Water System will be modified during the project phases.

4.4.2.17 Plant, Instrument, and Breathing Air Systems (32)

The Plant, Instrument, & Breathing Air System provides clean, oil free, dry air to users of general use plant and instrument quality air. The system is subdivided into two major subsystems. These are:

- Plant and Instrument Air Subsystem
- Breathing Air Subsystem

The Breathing Air System provides clean air for consumption by personnel via air supplied breathing apparatus during work in airborne contamination areas within the facility.

4.4.2.18 Chilled Water System (non-process) (33)

The PDC Chilled Water System will provide chilled water for the various HVAC systems during all normal modes of operation.

4.4.2.19 Health & Safety Monitoring System (34)

The function of the Health & Safety Monitoring System is to monitor personnel safety during all expected modes of facility operation and provide notification of conditions for the safety and health of PDC personnel.

The Health &Safety Monitoring System performs three basic functions:

1) Radiological Conditions Monitoring, which includes:
- Radiological Monitoring System
- Personnel Contamination Monitoring
- Personnel Dose Monitoring

2) Industrial Safety and Health Monitoring, which includes:
- Flammable Gas Monitors
- Oxygen Deficient Atmosphere Monitors
- Chemical, Physical Agent and Toxic Gas Monitors

3) Nuclear Incident Monitoring, which is provided by Nuclear Incident Monitors (NIM's) connected to a facility-wide Criticality Accident Alarm System.

Note: Criticality Safety is provided by the Criticality Control System, which will limit fissile material accumulation within designated Criticality Control Areas throughout the PDC processes.

4.4.2.20 Fire Protection System (35)

The Fire Protection System at PDC consists of fire detection and alarm systems, automatic fire suppression systems, and manual fire suppression equipment.

4.4.2.21 Physical Security System (36)

The Physical Security System provides protection for special nuclear material and classified matter in use or in storage. The System will restrict, monitor, and control access to Special Nuclear Materials processed in PDC.

4.4.2.22 Structures & Building System (37)

The Structures & Building System provides structures and infrastructure to provide protective, secure and controlled shelter, and adequate space to accommodate PDC functions, personnel, systems, equipment and circulation spaces within the KAC.

The floor plan arrangements will facilitate efficient flow of material such as the transfer of material, receiving, handling, receipt storage areas, vaults, processing of products, shipping of the processed products, and the handling and disposal preparation of waste products.

4.4.2.23 Communications System (39)

The Communications System will provide communications between process operators and PDC control room, as well as between PDC and external systems. Modifications include providing additions to the public address system, telecommunication system, and ethernet connections from PDC to SRSnet.

4.4.2.24 Inert Gas Purification System (40)

The Inert Gas Purification System circulates and purifies the inert gas atmosphere in gloveboxes. Each glovebox is serviced by its own purification system. A pressure control system regulates the pressure inside the glovebox by adding makeup gas or venting inert gas.

4.4.2.25 Non-Confinement HVAC for Fan House and Support Areas System (41)

This system provides heating, ventilation, and air conditioning for functions and operations housed in non-confinement areas. These areas include non-process administrative areas, equipment, electrical, locker rooms, UPS room, generator area, and communication room in the main KAC process buildings as well as outside buildings such as the Fan House and support equipment buildings.

Adequate air-conditioning for all temperature, humidity, or dust sensitive equipment, as well as worker comfort will be provided.

The system will be controlled by a central process control system. Local control panels in PDC will maintain pressure and temperature set points if control room signal is lost.

The HVAC Equipment Room, HVAC Chiller Room, Chemical Distribution/Mechanical Room and Electrical Room will be conditioned by recirculating air handling units cooled by utility chilled water. Outside air will be supplied by separate make-up air units and conditioned by HVAC chilled water.

The Control Room and Central Alarm System (CAS) will be conditioned by computer room air conditioning units operating on utility chilled water. Fan coil units operating on utility chilled water will supply the locker rooms.

4.4.2.26 Operations and Engineering Center System (42)

The Operations and Engineering Center System houses and supports project personnel and Operations personnel, and glovebox equipment assembly and test areas.

4.4.2.27 Robotic Manipulator and Gripper System (43)

The Robotic Manipulator and Gripper System provides manipulators to maintain worker dose ALARA as well as to maximize worker ergonomics. The system is used to perform automated sequences for handling and placement of different objects within gloveboxes and other locations within the facility.

4.4.2.28 Electrical Power and Distribution System – Emergency Power (44)

The Electrical Power and Distribution System – Emergency Power supplies electrical power to the Safety Class loads in the event of a normal power outage.

The Electrical Power and Distribution System – Emergency Power generates power from the onsite diesel generators. The system design consists of two redundant distribution trains, with both always on standby. **HOLD** - confirm equipment

4.4.2.29 Electrical Power and Distribution System – Standby Power (45)

The Electrical Power and Distribution System – Standby Power supplies electrical power to the Safety Significant loads, physical security loads, and other selected loads in the event of a normal power outage.

Standby Power is generated from a dedicated diesel generator. In addition, there is a dedicated diesel generator for security operation.
HOLD - confirm equipment

4.4.2.30 Electrical Power and Distribution System – Uninterruptible Power Supply (UPS) (46)

The Electrical Power and Distribution System – UPS supplies uninterruptible electrical power to the critical and selected sensitive electronic loads.

During normal and standby operation, the Electrical Power and Distribution System – UPS receives electrical power to maintain the batteries fully charged. During power outages, the Electrical Power and Distribution System – UPS generates power from the batteries and then distributes it to the selected loads. The system consists of several UPS units located throughout the facility for more efficient distribution of power.

4.4.2.31 Sanitary Sewer System (47)

The PDC Sanitary Sewer System collects the sanitary waste streams from PDC. This waste is treated locally and then discharged to a local outfall. **HOLD**

4.4.2.32 Process Sewer System (48)

The PDC Process Sewer System ties into the existing KAC process sewer system.

5.0 FACILITY CONCEPT OF OPERATION

Requirements resulting from the following operating and maintainability sections are integrated with the overall facility safety philosophy as noted in the design constraints within Section 2.0 of this FDD.

The PDC will be operated 24 hours a day, 7 days a week with planned outages to perform maintenance and inventory activities. Once a processing line is loaded with radioactive material, safe operating practices demand the system is run continuously to minimize inactive inventories of radioactive material. Each system (section of a process line) should be de-inventoried of nuclear material to reduce worker exposure to the greatest extent possible prior to performing maintenance activity. This safety philosophy reduces the material at risk during maintenance and avoids unnecessary hold up of material when a system is not in use.

Consistent with this safety philosophy, operations will continue around the clock to avoid having backshift maintenance occur with large quantities of material at risk. Around the clock operations with scheduled and planned outages facilitate de-inventorying the process lines prior to maintenance.

In addition, the operations shift schedules are developed to allow ongoing training and assessment of operator proficiency. Continuous training, particularly in a facility that will be shifting procedures to process many different weapons systems, is crucial.

The safety envelope, once established through hazard analyses and the PSAR, will be maintained with safety systems designed to the appropriate safety classification level and associated design requirements.

Safety functions should be passive wherever possible. If not feasible, automated safety systems employing hardware and software that meet the design criteria (redundancy, separation, etc.) for the appropriate safety classification will be employed. Safety systems will be designed to be fail-safe and highly reliable. The design will maximize the use of automated systems to provide the necessary trending and historical data to facilitate analysis of plant excursions, safety system trips, interlock sequence initiations and non-routine, significant, operational events.

Operation of the facility should be accomplished from a central location, the MCR. Certain subsystems may be controlled independently, but all safety related processes must be able to be operated and monitored from the MCR. Control room layout will be in accordance with established Conduct of Operations principles and with Operations input. Individual operator displays will be engineered for ease of use, clarity, and performance, while minimizing complexity. Large screen displays will be utilized as needed to inform supervision, management, and visitors of plant overall status and configuration. A "dark board" concept will be applied, to the maximum extent possible, in displaying alarms and faults to minimize operator distractions. Partitions will be used to separate but not isolate operators from visitors, and support personnel. These partitions establish the required ‘controlled area’.

Local control stations will be available throughout the PDC to facilitate watch station monitoring, troubleshooting and maintenance. The controls will be uniform from station to station, and will employ consistent nomenclature and symbols.

Operators and support personnel will be trained and qualified in a simulated environment which will physically replicate the MCR and the functionality of the controls to the maximum extent possible, consistent with training, operational requirements, and cost effectiveness.

Pre-operational testing and start-up testing will be planned and conducted to assure proper performance of components and subsystems individually, and as part of the overall plant system.

6.0 FACILITY CONCEPT OF MAINTENANCE

The systems and equipment installed in the PDC are to be designed to support the throughput of Pu pit or metal material. Maintenance support (mechanical and E&I) will be provided on a 24 hour, 7 day a week schedule.

The design of PDC should incorporate ease of maintenance, ready access to equipment, and provide support equipment located and sized to facilitate work. All equipment subject to periodic failure will be rapidly replaceable to assure availability of required systems.

The facility safety documentation will dictate the requirements which must be met prior to performing maintenance activities.

Training and Qualification of Maintenance Personnel

Existing SRNS procedures provide the requirements for developing and maintaining an effective maintenance training and qualification program. The maintenance manager and supervisors are required to be directly involved in training maintenance personnel; the Maintenance Training Review Committee oversees this involvement. In addition, the maintenance program involves the overall support of the maintenance organization with regard to the following:

- Defining the skill levels and responsibilities of various positions
- Defining the training program for each position
- Determining the training needs
- Providing instructors and training
- Establishing qualification criteria

Maintenance personnel qualification records are maintained on the Maintenance Qualifications database accessible through the computer network.

Appendix A - References

This section presents references.

Reference No.	Reference Identification
A.1 Orders, Codes, and Standards	
A.1.1 Codes of Federal Regulations	
A.1.1.1	10 CFR 835, Occupational Radiation Protection, January 1, 2008
A.1.1.4	10 CFR 1022, Compliance with Floodplain/Wetlands Environmental Review Requirements, January 1, 2008
A.1.1.5	40 CFR 266, Standards for Management of Specific Hazardous Wastes and Specific Types of Hazardous Waste Management Facilities, July 1, 2008
A.1.1.6	40 CFR 268, Land Disposal Restrictions, July 1, 2008
A.1.1.7	40 CFR 141, National Primary Drinking Water Regulations, July 1, 2007
A.1.1.8	40 CFR 142, National Primary Drinking Water Regulations Implementation, July 1, 2007
A.1.1.9	40 CFR 143, National Secondary Drinking Water Regulations, July 1, 2007
A.1.1.10	40 CFR 262, Standards Applicable to Generators of Hazardous Waste, July 1, 2008
A.1.1.11	40 CFR 270, The Hazardous Waste Permit Program, July 1, 2008
A.1.1.12	40 CFR 50, National Primary and Secondary Ambient Air Quality Standards, July 1, 2008
A.1.1.13	40 CFR 82, Protection of Stratospheric Ozone, July 1, 2007
A.1.1.14	40 CFR 110, Discharge of Oil, July 1, 2008
A.1.1.15	40 CFR 112, Oil Pollution Prevention, July 1, 2008
A.1.1.16	40 CFR 60, Standards of Performance for New Stationary Sources, July 1, 2007
A.1.1.17	40 CFR 61, National Emission Standards for Hazardous Air Pollutants (NESHAP), July 1, 2008
A.1.1.18	10 CFR 962, By Product Material, January 1, 2008

Reference No.	**Reference Identification**
A.1.1.19	40 CFR 260, Hazardous Waste Management System: General, July 1, 2008
A.1.1.20	29 CFR 1910, Occupational Safety and Health Standards, July 1, 2008
A.1.1.21	10 CFR 850, Chronic Beryllium Disease Prevention Program, January 1, 2008
A.1.1.22	41 CFR 101, Uniform Federal Accessibility Standards, July 1, 2005
A.1.1.23	10 CFR 435, Energy Conservation Voluntary Performance Standards for New Buildings; Mandatory for Federal Buildings, January 1, 2006
A.1.1.24	40 CFR 63, National Emission Standards for Hazardous Air Pollutants for Source Categories, January 18, 2008
A.1.2 Congressional Acts	
None	
A.1.3 DOE Orders and Standards	
A.1.3.1	DOE-STD-3013-**HOLD**, Stabilization, Packaging, and Storage of Plutonium-Bearing Materials **HOLD** – Applicable 3013 standard to be determined
A.1.3.2	DOE Manual 470.4-6, Rev: Chg.1, Nuclear Materials Control and Accountability, August 14, 2006
A.1.3.3	DOE Order 420.1B, Facility Safety, April 19, 2010
A.1.3.4	DOE Guide 420.1-1, Non-Reactor Nuclear Safety Design Criteria and Explosives Safety Criteria Guide, March 28, 2000
A.1.3.5	DOE Guide 420.1-2, Guide for the Mitigation of Natural Phenomenon Hazards for DOE Nuclear Facilities and Non-Nuclear Facilities, March 28, 2000
A.1.3.6	DOE Order 450.1A, Environmental Protection Program, June 4, 2008
A.1.3.7	DOE Order 435.1, Rev: Change 1, Radioactive Waste Management, August 28, 2001
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A.1.6.201	IEEE 980, Guide for Containment and Control of Oil Spills in Substations, September 22, 1994 (reaffirmed March 17, 2001)

Reference No.	Reference Identification
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A.1.6.204	NFPA 79, Electrical Standard for Industrial Machinery, January 1, 2007 (errata through April 13, 2009)
A.1.6.205	SEMI F47, Specification for Semiconductor Processing Equipment Voltage Sag Immunity, July 1, 2006
A.1.6.206	IEEE 344, Recommended Practice for Seismic Qualification of Class 1E Equipment for Nuclear Power Generating Stations, December 8, 2004 (reaffirmed September 11, 2009)
A.1.6.207	IEEE 519, Recommended Practices and Requirements for Harmonic Control in Electrical Power Systems, June 18, 1992 (errata June 15, 2004)
A.1.6.208	IEEE 765, Standard for Preferred Power Supply (PPS) for Nuclear Power Generating Stations (NPGS), June 8, 2006
A.1.6.209	UL 586, UL Standard for Safety High-Efficiency, Particulate, Air Filter Units, August 14, 2009
A.1.6.210	AWS D1.2, Structural Welding Code for Aluminum, January 1, 2008
A.1.6.211	IEEE 7-4.3.2, IEEE Standard Criteria for Digital Computers in Safety Systems of Nuclear Power Generating Stations, September 11, 2003
A.1.6.212	IEEE 741, Criteria for the Protection of Class 1E Power Systems and Equipment for Nuclear Power Generating Stations, September 27, 2007
A.1.6.213	ASME NQA-1, Quality Assurance Requirements for Nuclear Facility Applications, March 14, 2008 (Addenda A, August 14, 2009)
A.1.6.214	ISA 18.2, Management of Alarm Systems for the Process Industries, June 23, 2009
A.1.7 SRS Engineering Standards	
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A.1.7.2	WSRC-TM-95-1, Standard 11595, Breathing Air Distribution System, January 26, 2009
A.1.7.3	WSRC-TM-95-1, Standard 01120, Rev: 7, SRS Fire Protection Design Criteria, October 19, 2007
A.1.7.4	WSRC-TM-95-1, Standard 01101, Rev: 0, Use of Listed Equipment & Components for Safety Class Applications, January 21, 2000
A.1.7.5	WSRC-TM-95-1, Standard 01060, Rev: 9, Structural Design Criteria, August 11, 2009
A.1.7.6	WSRC-TM-95-1, Standard 01061, Rev: 1, Engineering Standard Qualification of Systems, Equipment, and Components for Natural Phenomena Hazards, August 11, 2009
A.1.7.7	WSRC-TM-95-1, Standard 13096, Rev: 6, Field Installation of Nuclear Incident Monitors, March 15, 2010
A.1.7.8	WSRC-TM-95-1, Standard 01064, Radiological Design Requirements, June 22, 2009
A.1.7.9	WSRC-TM-95-1, Standard 05951, Rev: 5, Corrosion Evaluation: Stainless Steels and Other Corrosion Resistant Alloys, March 28, 2007
A.1.7.10	WSRC-TM-95-1, Standard 05952, Rev: 4, Required Practices to Minimize Chloride Induced Stress Corrosion Cracking of Austenitic Stainless Steel, May 26, 2009
A.1.7.11	WSRC-TM-95-1, Standard 01110, Rev: 5, Civil Site Design Criteria, November 8, 2005
A.1.7.12	WSRC-TM-95-1, Standard 03010, Rev: 1, Coring, Chipping, and Drilling in Concrete, December 19, 2005
A.1.7.13	WSRC-TM-95-1, Standard 07270, Rev: 7, Installation and Inspection of Penetration Seals, November 7, 2005
A.1.7.14	WSRC-TM-95-1, Standard 15061, Pressure Equipment Protection Requirements, August 10, 2009
A.1.7.15	WSRC-TM-95-1, Standard 15060, Rev: 15, ASME 31.3 Additional Requirements for SRS Piping Systems, December 9, 2008
A.1.7.16	WSRC-TM-95-1, Standard 16050, Rev: 5, Electrical Design Criteria, August 15, 2005

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A.1.7.18	WSRC-TM-95-1, Standard 01703, Rev: 5, Application of ISA 84.00.01-Part 1 for SRS Non-reactor Facilities, July 21, 2008
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A.1.7.22	WSRC-TM-95-1, Standard 15888, HEPA Filter Requirements, November 2, 2009
A.1.7.23	WSRC-TM-95-1 Attachment 1, National Codes and Standards for Engineering/Design Tasks Matrix, September 13, 2007
A.1.8 SRS Engineering Guides	
A.1.8.1	WSRC-IM-95-58, Guide 01100-G, Rev: 6, Engineering Guide Design Criteria for Structures, Systems, and Components, June 11, 2007
A.1.8.2	WSRC-IM-95-58, Guide 03251-G, Rev: 2, Engineering Guide Concrete Anchors, July 30, 2007
A.1.8.3	WSRC-IM-95-58, Guide 03252-G, Rev: 2, Installation and Testing of Concrete Anchors, September 10, 2007
A.1.8.4	WSRC-IM-95-58, Guide 09900-G, Rev: 2, Engineering Guide Architectural Field Painting, November 18, 2003
A.1.8.5	WSRC-IM-95-58, Guide 16745-G, Rev: 2, Environmental and Installation Considerations for Computer Type Equipment, July 16, 2003
A.1.8.6	WSRC-IM-95-58, Guide 15250-G, Rev: 1, Mechanical Insulation, May 27, 2004
A.1.8.7	WSRC-IM-95-58, Guide 16980-G, Rev: 1, Assessment of Listed/Non-Listed Electrical Equipment for Use at SRS, January 6, 2005

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A.1.8.8	WSRC-IM-95-58, Guide 01703-G, Rev: 4, Design Guidance For Instrumented Systems That Are Used in Safety Significant And Hazardous Processes, August 21, 2007 **HOLD** - Impact of hardware fault tolerance invoked in this guide to be looked at
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A.1.8.10	WSRC-IM-95-58, Guide 16600-G, Application of IEEE 384-1992 for SRS Non-Reactor Facilities, Safety Systems, January 6, 2005
A.1.8.11	WSRC-IM-95-58, Guide 16601-G, Application of IEEE 308-2001 for SRS Non-Reactor Facilities, Safety Systems, January 6, 2005
A.1.8.12	WSRC-IM-95-58, Guide 16051-G, Installation of Electrical Raceway Systems and Cable Trays, October 31, 2007
A.1.8.13	WSRC-IM-95-58, Guide 16052-G, Installation of Electrical Wires, Cables and Terminations, August 15, 2005
A.1.8.14	WSRC-IM-95-58, Guide 16053-G, Installation of Electrical Equipment, February 12, 2004
A.1.8.15	WSRC-IM-95-58, Guide 16054-G, Installation of Electrical Heat Tracing and Freeze Protection, October 31, 2007
A.1.8.16	WSRC-IM-95-58, Guide 16055-G, Installation of Lighting and Communications Systems, October 31, 2007
A.1.8.17	WSRC-IM-95-58, Guide 16056-G, Installation of Grounding Systems, October 31, 2007
A.1.8.18	WSRC-IM-95-58, Guide 16057-G, Installation of Cathodic Protection Systems, September 21, 2004
A.1.8.19	WSRC-IM-95-58, Guide 16256-G, Diesel Generator Systems, November 5, 2003
A.1.9 SRS Manuals	
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A.1.9.2	SRS-5Q, Radiological Control, January 2010

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A.1.9.6	SRS-8Q, Employee Safety Manual, October 30, 2008
A.1.9.7	SRS-4Q, Industrial Hygiene Manual, October 28, 2008
A.1.9.8	SRS-3Q, Environmental Compliance Manual, October 27, 2008
A.1.9.9	SRS-19Q, Transportation Safety Manual, February 15, 2007
A.1.9.10	SRS-7Q, Security Manual, August 28, 2008
A.1.9.11	SRS-14Q, Material Control and Accountability Manual, June 25, 2008
A.1.9.12	SRS-2Q, Fire Protection Manual, August 1, 2008
A.1.9.13	SRS-E7, Rev: 55, Conduct of Engineering Manual, April 28, 2008
A.1.9.14	SRS-10Q, Computer Security Manual, September 8, 2008
A.1.9.15	SRS-1Q, Quality Assurance Manual, September 25, 2008
A.1.9.16	SRS-11Q, Facility Safety Document Manual, January 25, 2010
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A.1.9.18	SCD-7, SRS Emergency Plan, May 13, 2010
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Reference No.	**Reference Identification**
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A.2.2	WSRC-RP-89-313, A Climatological Description of the Savannah River Site, 1989
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None	
A.4 Calculations	
None	
A.5 Vendor Documents	
None	
A.6 Correspondence	
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A.6.2	NNSA memorandum, “The Use of Teflon Components in NNSA Nuclear Facilities”, May 20, 2004
A.6.3	NNSA memorandum, “Transportation Package for Highly Enriched Uranium Oxide”, November 29, 2003
A.6.4	SRNS-E1300-2010-00005, “PDC Red/Black and Classification of Process Modules (U)”, March 24, 2010.
A.6.5	NNSA CTA memorandum, “Guidance and Expectations for DOE-STD-1189-2008, *Integration of Safety into the Design Process*, Natural Phenomena Hazard Design Basis Criteria for Chemical Hazard Safety Structures, Systems, and Components”, July 9, 2009
A.6.6	NNSA CTA Memorandum, “Interim Guidance for the Design and Operation of Wet Pipe Sprinkler Systems and Supporting Water Supplies”, March 10, 2010

Reference No.	Reference Identification
A6.7	DOE-SR Letter OSQA-09-0107, "Implementation of DOE-STD-1189, *Integration of Safety into the Design Process*, for Environmental Activities" May 5, 2009
A.7 Other References	
A.7.1	G-PP-K-00001, Rev: 0, Program Requirements Document, Pit Disassembly and Conversion Project at the Savannah River Site, May 2010.
A.7.2	G-ESR-K-00011, Rev: 1, Interface Control Document - ICD-07-025-01 - Alternate Feedstock (AFS) Plutonium Oxide Transfers from The K-Area Complex (KAC) to MFFF (U), May 11, 2010 **HOLD** – ICD to be revised
A.7.3	G-PP-F-00002, Classified Addendum to the Program Requirements Document
A.7.4	SRNS-RP-2008-00086, SRNS Standard / Requirements Identification Document
A.7.5	WSRC-SA-2002-00005, K-Area Complex Documented Safety Analysis, Rev. 3 CN2, October 2009
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A.7.7	G-FDD-K-00003, Rev. 0, Facility Design Description for Plutonium Preparation Facility, February 26, 2009
A.7.8	G-ESR-F-0060, Rev. 1, Interface Control Document - ICD-02-001-01 – Plutonium Dioxide Powder Interface Control Document, May 9, 2008 **HOLD** – ICD to be revised
A.7.9	G-ESR-F-00047, Rev. 0, Interface Control Document – ICD-04-021-01 – Interface Between the HEU Disposition Program and PDCF Project for Disposition of Highly Enriched Uranium, November 2004
A.7.10	ICD-08-029-01 - Facility Byproducts **HOLD** – ICD to be written
A.7.11	WSRC-TR-2001-00525, Classified Addendum to the PDCF FDD

Reference No.	Reference Identification
A.7.12	IAEA Design Information Questionnaire, K/NSP-185, Rev. 7, October 2007 **HOLD** - to be revised
A.7.13	MC&A Implementation Plan (MIP), OBU-NMM-03-00010, Rev. 3, January 2009 **HOLD** - to be revised
A.8 Permit Documents	
None	
A.9 System Design Descriptions	
None	

Appendix B - List of Acronyms

This section presents an alphabetical listing of all acronyms and abbreviations used in this document.

Acronym / Abbreviation	
AAMA	American Architectural Manufacturers Association
AC	Alternating Current
ACGIH	American Conference of Governmental Industrial Hygienists
ACI	American Concrete Institute
ACVS	Active Confinement Ventilation System
AFS	Alternate Feed Stock
AGS	American Glovebox Society
AHJ	Authority Having Jurisdiction
AISC	American Institute of Steel Construction
ALARA	As-Low-As-Reasonably-Achievable
AMS	Accountability Measurement System
ANS	American Nuclear Society
ANSI	American National Standards Institute
API	American Petroleum Institute
ARI	American Air Conditioning and Refrigeration Institute
ARM	Area Radiation Monitor
ASCE	American Society of Civil Engineers
ASHRAE	American Society of Heating, Refrigeration and Air Conditioning Engineers
ASME	American Society for Mechanical Engineers
ASTM	American Society for Testing and Materials
AWS	American Welding Society
AWWA	American Water Works Association
BA	Breathing Air
BNFL	British Nuclear Fuels Limited
BOP	Balance of Plant
Btu/hr	British Thermal Units per Hour
CAM	Continuous Air Monitor
cc	Cubic Centimeter
CCR	Central Control Room
CDIN	Classified Distributive Information Network
CFR	Code of Federal Regulations
CGS	Compressed Gas Storage and Distribution System
CHAP	Consolidated Hazards Analysis Process
CHW	Chilled Water System
CIMS	Classified Information Management System
cm	Centimeter
CMAA	Crane Manufacturers Association of America
CN	Change Notice
CNMMS	Comprehensive Nuclear Materials Management System
CPD	Can Puncture Device
CSDR	Conceptual Safety Design Report

Acronym / Abbreviation	
D3	Diversity and Defense in Depth
DAC	Derived Air Concentration
dB	Decibel
DCS	Distributed Control System
DMO	Direct Metal Oxidation
DOE	Department of Energy
DSA	Documented Safety Analysis
DW	Domestic Water
EA	Electrical Power and Distribution System
ECF	Entry Control Facility
EIA	Electronic Industries Alliance
EM	Environmental Management
EMG	Emergency Management Guide
ETP	Effluent Treatment Project
FA	Functional Area
FC	Functional Classification
FDD	Facility Design Description
FGE	Fissile Grams Equivalent
FM	Factory Mutual
GANA	Glass Association of North America
gm	Gram
GS	General Services
HC	Hazard Category
HDBK	Handbook
HDPO	HEU Disposition Program Office
HEPA	High Efficiency Particulate Air
HEU	Highly Enriched Uranium
HLW	High Level Waste
HM	Health and Safety Monitoring System
HMI	Human-Machine Interface
HQ	Headquarters
hr	Hour
HVAC	Heating, Ventilation, and Air Conditioning System
HW	Hazardous Waste
I/O	Input / Output
IA	Instrument Air
IBC	International Building Code
ICD	Interface Control Document
ICEA	Insulated Cable Engineering Association
ICW	Inner Can Welder
ID	Inside Diameter
IEEE	Institute of Electrical and Electronics Engineers
IESNA	Illuminating Engineering Society of North America
in	Inches
IPC	International Plumbing Code
ISA	Instrument Society of America
ISM	Interim Storage Module

Acronym / Abbreviation	
IT	Information Technology
ITSDF	Industrial Truck Standards Development Foundation
KAC	K-Area Complex
KAMS	K-Area Material Storage
KIS	K-Area Interim Surveillance
kg	kilograms
LANL	Los Alamos National Laboratory
lb	pound
LCO	Limited Condition for Operation
LLNL	Lawrence Livermore National Laboratory
LLW	Low Level Waste
LS	Limit State
LW	Liquid Waste
LWO	Liquid Waste Operations
M&O	Maintenance and Operations
MAA	Material Access Area
max	maximum
MBMA	Metal Building Manufacturers Association
MC&A	Material Control and Accountability
MFFF	Mixed Oxide Fuel Fabrication Facility
min	Minute or minimum
mm	Millimeter
MPFL	Maximum Possible Fire Loss
mR	Milli-roentgen
mrem	Millirem
MS	Material Storage
MSS	Manufacturers Standardization Society
MT	Metric Tons
NCSE	Nuclear Criticality Safety Evaluation
NDA	Non-destructive Analysis
NEMA	National Electrical Manufacturers Association
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
NIM	Nuclear Incident Monitor
NMD	Number Mean Diameter or Nuclear Materials Disposition
NMM	Nuclear Materials Management
NNMMS	National Nuclear Material Management System
NNSA	National Nuclear Security Agency
NPDES	National Pollutant Discharge Elimination System
NPH	Natural Phenomena Hazard
NRCA	National Roofing Contractors Association
OCW	Outer Can Welder
OD	Outside Diameter
OSHA	Occupational Health and Safety Administration
OST	Office of Secure Transportation
oz	ounce
PA	Protected Area or Public Address

Acronym / Abbreviation	
PAV	Purification Area Vault
PC	Performance Category
PCV	Primary Containment Vessel
PDC	Pit Disassembly and Conversion
PFHA	Project Fire Hazards Analysis
PIDAS	Perimeter Intrusion Detection and Assessment System
PLC	Process Logic Controller
PS	Production Support
psig	Pounds per Square Inch Gauge
PTFE	Polytetrafluoroethylene
PTSO	Protected Transmission Security Officer
Pu	Plutonium
PuP	Plutonium Preparation
QA	Quality Assurance
RAMI	Reliability, Availability, Maintainability, and Inspectability
RCO	Radiological Control Operations
rem	Roentgen Equivalent Man
RF	Radio Frequency
RFETS	Rocky Flats Environmental Technology Site
RFTID	Radio Frequency Tamper Indicating Device
RME	Radiation Monitoring Equipment
S&P	Stabilization and Packaging
S&S	Safeguards and Security
S/RID	Standards & Requirements Identification Document
SAB	Structures and Buildings System
SANS	Sanitary Sewer System
SAS	Secondary Alarm Station
SBCCI	Southern Building Code Congress International
SC	Safety Class
SCDHEC	South Carolina Department of Health and Environmental Control
SCE&G	South Carolina Electric & Gas Company
scfm	Standard Cubic Feet per Minute
SCV	Secondary Containment Vessel
SDC	Structural Design Category
SDD	System Design Description
SDI	Steel Door Institute
SecDIT	Security Design Integration Team
SFAS	Site Fire Alarm System
SGT	Safeguards Transporter
SI	Sealed Insert
SMACNA	Sheet Metal and Air Conditioning Contractors' National Association
SNM	Special Nuclear Material
SRI	Safeguards and Security Requirements Identification Document
SRNL	Savannah River National Laboratory
SRNS	Savannah River Nuclear Solutions
SRS	Savannah River Site
SRSNET	Savannah River Site Network

Acronym / Abbreviation	
SRSOC	Savannah River Site Operations Center
SS	Safety Significant
SSC	Structures, Systems, and Components
SSMR	Safeguards and Security Management Report
SSSP	Site Safeguards and Security Plan
SST	Safe Secure Trailer
SWB	Standard Waste Box
SWM	Solid Waste Management
TAM	Tritium Air Monitor
TBD	To Be Determined
TCA	Tile Council of America
TEFC	Totally Enclosed Fan-Cooled
TEMA	Tubular Exchanger Manufacturers Association
TIA	Telecommunications Industry Association
TRU	Transuranic
TSR	Technical Safety Requirement
U	Uranium or Unclassified
U.G.	Underground
UL	Underwriter's Laboratory
UPS	Uninterruptible Power Supply
VAR	Vulnerability Assessment Report
VFD	Variable Frequency Drive
w/	with
w/o	without
WAC	Waste Acceptance Criteria
WAN	Wide Area Network
WAT	Water Systems
WM	Waste Management System
WSB	Waste Solidification Building
WSI	Wackenhut Services Incorporated
WSRC	Washington Savannah River Company

Appendix C – Interrelationship of Functions

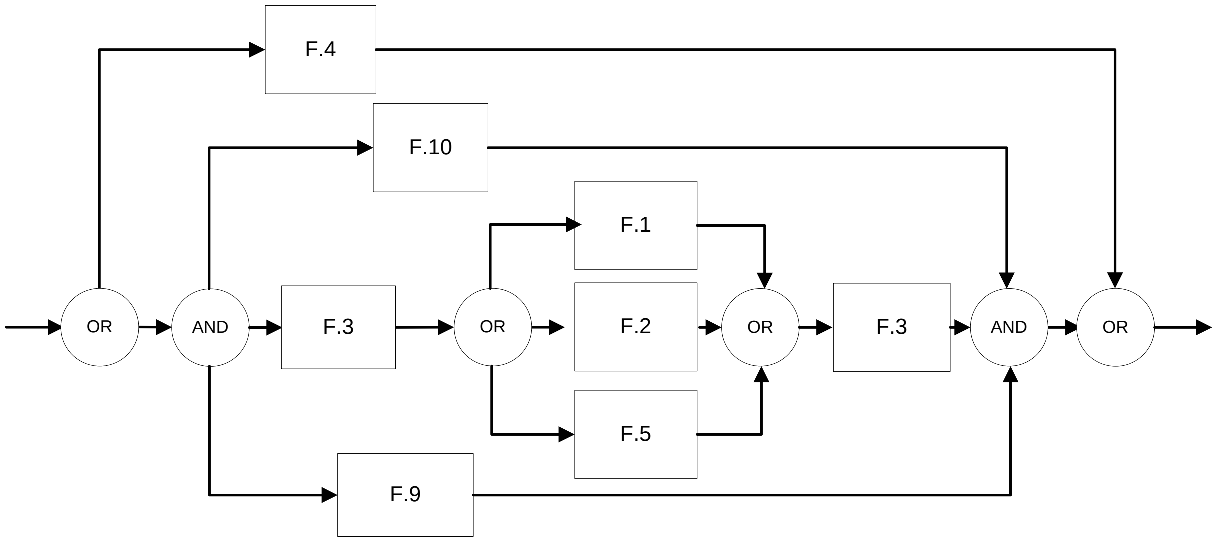

Figure C.1 Functional Flow Block Diagram of Level 1 Functions

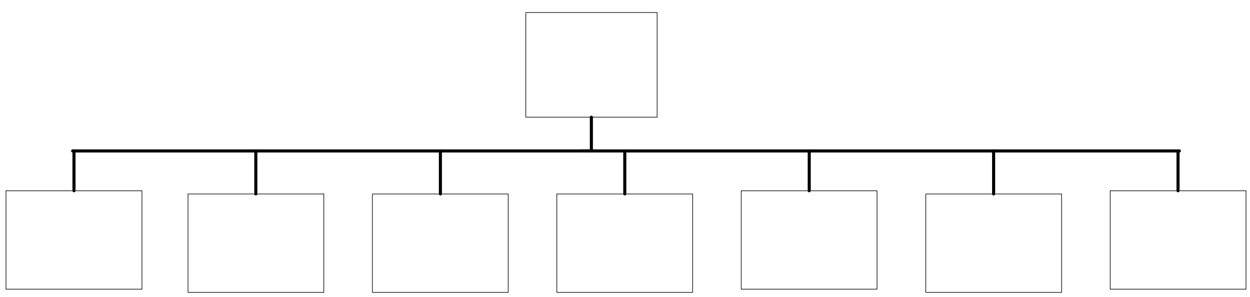

Figure C.2 Functional Hierarchy Diagram of Level 1 Functions

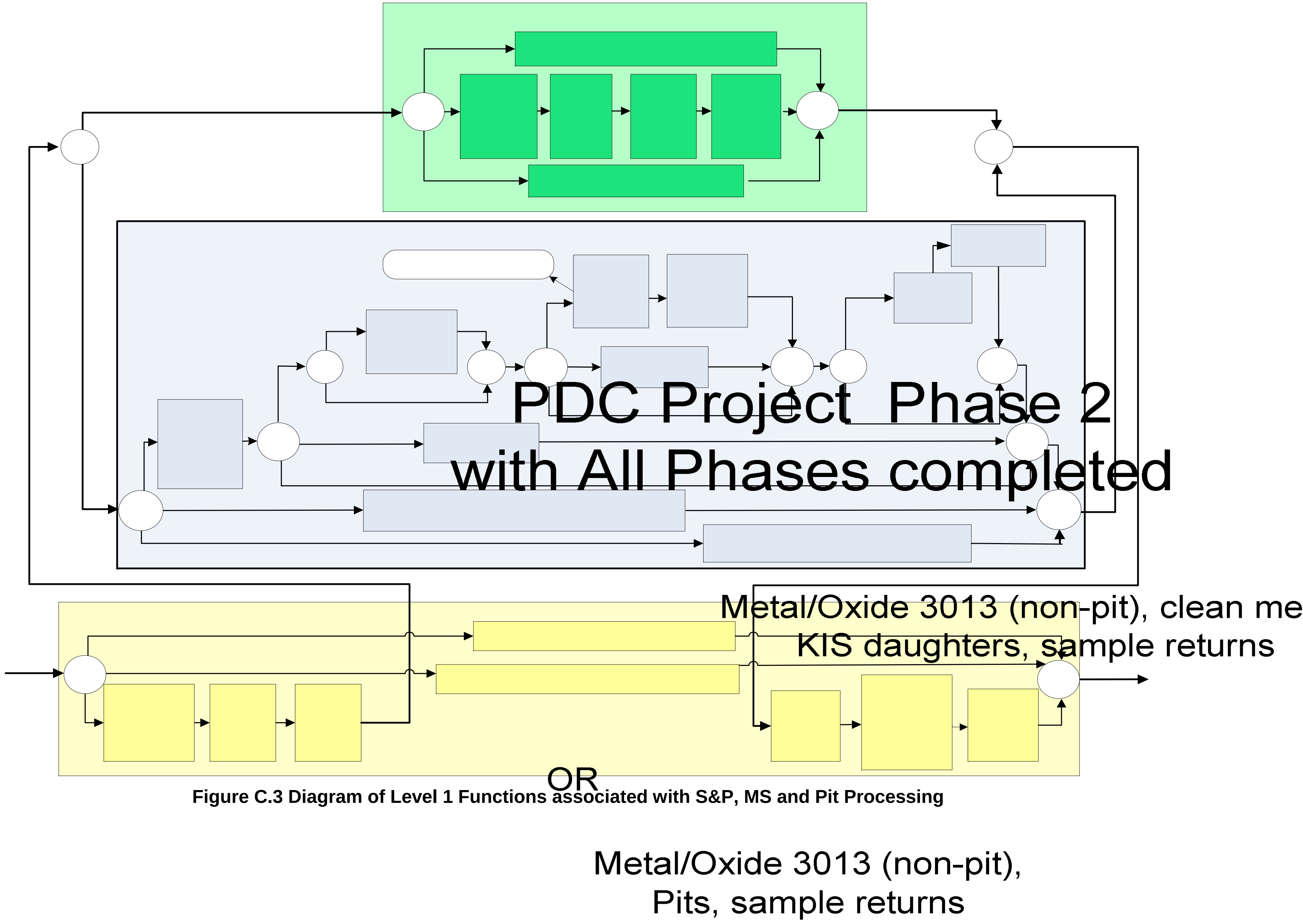

Figure C.3 Diagram of Level 1 Functions associated with S&P, MS and Pit Processing

Appendix D – Definitions

Appendix to be developed.